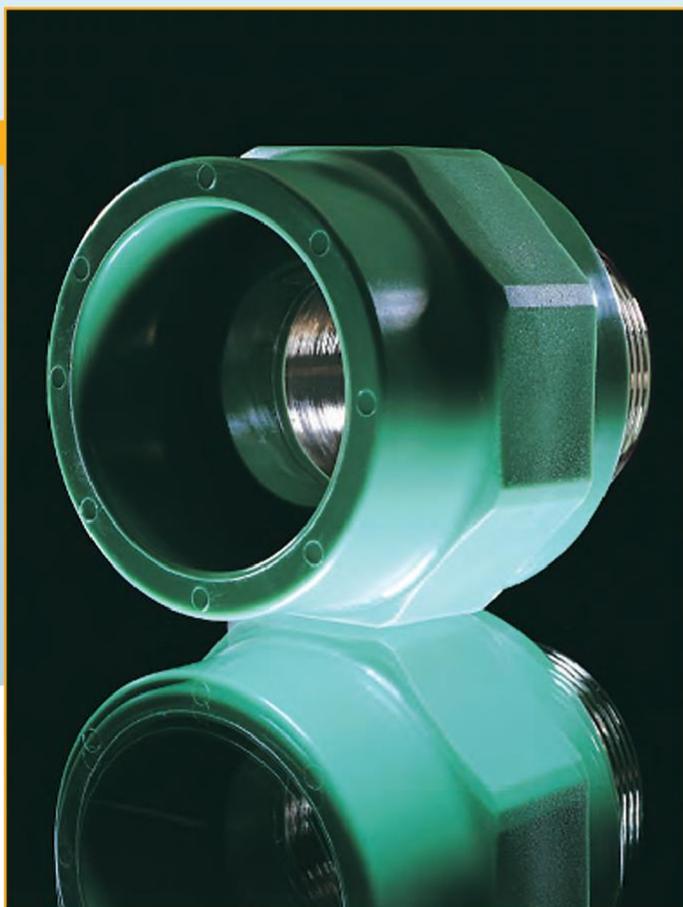


PP-R / PP-RCT

Полипропиленовые трубы
и фитинги Banninger
для водоснабжения и отопления.
Каталог моделей и размеров.
Инструкция по проектированию и
монтажу.



PP-R

www.baenninger.de



Checked Quality

Numerous national and international certificates and seals of approval have been awarded to us for the manufacture and distribution of our products. The application of our Quality Management System is checked in regular audits, e. g. by Deutsche Gesellschaft zur Zertifizierung von Managementsystemen (DQS German Association for the Certification of Management Systems), member of the International Certification Network (IQNet), amongst other things. We would be pleased to answer your questions regarding our specific national approvals in a personal meeting.



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Modellübersicht • Summary of Models
 Sommaire de modèles • Sumario de los modelos • Обзор моделей



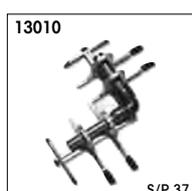
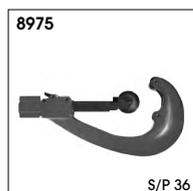
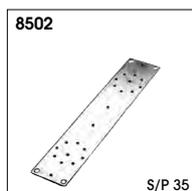
Fittings aus PP-RCT = Art.-Nr. + B	z. B.	G 8002a B
PP-RCT Fittings = Indicate number + B	e. g.	G 8002a B
Raccords PP-RCT = Réf. no. + B	p. ex.	G 8002a B
Accesorios en PP-RCT = Art. n° + B	p. ej.	G 8002a B
Фитинги из PP-RCT = Артикул № + B	напр.	G 8002a B

Modellübersicht • Summary of Models

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<p>G 8090g PP-R G 8090gB PP-RCT</p> <p>S/P 18</p>	<p>G 8091g PP-R G 8091gB PP-RCT</p> <p>S/P 18</p>	<p>G 8092g PP-R G 8092gB PP-RCT</p> <p>S/P 18</p>	<p>G 8244g PP-R G 8244Bg PP-RCT G 8245g PP-R G 8245gB PP-RCT</p> <p>S/P 20</p>	<p>G 8093g PP-R G 8093Bg PP-RCT G 8095g PP-R G 8095gB PP-RCT</p> <p>S/P 20</p>	<p>G 8130g PP-R G 8130gB PP-RCT</p> <p>S/P 18</p>
<p>G 8133g PP-R G 8133gB PP-RCT</p> <p>S/P 19</p>	<p>G 8243g PP-R G 8243gB PP-RCT</p> <p>S/P 19</p>	<p>G 8270g PP-R G 8270gB PP-RCT</p> <p>S/P 19</p>	<p>G 8330 PP-R G 8330B PP-RCT</p> <p>S/P 21</p>	<p>G 8330A PP-R G 8330AB PP-RCT</p> <p>S/P 22</p>	<p>G 8332 PP-R G 8332B PP-RCT</p> <p>S/P 22</p>
<p>G 8333 PP-R G 8333B PP-RCT</p> <p>S/P 22</p>	<p>G 8332g PP-R G 8332gB PP-RCT</p> <p>S/P 23</p>	<p>G 8333g PP-R G 8333gB PP-RCT</p> <p>S/P 23</p>	<p>8490f</p> <p>S/P 24</p>	<p>G 8542g PP-R G 8542gB PP-RCT</p> <p>S/P 24</p>	<p>G 8547g PP-R G 8547gB PP-RCT</p> <p>S/P 24</p>
<p>G 8130s PP-R G 8130sB PP-RCT</p> <p>S/P 25</p>	<p>G 8243s PP-R G 8243sB PP-RCT</p> <p>S/P 26</p>	<p>G 8270s PP-R G 8270sB PP-RCT</p> <p>S/P 27</p>	<p>G 8472g PP-R G 8472gB PP-RCT</p> <p>S/P 20</p>	<p>G 8473g PP-R G 8473gB PP-RCT</p> <p>S/P 20</p>	<p>G 8490g PP-R G 8490gB PP-RCT</p> <p>S/P 21</p>
<p>G 8492g PP-R G 8492gB PP-RCT</p> <p>S/P 21</p>	<p>G 8494g PP-R G 8494gB PP-RCT</p> <p>S/P 21</p>	<p>G 8599a PP-R G 8599aB PP-RCT</p> <p>S/P 31</p>	<p>G 8599b PP-R G 8599bB PP-RCT</p> <p>S/P 32</p>	<p>G 8599c PP-R G 8599cB PP-RCT</p> <p>S/P 32</p>	<p>G 8599d PP-R G 8599dB PP-RCT</p> <p>S/P 32</p>
<p>8599v</p> <p>S/P 33</p>	<p>8670</p> <p>S/P 33</p>	<p>8670A</p> <p>S/P 33</p>	<p>83600</p> <p>S/P 33</p>	<p>G 8600 PP-R G 8600B PP-RCT G 8600/1 PP-R G 8600/1B PP-RCT</p> <p>S/P 28</p>	<p>G 8650 PP-R G 8650B PP-RCT</p> <p>S/P 28</p>
<p>G 8655 PP-R G 8655B PP-RCT G 8655/1 PP-R G 8655/1B PP-RCT</p> <p>S/P 28/29</p>	<p>G 8700 PP-R G 8700B PP-RCT G 8700/1 PP-R G 8700/1B PP-RCT</p> <p>S/P 29</p>	<p>G 8800 PP-R G 8800B PP-RCT</p> <p>S/P 29</p>	<p>G 8800 PP-R G 8800B PP-RCT</p> <p>S/P 30</p>	<p>G 8850 PP-R G 8850B PP-RCT</p> <p>S/P 30</p>	<p>G 8852</p> <p>S/P 30</p>
<p>G 8060 PP-R G 8060B PP-RCT</p> <p>S/P 30</p>	<p>G 8860 PP-R G 8860B PP-RCT</p> <p>S/P 31</p>	<p>8910</p> <p>S/P 31</p>			

Modellübersicht • Summary of Models
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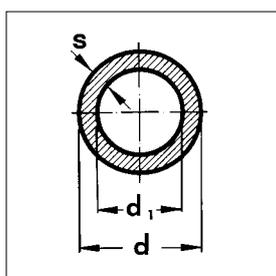
Druckrohre aus PP-R und PP-RCT • PP-R and PP-RCT Pressure Pipes

Tubes pression en PP-R/PP-RCT • Tubería sanitaria • Напорные трубы из PP-R/PP-RCT

PP-RCT Druckrohr 20°C/1,6 MPa • 60°C/0,8 MPa
Anwendungsbereiche: Trinkwasser und Sanitärinstallation

Pressure pipe
Application: Potable Water and Industrial Installation

Tube pression
 Tubería sanitaria • Напорная труба



d	DN	s	d ₁	kg/m	Stp./m
20	15	2,3	15,4	0,139	100
25	20	2,8	19,4	0,203	100
32	25	2,9	26,2	0,284	60
40	32	3,7	32,6	0,420	40
50	40	4,6	40,8	0,640	20
63	50	5,8	51,4	1,395	20
75	-	6,8	61,4	1,440	8
90	65	8,2	73,6	2,030	8
110	80	10,0	90,0	3,080	8
125	100	11,4	102,2	3,910	8
160	125	14,6	130,8	6,330	8
200	160	18,2	163,6	9,950	8
250	200	22,7	204,6	15,289	8
315	250	28,6	257,8	24,600	8
355	-	32,2	290,6		8
400	-	36,3	327,4		8

Lieferform: 4 m Stangen Rods in 4 meters

Verbindungsart Empfehlung ab ø 160 mm

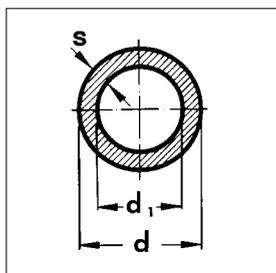
Heizwendel-Muffenschweißen und Heizelement-Stumpfschweißen

From ø 160 mm on joining by socket welding and butt welding with heating elements recommended.

PP-RCT Druckrohr 20°C/2,0 MPa • 70°C/1,0 MPa
Anwendungsbereiche: Trinkwasser und Sanitärinstallation

Pressure pipe
Application: Potable Water and Industrial Installation

Tube pression
 Tubería sanitaria • Напорная труба



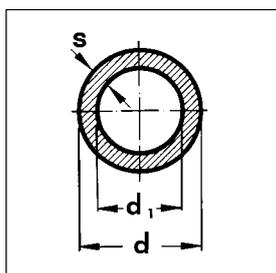
d	DN	d ₁	s	kg/m	Stp./m
20	15	14,4	2,8	0,141	100
25	20	18,0	3,5	0,238	100
32	25	23,2	4,4	0,369	60
40	32	29,0	5,5	0,587	40
50	40	36,2	6,9	0,900	20
63	50	45,8	8,6	1,377	20
75	-	54,4	10,3	1,961	8
90	65	65,4	12,3	2,938	8
110	80	79,8	15,1	4,355	8
125	90	90,8	17,1	5,555	8

Lieferform: 4 m Stangen Rods in 4 meters

PP-R Druckrohr 20°C/2,0 MPa • 70°C/1,0 MPa
Anwendungsbereiche: Trinkwasser und Sanitärinstallation

Pressure pipe
Application: Potable Water and Industrial Installation

Tube pression
 Tubería sanitaria para agua fría y caliente
 Напорная труба



d	DN	d ₁	s	kg/m	Stp./m
16	10	10,6	2,7	0,110	100
20	12	13,2	3,4	0,180	100
25	15	16,6	4,2	0,280	100
32	20	21,2	5,4	0,460	60
40	25	26,6	6,7	0,680	40
50	32	33,2	8,3	1,090	20
63	40	42,0	10,5	1,400	20
75	50	50,0	12,5	2,500	8
90	-	60,0	15,0	3,300	8
110	65	73,2	18,4	5,000	8
125	80	83,2	20,8	6,500	8

Lieferform: 4 m Stangen Rods in 4 meters

PP-RCT Faser-Verbundrohr Watertec

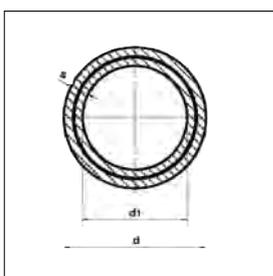
Anwendungsbereiche: Trinkwasser und Sanitärinstallation mit 4 Streifen; Farbe: Verkehrsgrau RAL 7042

Fibre pipe

Application: Potable Water and Industrial Installation

Tube Fibre • Tubería Faser

Труба армированная волокном



Patent angemeldet • Patent Pending

d	DN	d ₁	s	kg/m	Stp./m
20°C / 2,0 MPa • 70°C/1,0 MPa					
20	15	14,4	2,8	0,151	100
25	20	18,0	3,5	0,232	100
32	25	24,8	3,6	0,330	60
40	32	31,0	4,5	0,513	40
50	40	38,8	5,6	0,746	20
63	50	48,8	7,1	1,190	20
75	–	58,2	8,4	1,700	8
90	65	69,8	10,1	2,400	8
110	80	85,4	12,3	3,400	8
125	100	97,0	14,0	4,480	8
20°C / 1,6 MPa • 70°C / 0,8 MPa					
160	125	130,8	14,6	6,755	8
200	160	163,6	18,2	10,640	4
250	200	204,6	22,7	16,250	4

Lieferform: 4 m Stangen Rods in 4 meters
 Verbindungsart Empfehlung ab ø 160 mm Heizwendel-Muffenschweißen
 From ø 160 mm on socket welding with heating elements recommended

PP-RCT Stabi-Verbundrohr

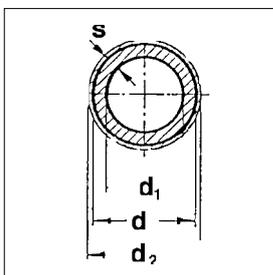
20°C/2,0 MPa • 70°C/1,0 MPa

Anwendungsbereiche: Trinkwasser und Sanitärinstallation Stabi-pipe

Application: Potable Water and Industrial Installation

Tube-Stabi • Tubería sanitaria con aluminio

Армированная труба Штаби



d	DN	d ₁	d ₂	s	kg/m	Stp./m
* 16	12	11,6	17,6	2,2	0,158	100
20	15	14,4	21,6	2,8	0,218	100
25	20	19,4	26,6	2,8	0,294	100
32	25	24,8	33,7	3,6	0,454	60
40	32	31,0	42,0	4,5	0,644	40
50	40	38,8	52,0	5,6	0,935	20
63	50	48,8	65,0	7,1	1,465	20
75	–	58,2	76,8	8,4	1,929	8
90	65	69,8	91,8	10,1	3,011	8
110	80	85,4	112,7	12,3	4,288	8
125	100	97,0	128,0	14,0	5,280	8

Lieferform: 4 m Stangen Rods in 4 meters
 * G 8215 Stabi-Verbundrohr PP-R/AL/PP-R
 Stabi-Verbundrohre sind PP-RCT Rohre mit Alu-Ummantelung.
 Stabi pipes are PP-RCT pipes coated with Aluminum

PP-RCT Faser-Verbundrohr Climatic

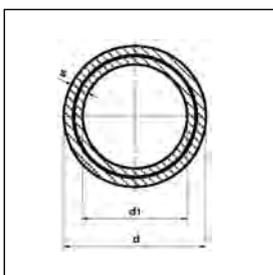
Anwendungsbereiche: Klimaanlage, Industrieanlagen, Trinkwasser und Sanitärinstallation, mit 4 Streifen; Farbe: Kieselgrau RAL 7032, 1 Streifen in Rotbraun

Fibre pipe

Application: Air conditioning, Industrial plants, potable water and sanitary installation, with four stripes.

Colour: Grey RAL 7032, 1 stripe red-brown

Tube Fibre • Tubería inst. con aire acondicionado/industriales • Напорная труба



Patent angemeldet • Patent Pending

d	DN	d ₁	s	kg/m	Stp./m
20°C / 1,6 MPa • 70°C/0,8 MPa					
20	15	14,4	2,8	0,151	100
25	20	18,0	3,5	0,232	100
32	25	24,8	3,6	0,293	60
40	32	32,6	3,7	0,439	40
50	40	40,8	4,6	0,678	20
63	50	51,4	5,8	0,996	20
75	–	61,4	6,8	1,419	8
90	65	73,6	8,2	2,039	8
110	80	90,0	10,0	3,031	8
125	100	102,2	11,4	3,350	8
20°C / 1,0 MPa • 70°C / 0,5 MPa					
160	150	141,0	9,5	4,635	8
200	180	176,2	11,9	7,321	
250	220	220,4	14,8	15,300	

Lieferform: 4 m Stangen Rods in 4 meters
 Verbindungsart Empfehlung ab ø 160 mm Heizwendel-Muffenschweißen
 From ø 160 mm on socket welding with heating elements recommended

Fittings aus PP-R/PP-RCT

PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • ФИТИНГИ ИЗ PP-R/PP-RCT

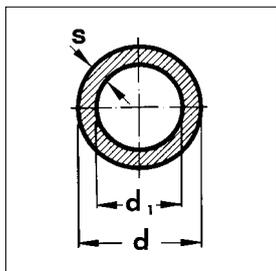
PP-R – Ringrohr 20°C/1,5 MPa • 60°C/0,8 MPa

Anwendungsbereiche: Trinkwasser und Sanitärinstallation • Fußbodenheizung

PP-R – Pipe in coils

Application: Potable water and sanitary installation • floor heating systems

Tube en cycle • Tubo en rollos • Труба в бухтах

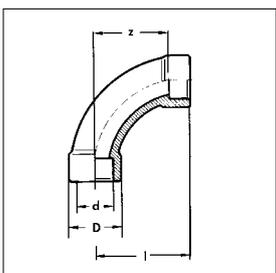


d	DN	d ₁	s	kg/m	Stp./m
20	15	16	2,0	0,107	100
25	20	20,4	2,3	0,164	100

PP-R/PP-RCT – Bogen 90° mit beidseitiger Schweißmuffe

PP-R/PP-RCT – Bend 90° with welding socket at both ends

Courbe à 90° • Curva 90° • Колено 90°

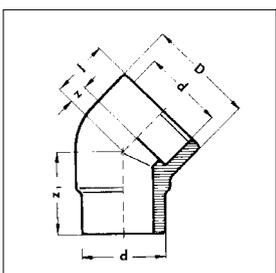


d	D	l	z	Stp.
16	23	36	33	10
20	28	56	42	5
25	34	69	53	5
32	42	86	68	2
40	52	106	86	2

PP-R/PP-RCT – Winkel 45° I - A mit Schweißmuffe und Schweißstutzen

PP-R/PP-RCT – Elbow 45° with welding socket and welding stub

Coude à 45° • Codo 45° macho/hembra soldable • Уголок 45°

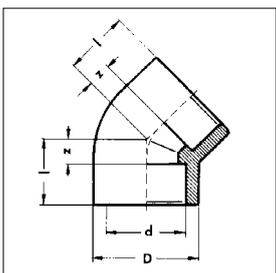


d	D	l	z	z ₁	Stp.
20	29	20	5	28	5
25	34	22	6	34	5
32	43	26	8	39	5

PP-R/PP-RCT – Winkel 45° mit beidseitiger Schweißmuffe

PP-R/PP-RCT – Elbow 45° with welding socket at both ends

Coude à 45° • Codo 45° soldable • Уголок 45°



d	D	l	z	Stp.
16	23	19	6	10
20	29	21	6	10
25	34	24	8	10
32	43	28	10	10
40	52	32	11	5
50	65	37	13	5
63	82	44	16	2
75	99	50	20	2
90	120	58	25	1
110	148	69	32	1
125	165	77	37	1

160 siehe Seite / see page 15 / regardez page 15



Fittings aus PP-R/PP-RCT

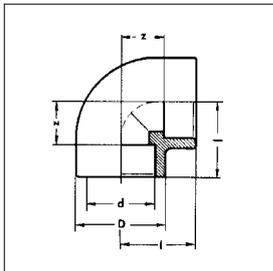
PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • ФИТИНГИ ИЗ PP-R/PP-RCT

PP-R/PP-RCT – Winkel 90° mit beidseitiger Schweißmuffe

PP-R/PP-RCT – Elbow 90° with welding socket at both ends

Coude à 90° • Codo 90° F soldable • Уголок 90°

G 8090 PP-R
G 8090B PP-RCT



d	D	l	z	Stp.
16	26	24	11	10
20	29	28	13	10
25	34	32	16	10
32	43	38	20	10
40	52	44	23	10
50	65	52	28	10
63	84	62	34	2
75	101	71	41	2
90	120	83	50	1
110	148	99	62	1
125	165	124	84	1

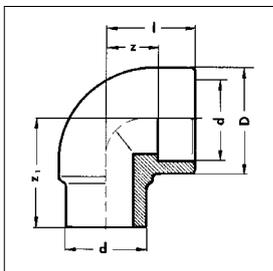
from d 160 on see page 15 / regardez page 15

PP-R/PP-RCT – Winkel 90° I - A mit Schweißmuffe und Schweißstutzen

PP-R/PP-RCT – Elbow 90° I - A with welding socket and welding stub

Coude à 90°
Codo 90° macho/hembra soldable
Уголок 90° (внутр./наружн.)

G 8092 PP-R
G 8092B PP-RCT



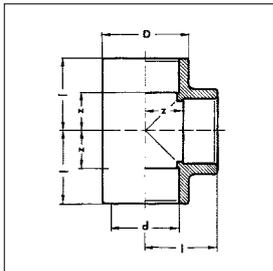
d	D	l	z	z ₁	Stp.
16	24	22	9	25	10
20	29	27	12	36	10
25	34	30	14	41	10
32	43	36	18	48	10
40	52	42	21	55	10

PP-R/PP-RCT – T - Stück 90° mit allseitiger Schweißmuffe

PP-R/PP-RCT – Tee 90° with welding socket at all ends

Té à 90° • Te 90° soldable
Тройник 90°

G 8130 PP-R
G 8130B PP-RCT



d	D	l	z	Stp.
16	23	24	11	10
20	29	28	13	10
25	34	32	16	10
32	43	38	20	10
40	52	44	23	10
50	65	52	28	10
63	84	62	34	2
75	100	71	41	2
90	120	83	50	2
110	148	99	62	2
125	165	124	84	1

from d 160 on see page 15 / regardez page 15

Fittings aus PP-R/PP-RCT

PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • ФИТИНГИ ИЗ PP-R/PP-RCT

**PP-R/PP-RCT – T - Stück 90° red.
mit allseitiger Schweißmuffe**

**PP-R/PP-RCT – Tee 90° red.
with welding socket at all ends**

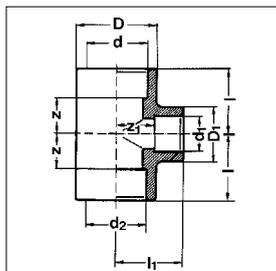
Té à 90°

Te 90° reducida soldable

Тройник 90° ред.



G 8130 red. PP-R
G 8130red.B PP-RCT



d - d ₁ - d ₂	D	D ₁	l	l ₁	z	z ₁	Stp.
20 - 16 - 20	29	29	28	28	13	15	10
20 - 25 - 20	34	34	32	32	18	16	10
25 - 16 - 25	34	29	32	32	16	19	10
25 - 20 - 20	34	34	32	32	16	18	10
25 - 20 - 25	34	29	32	32	16	17	10
25 - 25 - 20	34	34	32	32	16	16	10
32 - 20 - 20	43	34	37	38	18	22	10
32 - 20 - 25	43	34	37	38	18	23	10
32 - 20 - 32	43	29	38	36	20	21	10
32 - 25 - 20	43	34	37	38	18	22	10
32 - 25 - 25	43	34	37	38	18	22	10
32 - 25 - 32	43	34	38	36	20	20	10
40 - 20 - 40	52	43	44	39	24	24	5
40 - 25 - 40	52	43	44	40	23	24	5
40 - 32 - 32	52	43	43	44	21	24	5
40 - 32 - 40	52	43	44	40	23	22	5
50 - 20 - 50	65	43	52	46	28	31	10
50 - 25 - 50	65	43	52	46	28	30	10
50 - 32 - 50	65	43	52	46	28	28	10
50 - 40 - 50	85	85	62	62	39	35	10
63 - 20 - 63	85	43	62	62	35	48	2
63 - 25 - 63	85	43	62	62	35	46	2
63 - 32 - 63	85	43	62	62	35	44	2
63 - 40 - 50	85	85	62	62	39	35	2
63 - 40 - 63	85	85	62	62	35	42	2
63 - 50 - 63	85	85	62	62	35	39	2
75 - 20 - 75	100	43	71	71	41	57	2
75 - 25 - 75	100	43	71	71	41	55	2
75 - 32 - 75	100	43	71	71	41	53	2
75 - 40 - 75	100	65	71	71	41	51	2
75 - 50 - 75	100	65	71	71	41	48	2
75 - 63 - 75	100	101	71	71	41	44	2
90 - 63 - 90	120	85	83	83	50	55	2
90 - 75 - 90	120	100	83	83	50	53	2
110 - 63 - 110	148	85	99	99	62	71	2
110 - 75 - 110	148	100	99	99	62	69	2
110 - 90 - 110	148	120	99	99	62	66	2
125 - 75 - 125	165	100	124	104	84	74	2
125 - 90 - 125	165	120	124	106	84	73	2
125 - 110 - 125	165	148	124	110	84	87	2
160 - 90 - 160	siehe Seite 15/see page 15/regardez page 15						
160 - 110 - 160	siehe Seite 15/see page 15/regardez page 15						

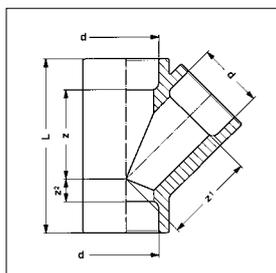
PP-R/PP-RCT – T-Stück 45° mit allseitiger Schweißmuffe SDR 11

PP-R/PP-RCT – Tee 45° with welding socket at all ends

Té à 45° • Te 45° soldable • Тройник 45°



G 8165 PP-R
G 8165B PP-RCT



d	L	z	z ¹	z ²
32	89	53	43	7
40	121	81	66	15
50	132	86	68	15
63	170	132	90	20



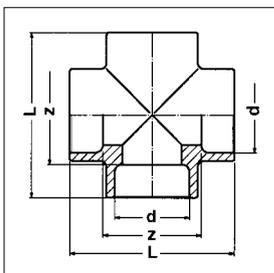
Fittings aus PP-R/PP-RCT

PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • ФИТИНГИ ИЗ PP-R/PP-RCT

PP-R/PP-RCT – Kreuz mit allseitiger Schweißmuffe SDR 11

PP-R/PP-RCT – Cross with welding socket at all ends

Croix • Cruz soldable • Крестовина

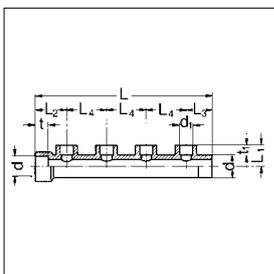


d	L	z
20	52	23
25	59	27
32	78	34
40	94	42
50	112	66
63	138	84

PP-R/PP-RCT – Verteiler-Rohr mit Schweißstutzen und Schweißmuffe

PP-R/PP-RCT – Manifold distributor pipe with welding socket and welding stub

Tube de distribution • Colector 4 salidas • Распределительная труба



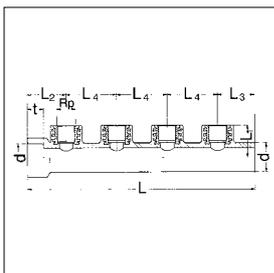
d - d ₁ x4	d	t	d ₁	t ₁	L	L ₁	L ₂	L ₃	L ₄
25-16x4	25	16	16	13	234	26	37	32	56
32-20x4	32	18	20	14,5	245	30	43	37	56
32-25x4	32	18	25	16	250	35	43	41	56
40-25x4	40	20,5	25	16	250	38	43	41	56
63-25x2	63	27,5	25	16	434	59	148	82	204
63-32x2	63	27,5	32	18	434	59	148	82	204

PP-R/PP-RCT – Verteiler-Rohr mit Schweißstutzen und zylindrischem Innengewinde

PP-R/PP-RCT – Manifold distributor pipe for socket welding: with welding stub and cylindrical female thread

Tube de distribution avec taraudage femelle • Colector 4 salidas y nosca hembra

Распределительная труба с внутренней резьбой



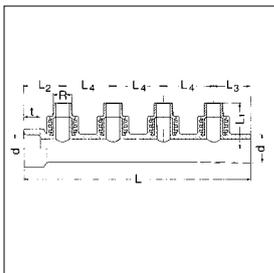
d-Rp _x 4	d	t	Rp	t ₁	L	L ₁	L ₂	L ₃	L ₄
32-1/2x4	32	18	1/2	14	250	35	43	41	56
40-1/2x4	40	20,5	1/2	14	250	38	43	41	56
63-1/2x2	63	27,5	1/2	14	434	59	148	82	204
63-3/4x2	63	27,5	3/4	15	435	59	148	82	204

PP-R/PP-RCT – Verteiler-Rohr mit Schweißstutzen und kegligem Außengewinde

PP-R/PP-RCT – Manifold distributor pipe for socket welding: with welding stub and cylindrical male thread

Tube de distribution avec taraudage male • Colector 4 salidas y nosca macho

Распределительная труба с наружной резьбой



d-R _x 4	d	t	R	t ₁	L	L ₁	L ₂	L ₃	L ₄
32-1/2x4	32	18	1/2	15	250	50	43	41	56
40-1/2x4	40	20,5	1/2	15	250	53	43	41	56
63-1/2x2	63	27,5	1/2	15	434	73	148	82	204
63-3/4x2	63	27,5	3/4	15	434	75	148	82	204

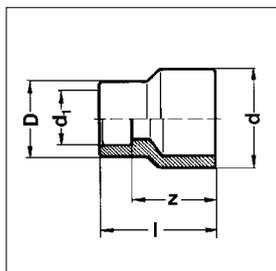
Fittings aus PP-R/PP-RCT

PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • ФИТИНГИ ИЗ PP-R/PP-RCT

PP-R/PP-RCT – Reduktion mit Schweißstutzen und Schweißmuffe

PP-R/PP-RCT – Reducer with welding socket and welding stub

Réduction • Reduccion soldable • Редуктор

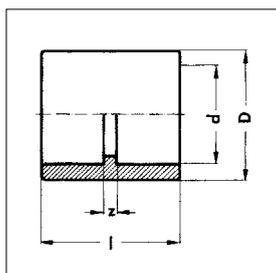


d - d ₁	D	l	z	Stp.
20 - 16	23	33	20	10
25 - 16	23	32	19	10
25 - 20	29	36	22	10
32 - 20	29	37	23	10
32 - 25	34	39	23	10
40 - 20	34	43	28	10
40 - 25	34	43	27	10
40 - 32	43	45	27	10
50 - 20	43	51	36	10
50 - 25	43	51	35	10
50 - 32	43	51	33	10
50 - 40	52	53	33	10
63 - 20	34	56	42	5
63 - 25	34	56	40	5
63 - 32	43	58	40	5
63 - 40	52	60	40	5
63 - 50	65	63	40	5
75 - 50	65	67	44	2
75 - 63	80	71	44	2
90 - 50	65	74	51	2
90 - 63	80	78	51	2
90 - 75	99	81	51	2
110 - 63	85	87	60	2
110 - 75	100	90	60	2
110 - 90	120	93	61	2
125 - 110	siehe Seite 16 / see page 16 / regardez page 16			
160 - 110	siehe Seite 16 / see page 16 / regardez page 16			
160 - 125	siehe Seite 16 / see page 16 / regardez page 16			

PP-R/PP-RCT – Muffe

PP-R/PP-RCT – Socket

Manchon • Manguito soldable • Муфта



d	D	l	z	Stp.
16	23	31	5	10
20	29	34	5	10
25	34	37	5	10
32	43	41	5	10
40	52	46	5	10
50	65	52	5	10
63	84	60	5	2
75	99	65	5	2
90	120	76	10	2
110	148	80	6	2
125	165	90	10	2



Fittings aus PP-R/PP-RCT

PP-R/PP-RCT Fittings • Raccords en PP-R/PP-RCT • Accesorios • Фитинги из PP-R/PP-RCT

PP-R – PP-RCT Heizwendel-Schweißmuffe PN 20

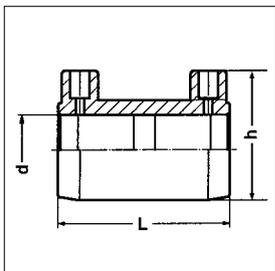
PP-R – PP-RCT Electrofusion socket

Manchon Electrosoudable

Manguitos para soldadura electrica

Сварочная муфта с нагревательной спиралью

G 8271 PP-R
G 8271B PP-RCT



d	h	L	Stp.
20	50	70	1
25	57	70	1
32	61	70	1
40	70	84	1
50	82	88	1
63	100	98	1
75	114	105	1
90	131	120	1
110	154	150	1
125	170	198	1

ab d 160 siehe Seite 16

from dia 160 on see page 16

à partir de d 160 regardez page 16

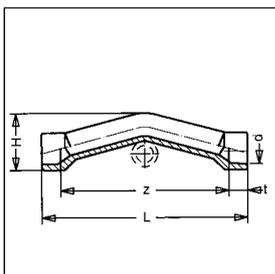
PP-R/PP-RCT – Überspringbogen für Kalt- und Warmwasserleitungen

PP-R/PP-RCT – Crossover for cold and hot water

Raccord à dos d'âne pour eau choide et froide • Salvatubos agua fria y caliente

Обводное колено опрысканное с обеих сторон муфтой. Для водопровода холодный и горячей воды

G 8287 PP-R
G 8287B PP-RCT



d	t	H	z	L
20	14,5	45	131	160
25	16	55	168	200
32	26	70	204	240

PP-R/PP-RCT – Kappe

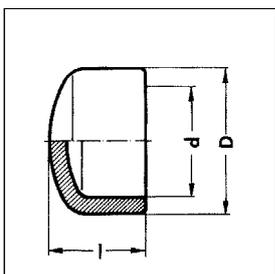
PP-R/PP-RCT – Cap

Bouchon femelle

Tapa soldable

Заглушка

G 8301 PP-R
G 8301B PP-RCT



d	D	l	Stp.
16	23	24	10
20	29	25	10
25	34	28	10
32	43	32	10
40	52	36	10
50	65	41	10
63	79	48	5
75	99	54	2
90	120	66	2
110	148	79	2
125	165	87	2

ab d 160 siehe Seite 16

from dia 160 on see page 16

à partir de d 160 regardez page 16

Fittings für Heizwendel- oder Stumpfschweißung aus PP-RCT

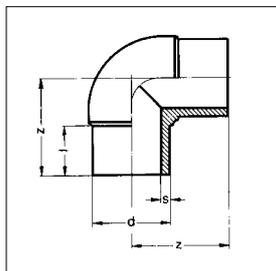
Fittings for Butt-Welding with Heating Elements or by Electric Fusion PP-RCT • Raccords à souder bout à bout ou par électrosoudage

Manguitos para soldadura a espiral de calefacción o soldadura a tope

Фитинги ПП-Р для сварки посредством нагревательной спирали

PP-RCT – Winkel 90°, 20° C/1,6 MPa, 60° C 0,8 MPa

PP-RCT – Elbow 90°, 20° C/1,6 MPa, 60° C 0,8 MPa • Coude à 90° • Codo 90° • Уголок 90°

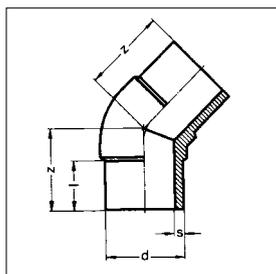


SDR 11				
d	s	l	z	Stp.
160	14,6	117	210	1
200	18,2	128	250	1
250	22,7	180	307	1
315	28,6	192	393	1
355*				
400*				

* auf Anfrage / on request / sur demande

PP-RCT – Winkel 45°, 20° C/1,6 MPa, 60° C 0,8 MPa

PP-RCT – Elbow 45°, 20° C/1,6 MPa, 60° C 0,8 MPa • Coude à 45° • Codo 45° • Уголок 45°

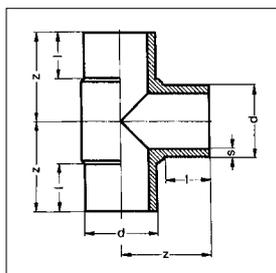


SDR 11				
d	s	l	z	Stp.
160	14,6	113	169	1
200	18,2	127	201	1
250	22,7	155	217	1
315	28,6	161	280	1
355*				
400*				

* auf Anfrage / on request / sur demande

PP-RCT – T - Stück 90°, 20° C/1,6 MPa, 60° C 0,8 MPa

PP-RCT – Tee 90°, 20° C/1,6 MPa, 60° C 0,8 MPa • Té à 90° • Те 90° • Тройник 90°



SDR 11							
d - d ₁ red.	s	s ₁ red.	l	l ₁ red.	z	z ₁ red.	Stp.
160	14,6	-	124	-	225	-	1
160 - 90	14,6	8,2	111	84	212	190	1
160 - 110	14,6	10,0	111	93	212	197	1
200	18,2	-	127	-	251	-	1
200 - 90	18,2	8,2	128	88	258	213	1
200 - 110	18,2	10,0	128	98	258	224	1
200 - 125	18,2	11,4	128	104	258	226	1
200 - 160	18,2	14,6	128	112	258	242	1
250	22,7	-	148	-	314	-	1
315	28,6	-	175	-	390	-	1
355*							
400*							

* auf Anfrage / * on request / * sur demande

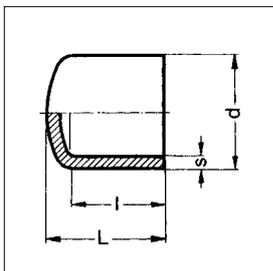
Fittings für Heizwendel- oder Stumpfschweißung aus PP-RCT

Fittings for Butt-Welding with Heating Elements or by Electric Fusion PP-RCT • Raccords à souder bout à bout ou par électrosoudage
Manguitos para soldadura a espiral de calefacción o soldadura a tope
Фитинги ПП-Р для сварки посредством нагревательной спирали

PP-RCT – Kappe, 20° C/1,6 MPa, 60° C/0,8 MPa

PP-RCT – Cap, 20° C/1,6 MPa, 60° C/0,8 MPa • Bouchon femelle • Tapa soldable • Заглушка

G 8301B PP-RCT



SDR 11		L	l	Stp.
d	s			
160	14,6	152	121	1
200	18,2	184	140	1
250	22,7	230	152	1
315	28,6	307	267	1
355*				
400*				

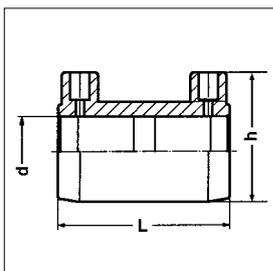
* auf Anfrage / on request / sur demande

PP-RCT – Heizwendel-Schweißmuffe aus SDR 11

PP-RCT – Electrofusion socket • Manchon Electrosoudable

Manguitos para soldadura electrica • Сварочная муфта с нагревательной спиралью

G 8271B PP-RCT



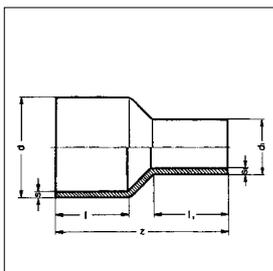
d	h	L	Stp.
160	205	197	1
200	245	202	1
250	315	220	1
315	375	280	1
355*			
400*			

* auf Anfrage / on request / sur demande

PP-RCT – Reduktion, 20° C/1,6 MPa, 60° C/0,8 MPa

PP-RCT – Reducer, 20° C/1,6 MPa, 60° C/0,8 MPa • Réduction • Reduccion soldable • Редуктор

G 8243B PP-RCT



d - d ₁	SDR 11		SDR 9		l	l ₁	z	Stp.
	s	s ₁	s	s ₁				
125 - 110	-	-	14,0	12,3	100	85	225	1
160 - 110	14,6	10,0	-	-	110	93	255	1
160 - 125	14,6	11,4	-	-	113	95	260	1
200 - 160	18,2	14,6	-	-	142	117	303	1
250 - 160	22,7	14,6	-	-	138	111	339	1
250 - 200	22,7	18,2	-	-	140	130	340	1
315 - 250	28,6	22,7	-	-	160	145	400	1
355 - 250*								
355 - 315*								
400 - 315*								
400 - 355*								

* auf Anfrage / on request / sur demande

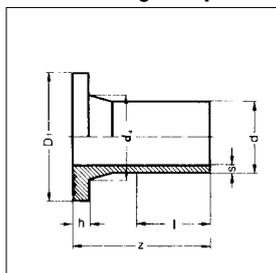
Fittings für Heizwendel- oder Stumpfschweißung aus PP-RCT

Fittings for Butt-Welding with Heating Elements or by Electric Fusion PP-RCT • Raccords à souder bout à bout ou par électrosoudage

Manguitos para soldadura a espiral de calefacción o soldadura a tope

Фитинги ПП-Р для сварки посредством нагревательной спирали

PP-RCT – Vorschweißbund • PP-RCT – Flange adaptor • Collet à souder • Cuello de brida • Муфта с буртиком

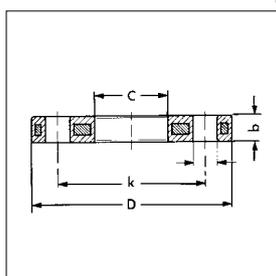


d	SDR 11		SDR 9		D ₁	d ₄	z	l	Stp.
	s	h	s	h					
160	14,6	25	-	25	212	175	175	110	1
200	18,2	32	-	32	268	232	205	127	1
250	22,7	35	-	35	320	285	235	146	1
315	228,6	36	-	36	372	337	262	185	1
355*									
400*									

* auf Anfrage / on request / sur demande

Flansch PP, glasfaserverstärkt mit Stahleinlage • Backing flange PP, reinforced with fibre glass and steel inlay

Brides libres PP • Bidas con alma de acero • фланец ПП со стальной прокладкой



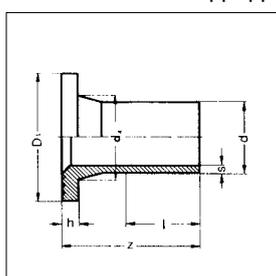
d	D	k	b	c	l	AL
160	285	240	24	178	22	8
200	340	295	24	235	22	8
250	406	350	31	288	22	12
315	460	400	34	338	22	12
355*						
400*						

* auf Anfrage / on request / sur demande

PP-RCT – Austrittshilfe für den Einsatz von Absperrklappen

PP-RCT – Exhaust help for throttle valve • Retrait pour robinet • Cuello de brida para montura mariposa

Вспомогательное приспособление выхода для вставки запорных клапанов



d	SDR 6		h	D ₁	d ₄	z	l	Stp.
	s	h						
110	18,3	32	158	125	170	100	100	1
*125	20,8	40	188	155	185	104	104	1

* für den Einbau von Klappen d = 140 mm

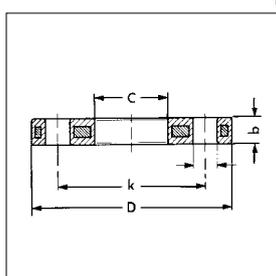
* for installation of flaps dia 140 mm

* pour installation des clapets d = 140 mm

* Для вставки запорных клапанов d=140 mm

Flansch PP, glasfaserverstärkt mit Stahleinlage • Backing flange PP, reinforced with fibre glass and steel inlay

Brides libres PP • Bidas con alma de acero • фланец ПП со стальной прокладкой



d	D	k	b	c	l	AL
110	220	180	18	128	18	8
*125(140)	250	210	24	158	18	8

* für den Einbau von Klappen d = 140 mm

* for installation of flaps dia 140 mm

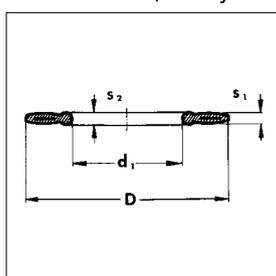
* pour installation des clapets d = 140 mm

* Для вставки запорных клапанов d=140 mm

Flachdichtung NBR mit Stahleinlage, Fabrikat Kroll + Ziller, für Vorschweißbunde

Flat gasket NBR with steel inlay, Manufacturer Kroll + Ziller, for flange adaptors

Joint plat • Junta plana • Плоское кольцевое уплотнение со стальной прокладкой для муфты с буртиком



d	D	d ₁	S ₁	S ₂
125	162	105	5	6
160	218	135	6	8
200	273	168	6	8
250	328	208	6	8
315	378	262	6	8

355 auf Anfrage / on request / sur demande

400 auf Anfrage / on request / sur demande

NBR = Perbunan N approved for potable water according to DVGW - DIN 1988 with KTW recommendation and microbiological approval acc. to DVGW form W 270.

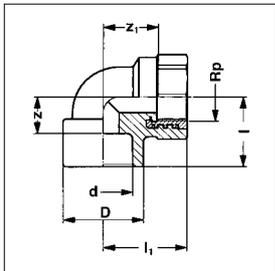
NBR = Perbunan N admis pour l'eau potable selon DVGW - DIN 1988 avec recommandation KTW et admission microbiologique selon DVGW page W 270.

NBR = Perbunan N für Trinkwasser zugelassen nach DVGW - DIN 1988 mit KTW - Empfehlung und mikrobiologischer Zulassung entspr. DVGW Arbeitsblatt W 270.



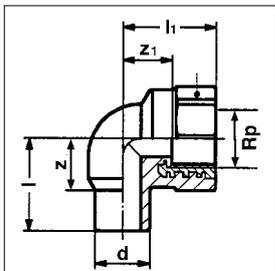
Übergangs-Gewindefittings aus PP-R/PP-RCT
 Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation
 Racores de paso • Переходные резьбовые фитинги.

PP-R-Rg/PP-RCT-Rg - Winkel 90° mit einseitigem zylindrischem Innengewinde
PP-R-Red Brass/PP-RCT-Red Brass - Elbow 90° with one sided cylindrical female thread
 Coude à 90° Rg/PP-R/PP-RCT • Codo 90° soldable y rosca hembra
 Уголок 90° с односторонней цилиндрической внутренней резьбой



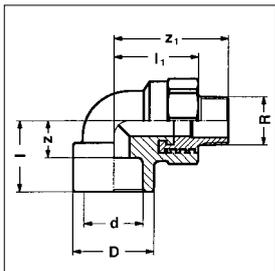
d - Rp	D	l	li	z	z1	SW	Stp.
16 - 1/2	23	25	32	12	18	36	10
20 - 1/2	29	28	34	14	20	36	10
20 - 3/4	34	32	40	18	25	44	10
25 - 1/2	34	32	36	14	24	36	10
25 - 3/4	34	32	40	16	25	44	10
32 - 3/4	43	38	45	20	30	44	10
32 - 1	43	38	48	20	30	51	10

PP-R-Rg/PP-RCT-Rg - Winkel 90° mit einseitigem zylindrischem Innengewinde und Schweißstutzen
PP-R-Red Brass/PP-RCT-Red Brass - Elbow 90° with one sided cylindrical female thread and welding stub
 Coude à 90° Rg/PP-R/PP-RCT • Codo 90° soldable y rosca hembra
 Уголок 90° с односторонней цилиндр. внутренней резьбой и сварочным штуцером



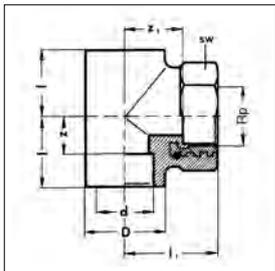
d - Rp	l	li	z	z1	SW	Stp.
20 - 1/2	34	34	19	18	36	10

PP-R-Rg/PP-RCT-Rg - Winkel 90° mit einseitigem kegligem Außengewinde
PP-R-Red Brass/PP-RCT-Red Brass - Elbow 90° / with one sided conical male thread
 Coude à 90° Rg/PP-R/PP-RCT • Codo soldable y rosca macho
 Уголок 90° с одностр. конической наружной резьбой



d - R	D	l	li	z	z1	SW	Stp.
16 - 1/2	23	25	32	12	47	36	10
20 - 1/2	29	28	34	14	49	36	10
20 - 3/4	34	32	40	18	56	44	10
25 - 1/2	34	32	36	16	53	36	10
25 - 3/4	34	32	40	16	56	44	10
32 - 3/4	43	38	45	20	61	44	10
32 - 1	43	38	48	20	66	51	10

PP-R-Rg/PP-RCT-Rg - T - Stück 90° mit zylindrischem Innengewinde am Abgang
PP-R-Red Brass/PP-RCT-Red Brass - Tee 90° with cylindrical female thread at exit
 Té à 90° Rg/PP-R/PP-RCT • Te soldable y rosca hembra
 Тройник 90° с цилиндрической внутренней резьбой на отводе



d - Rp	D	l	li	z	z1	SW	Stp.
16 - 1/2	23	25	32	12	18	36	10
20 - 1/2	29	28	34	14	20	36	10
20 - 3/4	29	28	35	14	20	44	10
25 - 1/2	34	32	38	16	24	36	10
25 - 3/4	34	32	40	16	25	44	10
32 - 3/4	43	38	45	20	30	44	10
32 - 1	43	38	48	20	30	51	10

Übergangs-Gewindefittings aus PP-R/PP-RCT

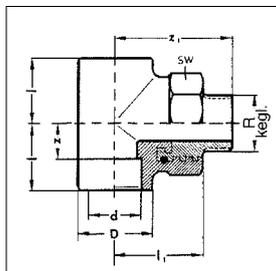
PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

PP-R-Rg/PP-RCT-Rg – T-Stück 90° mit kegligem Außengewinde am Abgang

PP-R-Red Brass/PP-RCT-Red Brass – Tee 90° with conical male thread at exit

Té à 90° Rg/PP-R • Te soldable y rosca macho • Тройник 90°



d - R	D	l	l ₁	z	z ₁	SW	Stp.
16 - 1/2	23	25	32	12	47	36	10
20 - 1/2	29	28	34	14	49	36	10
20 - 3/4	29	28	35	14	50	44	10
25 - 1/2	34	32	38	16	53	36	10
25 - 3/4	34	32	40	16	55	44	10
32 - 3/4	43	38	45	20	60	44	5
32 - 1	43	38	48	20	66	51	10

PP-R-Rg/PP-RCT-Rg

Übergangs-Gewinde-Nippel mit kegligem Außengewinde

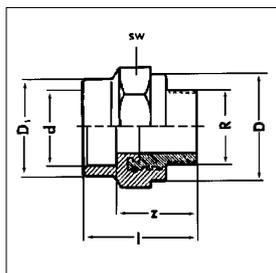
PP-R-Red Brass/PP-RCT-Red Brass

Adaptor socket with conical male thread

Manchon d'adaptation Rg/PP-R/PP-RCT

Enlace soldable y rosca macho

Переходной резьбовой ниппель



d - R	D	D'	l	z	SW	Stp.
16 - 1/2	35	24	53	40	36	10
20 - 1/2	35	29	55	40	36	10
20 - 3/4	43	34	58	42	44	10
25 - 1/2	35	34	56	40	36	10
25 - 3/4	43	34	58	42	44	10
32 - 3/4	43	43	58	42	44	10
32 - 1	50	43	66	48	51	10
40 - 1	62	55	71	51	62	10
40 - 1 1/4	62	52	74	53	63	10
50 - 1 1/4	69	64	77	54	70	10
50 - 1 1/2	69	64	77	54	70	10
63 - 2	84	79	92	65	85	5
75 - 2 1/2	112	99	112	82	115	5
90 - 3	134	120	143	111	135	2
110 - 4	169	148	161	124	170	2
125 - 5	206	168	170	130	208	1

PP-R-Rg/PP-RCT-Rg

Übergangs-Gewindemuffe mit zylindrischem Innengewinde

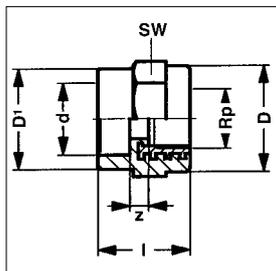
PP-R-Red Brass/PP-RCT-Red Brass

Adaptor socket with cylindrical female thread

Manchon d'adaptation Rg/PP-R/PP-RCT

Enlace soldable y rosca hembra

Переходная резьбовая муфта



d - Rp	D	D'	l	z	SW	Stp.
16 - 1/2	35	24	38	11	36	10
20 - 1/2	35	29	40	11	36	10
20 - 3/4	43	34	42	11	44	10
25 - 1/2	35	34	41	11	36	10
25 - 3/4	43	34	42	11	44	10
32 - 3/4	43	43	44	11	44	10
32 - 1	50	43	48	12	51	10
40 - 1	62	55	54	14	63	10
40 - 1 1/4	62	55	54	13	63	10
50 - 1 1/4	69	64	57	12	70	10
50 - 1 1/2	69	64	57	14	70	10
63 - 2	84	79	68	19	85	5
75 - 2 1/2	112	99	82	22	115	5
90 - 3	134	120	108	39	135	2
110 - 4	169	148	121	42	170	2
125 - 5	206	168	125	41	208	1



Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

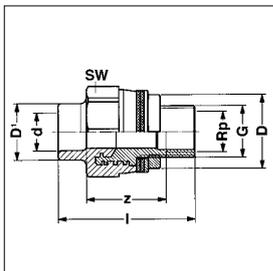
Racores de paso • Переходные резьбовые фитинги.

Übergangs-Gewinde-Nippel Rg/PP-R/PP-RCT für Hohlwandanschluss, mit Innengewinde

Bracket red brass/PP-R/PP-RCT for hollow wall installation with female thread

Applique Rg/PP-R/PP-RCT pour paroi creux • Enlace soldable y rosca hembra • Переходной резьбовой ниппель

G 8244g PP-R
G 8244gB PP-RCT
G 8245g PP-R
G 8245gB PP-RCT



G 8244g – length of thread 30 mm

d - Rp - G	D	D'	l	z	SW	Stp.
16 - 1/2 - 3/4	43	29	70	42	44	10
20 - 1/2 - 3/4	43	29	70	40,5	44	10

G 8245g – length of thread 19 mm

d - Rp - G	D	D'	l	z	SW	Stp.
16 - 1/2 - 3/4	43	29	59	31	44	10
20 - 1/2 - 3/4	43	29	59	29,5	44	10

komplett mit Kontersatz • complete with counter set

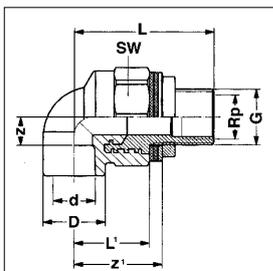
complete avec set de contre • completo con juego de contratueras

Winkel 90° Rg/PP-R/PP-RCT für Hohlwandanschluss, mit Innengewinde

Elbow 90° red brass/PP-R/PP-RCT for hollow wall installation with female thread

Coude à 90° Rg/PP-R/PP-RCT pour paroi creux • Codo 90° • Уголок 90°

G 8093g PP-R
G 8093gB PP-RCT
G 8095g PP-R
G 8095gB PP-RCT



G 8093g – length of thread 30 mm

d - Rp - G	D	L	L'	z	z'	SW	Stp.
16 - 1/2 - 3/4	29	65	35	15	50	44	10
20 - 1/2 - 3/4	29	65	35	13,5	50	44	10

G 8095g – length of thread 19 mm e.g. for toilet tank installation

d - Rp - G	D	L	L'	z	z'	SW	Stp.
16 - 1/2 - 3/4	29	54	35	15	39	44	10
20 - 1/2 - 3/4	29	54	35	13,5	39	44	10

komplett mit Kontersatz • complete with counter set

complete avec set de contre • completo con juego de contratueras

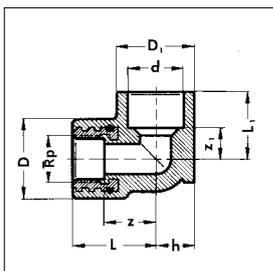
Wandscheibe Rg/PP-R/PP-RCT mit zylindrischem Gewinde

Bracket red brass/PP-R/PP-RCT for mounting wall with cylindrical female thread

Applique Rg/PP-R/PP-RCT pour montage sur crépi

Codo soldable y rosca hembra con sujecion a la pared • Настенная шайба

G 8472g PP-R
G 8472gB PP-RCT



d - Rp	D	D ₁	L	L ₁	h	t*	z	z ₁	Stp.
16 - 1/2	35	29	35	27	15	40	21	14	10
20 - 1/2	35	29	35	27	15	40	21	11	10
25 - 1/2	35	34	37	30	17	40	23	14	10
25 - 3/4	43	43	43	35	22	50	28	19	10
32 - 3/4	43	43	43	35	22	50	28	17	10

t* = Abstand der Befestigungslöcher

t* = Distance of mounting holes

t* = Distance de trous de montage

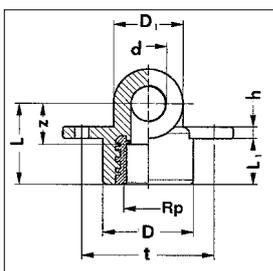
Wandscheibe für Hohlwandanschluss Rg/PP-RPP-RCT

Bracket red brass/PP-R/PP-RCT for hollow wall

Applique Rg/PP-R/PP-RCT pour paroi creux • Disco de pared para enlace de pared hueca

Настенная шайба для подсоединения к стене

G 8473g PP-R
G 8473gB PP-RCT



d - Rp	D	D ₁	z	L	L ₁	t*	h	Stp.
16 - 1/2	35	29	21	35	11	59	5	10
20 - 1/2	35	29	21	35	11	59	5	10
25 - 1/2	35	34	23	37	13	59	5	10

t* = Abstand der Befestigungslöcher

t* = Distance of mounting holes

t* = Distance de trous de montage



Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

PP-R/PP-RCT – Anschlussverschraubung mit beidseitiger Schweißmuffe, Runddichtring EPDM, 20°C, 10 bar

Einzelteile: Einlegeteil, Einschraubteil, Überwurfmutter glasfaserverstärkt, Runddichtring

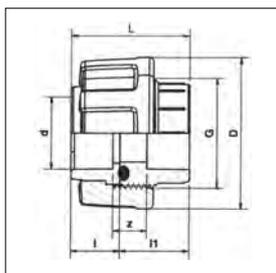
PP-R/PP-RCT – Union with welding socket at both ends, round gasket EPDM, 20°C, 10 bar

Component parts: Insert, screw part, union nut reinforced with fibre glass, round gasket

Manchon union avec manchon des deux côtés, joint torique

Composites: Pièce folle, pièce fileté, écrou

Enlace • Резьбовое соединение для



d	DN	G	L	I	I ₁	z	D
20	15	1	44,0	17,5	26	15	46
25	20	1 ¹ / ₄	47,5	19,0	28	15	56
32	25	1 ¹ / ₂	51,5	21,0	30	15	66
40	32	2	58,0	23,5	34	17	79
50	40	2 ¹ / ₄	66,0	26,5	39	19	87
63	50	2 ³ / ₄	78,5	30,5	47	23	107

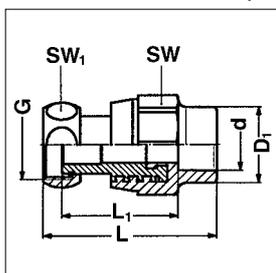
PP-R/PP-RCT – Anschlussverschraubung mit Dichtung, für Armaturen und Wasserzähler

PP-R/PP-RCT – Union with gasket for armatures and water meters

Union pour robinetteries et compteurs d'eau

Enlace reductor desmontable rosca hembra

Резьбовое соединение для подключения арматуры и водомеров с прокладкой



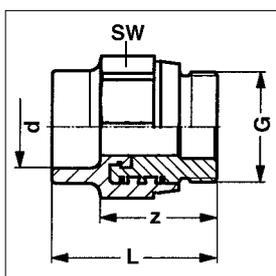
d	Nut thread	D ₁	~ L	L ₁	SW	SW ₁
16	G 3/4	29	64	44	36	30
20	G 3/4	29	66	44	36	30
20	G 1	29	68	44	44	37
25	G 3/4	34	67	44	36	30
25	G 1	34	72	47	44	37
32	G 1	43	80	53	44	37
32	G 1 ¹ / ₄	43	80	53	51	46
40	G 1 ¹ / ₄	55	86	56	63	46
40	G 1 ¹ / ₂	52	90	58	63	52
50	G 1 ³ / ₄	64	98	61	70	59
63	G 2 ³ / ₈	79	114	71	85	74
75	G 2 ³ / ₄	99	131	86	113	90
90	G 3 ¹ / ₂	120	172	118	135	109

PP-R/PP-RCT – Einschraubteil für Verschraubung 8332

PP-R/PP-RCT – Screw part for union 8332

Pièce filetée • Entronque roscado

Переходная деталь для 8332



d - G	L	z	SW
16 - 3/4	50	37	36
20 - 3/4	50	34	36
20 - 1	53	38	44
25 - 3/4	51	35	36
25 - 1	54	38	44
32 - 1 ¹ / ₄	62	43	51
40 - 1 ¹ / ₂	72	51	63
50 - 1 ³ / ₄	77	53	70
63 - 2 ³ / ₈	88	60	85
75 - 2 ³ / ₄	104	74	115
90 - 3 ¹ / ₂	137	104	135

Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

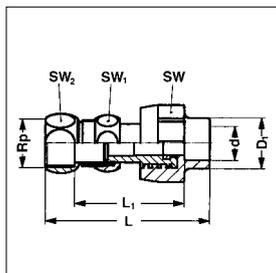
Rohrverschraubung PP-R/PP-RCT/Ms/Rg, flach dichtend, Anschluss für Metallgewinde, Innengewinde

Union PP-R/PP-RCT/red brass, flat sealing connection for metal thread, female thread

Manchon union PP-R/PP-RCT/Rg

Machon de unión PP-R/PP-RCT/Latón/Bronce

Переходник с внутренней резьбой



d - Rp	Nut thread	D ₁	~ L	L ₁	SW	SW ₁	SW ₂
16 - 1/2	G 3/4	29	85	58	36	30	27
20 - 1/2	G 3/4	29	85	56	36	30	27
20 - 3/4	G 1	29	93	62	44	37	34
25 - 1/2	G 3/4	34	87	57	36	30	27
25 - 3/4	G 1	34	95	62	44	37	34
32 - 3/4	G 1	43	97	62	44	37	34
32 - 1	G 1 1/4	43	103	67	51	46	44
40 - 1 1/4	G 1 1/2	52	115	77	63	52	50
50 - 1 1/2	G 1 3/4	64	126	85	70	59	55
63 - 2	G 2 3/8	79	142	91	85	74	70
75 - 2 1/2	G 2 3/4	99	169	112	113	90	90

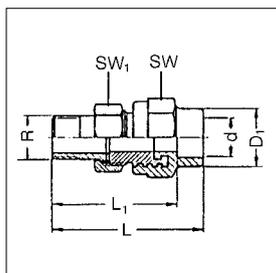
Rohrverschraubung PP-R/PP-RCTMs/Rg, flach dichtend, Anschluss für Metallgewinde, Außengewinde

Union PP-R/PP-RCT/brass/red brass, flat sealing connection for metal thread, male thread

Manchon union PP-R/PP-RCT/Rg

Racor de enlace desmontable macho

Переходник с наружной резьбой



d - R	Nut thread	D ₁	~ L	L ₁	SW	SW ₁
16 - 1/2	G 3/4	29	79	66	36	30
20 - 1/2	G 3/4	29	79	65	36	30
20 - 3/4	G 1	29	86	72	44	37
25 - 1/2	G 3/4	34	81	65	36	30
25 - 3/4	G 1	34	88	72	44	37
32 - 3/4	G 1	43	81	63	44	37
32 - 1	G 1 1/4	43	98	80	51	46
40 - 1 1/4	G 1 1/2	52	113	92	63	52
50 - 1 1/2	G 1 3/4	64	119	96	70	59
63 - 2	G 2 3/8	79	137	109	85	74
75 - 2 1/2	G 2 3/4	99	175	145	113	90



Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

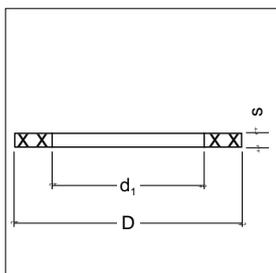
Flachdichtring

Flat gasket

Joint plat

Junta plana

Плоское кольцевое уплотнение



für Rohrverschraubungen PP-R / PP-RCT

for unions PP-R/PP-RCT • pour unions PP-R / PP-RCT

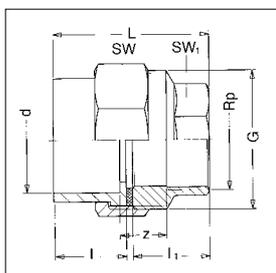
Art.-Nr. G 8330, G 8332, G 8332g, G 8333g, G 8600 + G 8650

d	R/Rp	Mutter-gewinde	D	d _i	s
16/20/25	1/2	G 3/4	24	17	3
20/25/32	3/4	G 1	30	21	3
32	1	G 1 1/4	38	27	3
40	1 1/4	G 1 1/2	44	32	3
50	1 1/2	G 1 3/4	50	40	3
63	2	G 2 3/8	66	52	3
75	2 1/2	G 2 3/4	78	63	3
90	3	G 3 1/2	97	75	3

Rohrverschraubung PP-R/PP-RCT/V2A, nur komplett lieferbar mit Schweißmuffe und zyl. Innengewinde, Flachdichtung EPDM; Anschluss für Metallgewinde

Union PP-R/PP-RCT/stainless steel, available only as complete set, with welding socket and cylindrical female thread, flat gasket EPDM, connection for metal thread

Manchon union PP-R/PP-RCT/V2A • Unión roscada de tubos PP-R/PP-RCT/V2A Û Переходник PP-R/PP-RCT/V2A



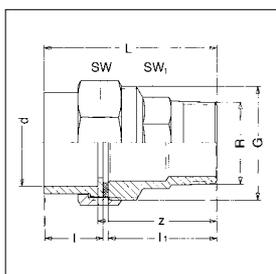
20° C/1,0 MPa

d - Rp	DN	G	L	l	l ₁	z	SW	SW ₁
20 - 1/2	15	1	49	21	25	21	38	27
25 - 3/4	20	1 1/4	52	21	28	20	47	32
32 - 1	25	1 1/2	57	23	31	21	52	38
40 - 1 1/4	32	2	62	26	33	21	66	47
50 - 1 1/2	40	2 1/4	68	29	36	24	72	53
63 - 2	50	2 3/4	78	33	42	26	87	65

Rohrverschraubung PP-R/PP-RCT/V2A, nur komplett lieferbar mit Schweißmuffe und kegligem Außengewinde, Flachdichtung EPDM; Anschluss für Metallgewinde

Union PP-R/PP-RCT/stainless steel, available only as complete set, with welding socket and conical male thread, flat gasket EPDM, connection for metal thread

Manchon union PP-R/PP-RCT/V2A • Unión roscada de tubos PP-R/PP-RCT/V2A Û Переходник PP-R/PP-RCT/V2A



20° C/1,0 MPa

d - R	DN	G	L	l	l ₁	z	SW	SW ₁
20 - 1/2	15	1	68	21	43	52	38	27
25 - 3/4	20	1 1/4	73	21	49	58	47	27
32 - 1	25	1 1/2	79	23	53	61	52	34
40 - 1 1/4	32	2	87	26	58	82	66	43
50 - 1 1/2	40	2 1/4	94	29	62	89	72	50
63 - 2	50	2 3/4	107	33	71	102	87	61

Übergangsfittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings • Raccords d'adaptation

Racores de paso • Переходные резьбовые фитинги.

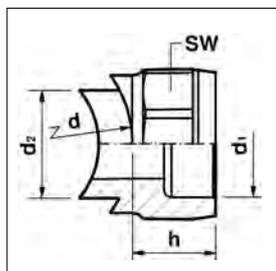
PP-R/PP-RCT – Einschweißsattel

PP-R/PP-RCT Welding saddle

Selle de soudage

Adaptador a soldar

Вварное седло



d	d ₁	d ₂	h	SW	emb.
40	20	25	29	38	10
40	25	25	29	38	10
50	20	25	29	38	10
50	25	25	29	38	10
63	20	25	29	38	10
63	25	25	29	38	10
63*	32	32			
75	20	25	29	38	10
75	25	25	29	38	10
75*	32	32			
75	40	40	38	63	10
90	20	25	29	38	10
90	25	25	29	38	10
90*	32	32			
90	40	40	38	63	10
110	20	25	29	38	10
110	25	25	29	38	10
110*	32	32			
110	40	40	38	63	10
110	50	50	39	70	10
125	20	25	29	38	10
125	25	25	29	38	10
125*	32	32			
125	40	40	38	63	10
125	50	50	39	70	10
125	63	63	45	85	10
160	20	25	29	38	10
160	25	25	29	38	10
160*	32	32			
160	40	40	38	63	10
160	50	50	39	70	10
160	63	63	45	85	10

* auf Anfrage / * on request / * sur demande

d	d ₁	d ₂	h	SW	emb.
200	20	25	29	38	10
200	25	25	29	38	10
200*	32	32			
200	40	40	38	63	10
200	50	50	39	70	10
200	63	63	45	85	10
250	20	25	29	38	10
250	25	25	29	38	10
250*	32	32			
250	40	40	38	63	10
250	50	50	39	70	10
250	63	63	45	85	10
315	20	25	29	38	10
315	25	25	29	38	10
315*	32	32			
315	40	40	38	63	10
315	50	50	39	70	10
315	63	63	45	85	10
355	20	25	29	38	10
355	25	25	29	38	10
355*	32	32			
355	40	40	38	63	10
355	50	50	39	70	10
355	63	63	45	85	10
400	20	25	29	38	10
400	25	25	29	38	10
400*	32	32			
400	40	40	38	63	10
400	50	50	39	70	10
400	63	63	45	85	10

* auf Anfrage / * on request / * sur demande



Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

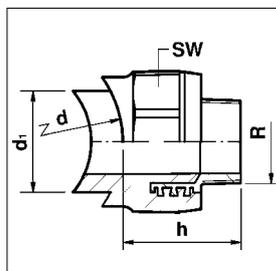
Einschweißsattel PP-R/PP-RCT/Rg mit Außengewinde

Welding saddle PP-R/PP-RCT/Red Brass with male thread

Selle de soudage avec taraudage male PP-R/PP-RCT/Rg

Adaptador a soldar con rosca macho

Вварное седло с наружной резьбой



d	d ₁	R	h	SW	emb.
40	25	1/2	43	38	10
50	25	1/2	43	38	10
63	25	1/2	43	38	10
63*		3/4			10
75	25	1/2	43	38	10
75*		3/4			10
75	40	1	56	63	10
75	40	1 1/4	58	63	10
90	25	1/2	43	38	10
90*		3/4			10
90	40	1	56	63	10
90	40	1 1/4	58	63	10
90	50	1 1/4	59	70	10
110	25	1/2	43	38	10
110*		3/4			10
110	40	1	56	63	10
110	40	1 1/4	58	63	10
110	50	1 1/4	59	70	10
110	50	1 1/2	59	70	10
125	25	1/2	43	38	10
125*		3/4			10
125	40	1	56	63	10
125	40	1 1/4	58	63	10
125	50	1 1/4	59	70	10
125	50	1 1/2	59	70	10
125	63	2	70	85	10
160	25	1/2	43	38	10
160*		3/4			10
160	40	1	56	63	10
160	40	1 1/4	58	63	10
160	50	1 1/4	59	70	10
160	50	1 1/2	59	70	10
160	63	2	70	85	10

* auf Anfrage / * on request / * sur demande

d	d ₁	R	h	SW	emb.
200	25	1/2	43	38	10
200*		3/4			10
200	40	1	56	63	10
200	40	1 1/4	58	63	10
200	50	1 1/4	59	70	10
200	50	1 1/2	59	70	10
200	63	2	70	85	10
250	25	1/2	43	38	10
250*		3/4			10
250	40	1	56	63	10
250	40	1 1/4	58	63	10
250	50	1 1/4	59	70	10
250	50	1 1/2	59	70	10
250	63	2	70	85	10
315	25	1/2	43	38	
315*		3/4			
315	40	1	56	63	
315	40	1 1/4	58	63	
315	50	1 1/4	59	70	
315	50	1 1/2	59	70	
315	63	2	70	85	
355	25	1/2	43	38	
355*		3/4			
355	40	1	56	63	
355	40	1 1/4	58	63	
355	50	1 1/4	59	70	
355	50	1 1/2	59	70	
355	63	2	70	85	
400	25	1/2	43	38	
400*		3/4			
400	40	1	56	63	
400	40	1 1/4	58	63	
400	50	1 1/4	59	70	
400	50	1 1/2	59	70	
400	63	2	70	85	

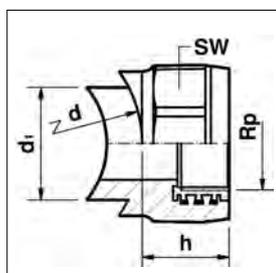
* auf Anfrage / * on request / * sur demande

Übergangs-Gewindefittings aus PP-R/PP-RCT

PP-R/PP-RCT Adaptor Pipe Fittings with thread • Raccords mixtes d'adaptation

Racores de paso • Переходные резьбовые фитинги.

Einschweißsattel PP-R/PP-RCT/Rg mit Innengewinde
Welding saddle PP-R/PP-RCT/red brass with female thread
 Selle de soudage avec taraudage intérieure
 Adaptador a soldar con rosca hembra
 Вварное седло с внутренней резьбой



d	d ₁	Rp	h	SW	emb.
40	25	1/2	29	38	10
50	25	1/2	29	38	10
63	25	1/2	29	38	10
63*		3/4			10
75	25	1/2	29	38	10
75*		3/4			10
75	40	1	38	63	10
75	40	1 1/4	38	63	10
90	25	1/2	29	38	10
90*		3/4			10
90	40	1	38	63	10
90	40	1 1/4	38	63	10
90	50	1 1/4	39	70	10
110	25	1/2	29	38	10
110*		3/4			10
110	40	1	38	63	10
110	40	1 1/4	38	63	10
110	50	1 1/4	39	70	10
110	50	1 1/2	39	70	10
125	25	1/2	29	38	10
125*		3/4			10
125	40	1	38	63	10
125	40	1 1/4	38	63	10
125	50	1 1/4	39	70	10
125	50	1 1/2	39	70	10
125	63	2	45	85	10
160	25	1/2	29	38	10
160*		3/4			10
160	40	1	38	63	10
160	40	1 1/4	38	63	10
160	50	1 1/4	39	70	10
160	50	1 1/2	39	70	10
160	63	2	45	85	10

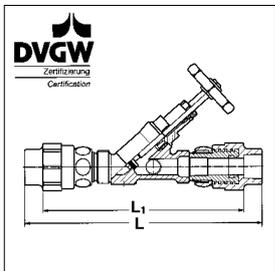
* auf Anfrage / * on request / * sur demande

d	d ₁	Rp	h	SW	emb.
200	25	1/2	29	38	10
200*		3/4			10
200	40	1	38	63	10
200	40	1 1/4	38	63	10
200	50	1 1/4	39	70	10
200	50	1 1/2	39	70	10
200	63	2	45	85	10
250	25	1/2	29	38	10
250*		3/4			10
250	40	1	38	63	10
250	40	1 1/4	38	63	10
250	50	1 1/4	39	70	10
250	50	1 1/2	39	70	10
250	63	2	45	85	10
315	25	1/2	29	38	10
315*		3/4			10
315	40	1	38	63	10
315	40	1 1/4	38	63	10
315	50	1 1/4	39	70	10
315	50	1 1/2	39	70	10
315	63	2	45	85	10
355	25	1/2	29	38	10
355*		3/4			10
355	40	1	38	63	10
355	40	1 1/4	38	63	10
355	50	1 1/4	39	70	10
355	50	1 1/2	39	70	10
355	63	2	45	85	10
400	25	1/2	29	38	10
400*		3/4			10
400	40	1	38	63	10
400	40	1 1/4	38	63	10
400	50	1 1/4	39	70	10
400	50	1 1/2	39	70	10
400	63	2	45	85	10

* auf Anfrage / * on request / * sur demande

Schrägsitzventil Ms mit Entleerung; Anschluss PP-R/PP-RCT Schweißmuffe

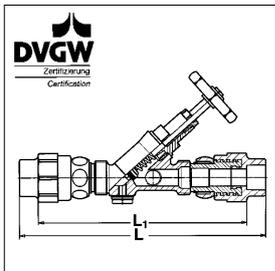
Angle seat brass valve with draining connection PP-R/PP-RCT welding socket
 Robinet à soupape diagonale en laiton avec vidage; branchement PP-R/PP-RCT manchon à souder
 Válvula con asiento de latón en ángulo y conexión para
 Косопосадочный вентиль Ms со сливом воды



d	L	L ₁
50	298	251
63	347	292
75	375	315

Schrägsitzventil Ms mit Rückflussverhinderer und Prüfstopfen; Anschluss PP-R/PP-RCT Schweißmuffe

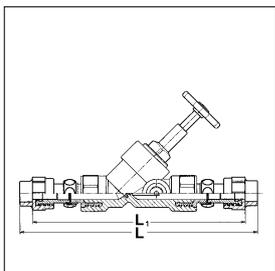
Angle seat brass valve with return flow preventor and test plug; connection PP-R/PP-RCT welding socket
 Robinet à soupape diagonale en laiton avec empêchement d'écoulement de retour et bouchon d'essai; branchement PP-R/PP-RCT manchon à souder
 Válvula de asiento de latón en ángulo con antirretorno y tapón de prueba
 Косопосадочный вентиль Ms со стопором обратного потока и контрольным патрубком



d	L	L ₁
50	298	251
63	347	292
75	375	315

Schrägsitzventil PP-R/PP-RCT mit Metallsitz, Entleerungsventil und Prüfstopfen; mit Anschlussverschraubung

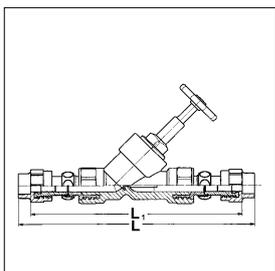
Angle seat valve PP-R/PP-RCT with metal seat, with draining connection and union
 Robinet à soupape PP-R/PP-RCT siège en métal avec vidage avec branchement union
 Válvula de asiento inclinado PP-R/PP-RCT metal con desagüe y tapón de prueba; con unión
 Косопосадочный вентиль с металлической основой, со сливным контрольным патрубком и подсоединительной деталью



d	L	L ₁
20	258	229
25	261	229
32	294	258
40	336	295

Schrägsitzventil PP-R/PP-RCT mit Metallsitz ohne Entleerungsventil; mit Anschlussverschraubung

Angle seat valve PP-R/PP-RCT with metal seat, without draining connection with union
 Robinet à soupape PP-R/PP-RCT siège en métal sans vidage avec union
 Válvula de paso total PP-R/PP-RCT metal con unión
 Косопосадочный вентиль ППР с металлической основой без сливного патрубка, с подсоединительной деталью



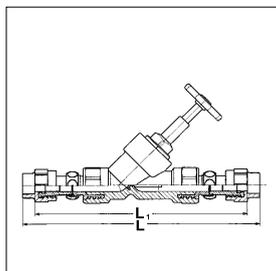
d	L	L ₁
20	258	229
25	261	229
32	294	258
40	336	295

Armaturen aus PP-R/PP-RCT

PP-R/PP-RCT Armatures • Robinetteries • Válvula • Арматура

Schrägsitzventil PP-R/PP-RCT mit Metallsitz und Rückflussverhinderer; mit Anschlussverschraubung

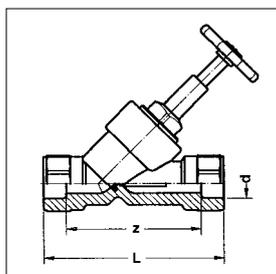
Angle seat valve PP-R/PP-RCT with metal seat and with return flow preventor and union
 Robinet à soupape PP-R/PP-RCT avec empêchement d'écoulement de retour et union
 Válvula de asiento inclinado PP-R/PP-RCT/metal y dispositivo antirretorno; con union
 Косопосадоочный вентиль ППР с металлической основой и со стопором обратного потока, с подсоединительной деталью



d	L	L ₁
20	258	229
25	261	229
32	294	258
40	336	295

Schrägsitzventil PP-R/PP-RCT ohne Entleerung

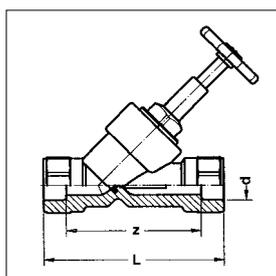
Angle seat valve PP-R/PP-RCT without draining connection
 Robinet à soupape
 Válvula paso total y asiento inclinado
 Косопосадоочный вентиль без слива воды



mit Metallsitz		
d	L	z
20	115	86
25	115	83
32	120	84
40	145	104

Schrägsitzventil PP-R/PP-RCT mit Rückflussverhinderer ohne Entleerung

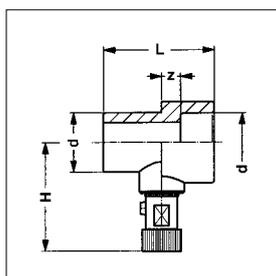
Angle seat valve PP-R/PP-RCT with return flow preventor without draining connection
 Robinet à soupape
 Válvula paso total y asiento inclinado y dispositivo antirretorno
 Косопосадоочный вентиль со стопором обратного потока без слива воды



mit Metallsitz		
d	L	z
20	115	86
25	115	83
32	120	84
40	145	104

Entleerungsstutzen mit Schweißmuffe und Schweißstutzen

Drain valve for socket-welding, female and male
 Soupape pour dépoter
 Válvula de drenaje
 Сливной патрубок со сварочной муфтой и сварным штуцером



d	L	z	H
20	52	8	51
25	54	8	53
32	59	9	56
40	62	7	62



Armaturen aus PP-R/PP-RCT

PP-R/PP-RCT Armatures • Robinetteries • Válvula • Арматура

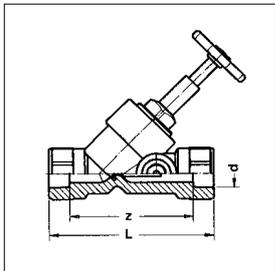
Schrägsitzventil PP-R/PP-RCT mit integriertem Entleerungsventil und Prüfstopfen

Angle seat valve PP-R/PP-RCT with draining connection and test plug

Robinet à soupape diagonale en laiton avec vidage

Válvula de asiento inclinado con desagüe y tapón de prueba

Косопосадоочный вентиль с интегрир. сливным и контр. патрубком



mit Metallsitz		
d	L	z
20	115	86
25	115	83
32	120	84
40	145	104

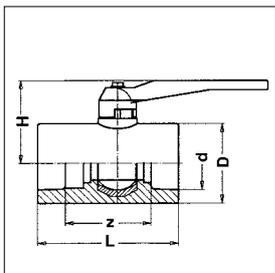
Kugelhahn PP-R/PP-RCT

Ball valve PP-R/PP-RCT

Robinet à bille

Válvula de esfera

Шаровой кран



d	D	L	z	H
20	30	74	45	54
25	37	78	46	72
32	48	91	55	56
40	60	105	64	62
50	75	122	75	67
63	94	145	90	85
75	108	166	106	98

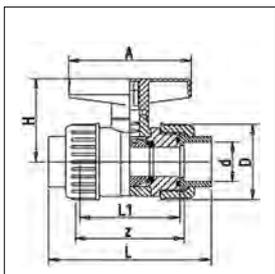
Kugelhahn aus PP SDR 11, mit Dichtung aus EPDM, Kugelabdichtung aus PTFE; 20°C, 10 bar

Ball valve PP SDR 11, with sealing EPDM, ball seating in PTFE; 20°C, 10 bar

Robinet à bille

Válvula de esfera

Шаровой кран



d	DN	L	L1	z	D	H	A
20	15	98	63	70	46	51	68
25	20	113	75	82	56	61	78
32	25	121	79	87	66	70	88
40	32	138	91	98	79	81	98
50	40	148	95	101	87	90	108
63	50	175	115	121	107	110	118
75	65	275	205	213	128	137	186

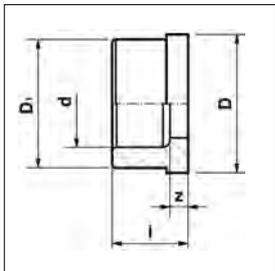
Einlegeteil aus PP-R/PP-RCT mit Schweißmuffe für Verschraubungen G 8330A, G 8542g, G 8547g und Kugelhahn G 8852

Insert of PP-R/PP-RCT with welding socket for unions G 8330A, G 8542g, G 8547g and ball valve G 8852

Pièce folle en PP-R/PP-RCT avec manchon soudable pour manchon union G 8330A, G 8542g, G 8547g et robinet G 8852

Pieza loca de PP-R/PP-RCT con unión soldable para Uniones G 8330A, G 8542g, G 8547g Válvula de esfera con unión doble G 8852

Вкладыш из ПП-Р / ПП-РСТ смуфтой для соединение G 8330A, G 8542g, G 8547g и шаровых кранов



d	DN	D ₁	D	l	z
20	15	27,5	30	21	6
25	20	36	38,5	21	6
32	25	41,5	44,7	23	6
40	32	53	56,5	28	7
50	40	59	62,6	32	8
63	50	74	78,5	42	13
75	-	90	97,2	35	5

Armaturen aus PP-R/PP-RCT

PP-R/PP-RCT Armatures • Robinetteries • Válvula • Арматура

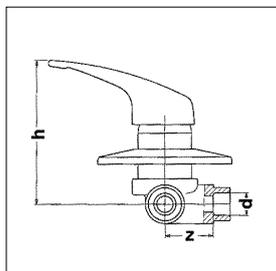
Einhebel-Mischbatterie PP-R/PP-RCT

Single mixing device PP-R/PP-RCT

Mélangeur single PP-R/PP-RCT

Grifería PP-R/PP-RCT

Рычажной смеситель



d	z	h
20	27	130

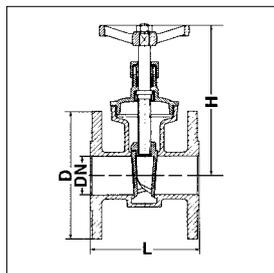
Flanschen-Schieber DIN 3352, aus Rotguss DIN 1705, Nenndruck 16 bar

Gate Valve DIN 3352, red brass DIN 1705, 16 bar

Ouverture bride, DIN 3352, cuivre DIN 1705, 16 bar

Puerta valvulas DIN 3352, cobre DIN 1705, 16 bar

Стальная задвижка



d	DN	D	L	H
90	80	200	150	245
110	100	220	160	340
125	125	250	200	400
160	150	285	210	430

Bigger sizes available on request.

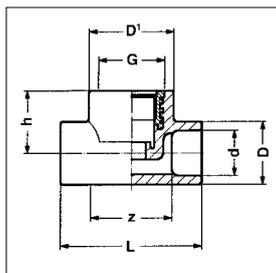
PP-R/PP-RCT – Ventil-Unterteil, für Oberteil 3/4" (UP oder AP) max. 12 mm Gewindelänge

PP-R/PP-RCT – Bottom part of valve for upper part 3/4" (in wall or on wall), max. 12 mm Threading length

Pièce inférieure de robinet à recevoir pièce supérieure 3/4", max. 12 mm longueur de taraudage

Cuerpo de válvula (solo parte inferior)

Вентиль-нижняя часть, для верхней части 3/4", максималь. длина нарезки 12мм



d - G	D	D'	z	L	h	Stp.
20 - 3/4	34	45	46	75	33	5
25 - 3/4	34	45	43	75	33	5
32 - 3/4	43	45	39	75	33	5



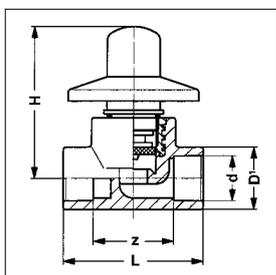
Armaturen aus PP-R/PP-RCT

PP-R/PP-RCT Armatures • Robinetteries • Válvula • Арматура

PP-R/PP-RCT – UP-Ventil mit Flügelrad und geschlossener Kappe

PP-R/PP-RCT – Concealed valve with winged wheel and closed flap

Souape • Válvula para empotrar • Уп-вентиль с лопастным колесом и заглушкой

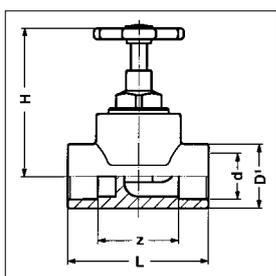


d - G	D	D ¹	z	L	H
20 - ³ / ₄	34	45	46	75	63
25 - ³ / ₄	34	45	46	75	63
32 - ³ / ₄	43	45	39	75	63

PP-R/PP-RCT – Geradsitzventil

PP-R/PP-RCT Straight seat valve

Souape droite • Válvula de compuerta • прямопосадочный вентиль



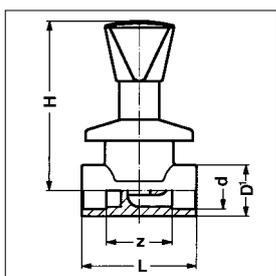
d - G	D	D ¹	z	L	H
20 - ³ / ₄	34	45	46	75	69
25 - ³ / ₄	34	45	43	75	69
32 - ³ / ₄	43	45	39	75	69

PP-R/PP-RCT – UP-Ventil mit verchromtem Oberteil

PP-R/PP-RCT – Concealed valve with chromed upper part

Souape pour installation sous crépi avec pièce superieur chromé • Válvula de corte mando cromado

Уп-вентиль с хромированной верхней частью



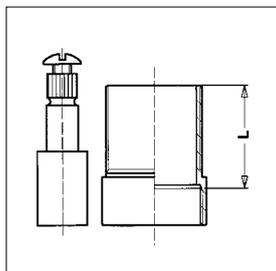
d - G	D	D ¹	z	L	H
20 - ³ / ₄	34	45	46	75	112
25 - ³ / ₄	34	45	43	75	112
32 - ³ / ₄	43	45	39	75	112

Zubehör

Accessories • Accessoires • Accesorios • Комплектующие детали

Verlängerung für UP-Ventil

Prolongation for concealed valve • Rallonge pour soupape UP • Prolongación para válvula de empotrar
Удлинение для УП-Вентилля



L
30



Druckminderer PN 16
mit Aussengewinde 3/4
für Anschlussverschraubung G 8332
Druck einstellbar von 1,5 bis 5,5 bar

Pressure Reducer PN 16
with male thread 3/4
suitable for union G 8332
Pressure adjustable from 1,5 to 5,5 bar

Réducteur de pression PN 16
avec taraudage mal 3/4
pour union G 8332
pressure réglable de 1,5 jusqu'au 5,5 bar

Редуктор давления PN 16
с наружной резьбой 3/4
для резьбового соединения G 8332



Manometer für Druckminderer 8670
Messbereich 0 bis 10 bar (0 bis 145 PSI)
Anschlussgewinde G 1/4

Pressure Gauge
for pressure reducer 8670
Measuring range 0 to 10 bar (0 to 145 PSI),
connecting thread G 1/4

Manomètre pour réducteur de pression 8670, gamme de mesure 0 jusqu'au 10 bar (0 à 145 PSI)
connexion taraudage G1/4

Манометр
для редуктора давления 8670
диапазон измерений 0 до 10 бар (0 до 145 PSI), соединительная резьба G 1/4



Rückschlagventil PN 16
mit Innengewinde 3/4
für Rohrverschraubung G 8333g

Check valve PN 16
with female thread 3/4
for union G 8333g

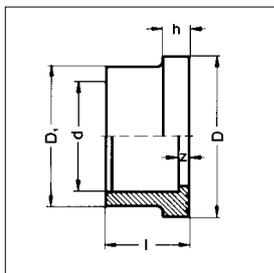
Soupape de retenue à bille PN 16
taraudage femelle 3/4
pour manchon union G 8333g

Запорный вентиль PN 16
с внутренней резьбой 3/4
для переходника G 8333g

PP-R/PP-RCT – Bundbuchse, für Flachdichtring Dichtfläche gerillt

PP-R/PP-RCT – Flange adaptor for flat gasket, seal face grooved

Collet • Cuellos de bridas • Втулка



d	D	D ₁	l	z	h	Stp.
40	61	50	29	9	8	2
50	74	61	27	4	8	2
63	102	76	40	13	17	2
75	122	90	38	8	19	2
90	138	108	45	12	21	2
110	158	131	50	13	21	2
125	162	146	53	13	25	2

ab d 160 siehe Seite 17

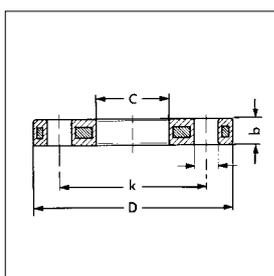
from d 160 on see page 17

à partir de d 160 regardez page 17

Flansch aus PP, glasfaserverstärkt mit Stahleinlage für Bundbuchsen, Anschlussmaße nach PN 10

Backing flanges PP/St for flange adaptor, with steel inlay, tie dimension acc. to PN 10 • Brides libres PP/St pour collets à souder

Bridas con alma de acero • фланец из полипропилена со стальной прокладкой для втулки



d	D	k	b	c	l	AL	Stp.
40	140	100	16	51	18	4	2
50	150	110	18	62	18	4	2
63	165	125	18	78	18	4	2
75	185	145	18	92	18	4	2
90	200	160	18	110	18	8	2
110	220	180	18	133	18	8	2
125	220	180	18	149	18	8	2

ab d 160 siehe Seite 17

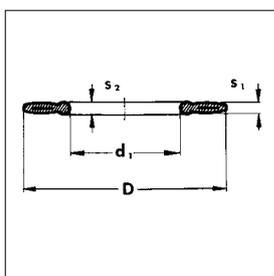
from d 160 on see page 17

à partir de d 160 regardez page 17

Flachdichtring NBR mit Stahleinlage Fabrikat Kroll + Ziller, für Bundbuchsen

Flat gasket NBR, Manufacturer Kroll + Ziller, for flange adaptor • Joint plat • Junta plana

Плоское кольцевое уплотнение НБР со стальной прокладкой для втулки



d	D	d ₁	s ₁	s ₂	Stp.
40	82	40	3	4	1
50	91	51	3,5	4,5	1
63	107	63	4	5	1
75	127	75	4	5	1
90	142	90	4	5	1
110	162	110	5	6	1
125	162	105	5	6	1

ab d 160 siehe Seite 17 • from d 160 on see page 17

à partir de d 160 regardez page 17

NBR = Perbunan N für Trinkwasser zugelassen nach DVGW- DIN 1988 mit KTW - Empfehlung und mikrobiologischer logischer Zulassung entspr. DVGW Arbeitsblatt W 270.

NBR = Perbunan N approved for potable water acc. DVGW - DIN 1988 with KTW-Recommendation and microbiological approval acc. to DGW W270.

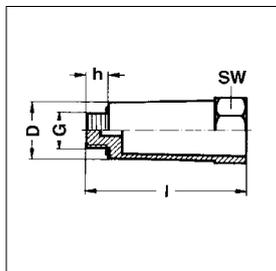
NBR = Perbunan N admis pour l'eau potable selon DVGW - DIN 1988 avec recommandation KTW et admission microbiologique selon DVGW page W 270.

Zubehör

Accessories • Accessoires • Accesorios • Комплектующие детали

Abpresszapfen mit Dichtung, PVC

Wall inlet plug with gasket PVC • Bouchon étanche à murer avec plat • Tapón para empotrar con junta
Обжимной шип с уплотнением



G	D	l	h	SW	Stp.
1/2	33	87	10	36	10
3/4	40	91	14	41	10

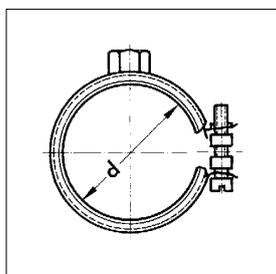
9910 Ersatzdichtring

9910 Replacement round gasket • 9910 Joint emplacement

G	O-Ring	Stp.
1/2	21,5 x 3	10
3/4	27,0 x 3	10

Rohrschelle

Pipe bracket
Collier pour tube
Abrazaderas metalicas
Хомут для подвески труб



d	Größe/Size	Stp.
16	15 - 18	10
20	20 - 23	10
25	25 - 28	10
32	31 - 35	10
40	40 - 43	10
50	47 - 53	10
63	64 - 67	10
75	75	10
90	90	10
110	110	10
125	125	10
160	160	10
200	200	10
250	250	10
315	315	10

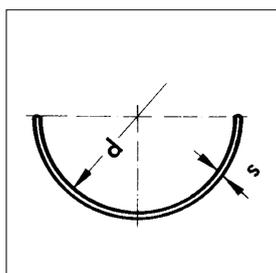
Halbschale, verzinkt, optische Mängel sind durch unsachgemäße Lagerung nicht zu vermeiden

Support semi-tube, galvanized, visual defects cannot be avoided by incorrect storage

Support semi-tube, galvanisé, défauts visuels sont inévitables par stockage incorrect

Soporte galvanizado para tubos, es inevitable defectos ópticos por almacenamiento no apropiado

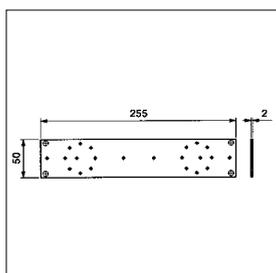
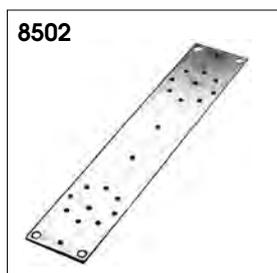
Полувкладыш, оцинкованный, при неправильном хранении не избежать появления визуальных недостатков



d	s	kg/m
16 - 25	0,6	0,200
32	0,6	0,255
40	0,6	0,315
50	0,6	0,380
63	0,6	0,500
75	0,6	0,600
90	0,6	0,684
110	0,6	0,783

Montageplatte • Mounting plate • Plaque à montage • Placa de montaje

Монтажная плита для размеров 76, 100, 153, 200 мм



Für Stichmaße:	mm
For depth gauge:	mm
Distance:	mm
	76
	100
	153
	200

Processing Tools

Daily practice proved tube cutters and pipe scissors to be the optimum tools for cutting plastic pipes. Both devices make clear rectangular cuts indispensable for professional weld joints. PP-R pipes can easily be cut with these tools.

Pipe cutter, type scissors

d 16 - 40 mm

8970



d 16 - 40 mm

Pipes of up to 40 mm in diameter can be cut with the plastic-tube scissors. For pipe from 50 mm in diameter on, the pipe cutter has to be used.

Tube-cutter

d 50 - 110 mm

8975



d 50 - 110 mm

The scraper is used to remove the outer surface oxide layer on the PP-R pipe.

Before welding the pipe with the electrofusion socket (part no. 8271) this layer on the outer surface has to be scraped off within the welding section.

Scraper

8974



The Stabi-Pipes are finished with an aluminium coating on their outer surface. This aluminium coating has to be scraped off within the welding section before welding the pipe. Each peeling tool is designed for two individual pipe diameters. The peeling tools for diameters from 50 mm on have turning handles.

Peeling tool for tube Stabi-Pipe

8977

d =
16 + 20
20 + 25
32 + 40
50 + 63,
75, 90,
110 mm
125 mm



Spare blade for peeling tool for Stabi-Pipe

8978



Processing Tools



Peeling tool



Welding tool



Repairing set



Repairing plug for welding of bore wholes (up to 10 mm) part. no. 8983



Welding tool for the welding of saddles



Chamfering device for removing the aluminium from stabi pipes as preparation for welding saddles



Borer for the installation of welding saddles



Temperature measuring instrument with surface sensor



Clamping tool d 160 – 315 mm

Processing Tools

The shown heating element was developed for manual welding. Stationary mounting can be done by a simple fixing device. The heating element diameter up to 63 mm allows welding without problems even under difficult construction site conditions and in slots. At 220 volt the thermostatically controlled heating element has power of 600 watt for coated heating sockets and mandrils from 16 mm to 63 mm in diameter. This device completed by a post and tools is delivered in a metal case.

Heating element for welding by hand

Part. no. 8980, d = 16 – 63 mm

Part. no. 8981, d = 20 – 32 mm



Heating element for welding by hand 125 mm without welding tools



The socket-welding machine with heating element is suitable for pipes and fittings from 50 mm to 125 mm in diameter. The clamping fixtures are designed to provide both sufficient clamping function and centric positioning. A definite on-axis alignment of the clamped joint parts is guaranteed. The heating element is thermostatically controlled and has a signal lamp. Its power is 1000 w. at 220 v. The heating sockets and mandrils of 50, 63, 75, 90, 110 and 125 mm are teflonized and easy to mount on the heating element.

Socket-welding machine with heating elements



Processing Tools

Butt Welding Machine with Heating Element. Type SP250 - Part Number 8289/250

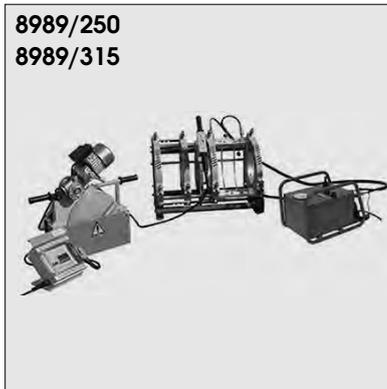
The butt welding machine SP250 is suitable for welding PP-R/PP-RCT pipes and fittings from 90 mm to 250 mm. The welding machine includes the basic machine, the heating element, a hydraulic aggregate as well as an electrical planing tool.

The heating element is coated with Teflon, thermostatically controlled and has an output of 1.500 watt at 220 volt.

Welding machine for butt welding

Part. no. 8989/250 d = 90 – 250 mm

Part. no. 8989/315 d = 90 – 315 mm



Butt Welding Machine with Heating Element. Type SP315 - Part Number 8989/315

The butt welding machine SP315 is suitable for welding PP-R/PP-RCT pipes and fittings from 90 mm to 315 mm. The welding machine includes the basic machine, the heating element, a hydraulic aggregate as well as an electrical planing tool.

The heating element is coated with Teflon, thermostatically controlled and has an output of 2.500 watt at 220 volt.

Electrofusion machine for electrofusion sockets



**Pipes and Fittings of PP-R/PP-RCT
for hot and cold water as well as for heating installations**

DIN EN ISO 15874	Plastic piping systems for hot and cold water installations Polypropylene (PP)
DIN 8077	Polypropylene (PP) pipes Dimensions
DIN 8078	Polypropylene (PP) pipes General quality requirements
DIN 1988	Codes of practice for drinking water installations
DIN 4109	Sound insulation in buildings
DVGW W 534, W 542 W 544	Pipe joints Compound pipes for drinking water installations Plastic pipes for drinking water installations
DVS 2207 Part 11	Welding of thermoplastic Heated tool welding of pipes, piping parts and panels made of PP
DVS 2208 Part 1	Welding of thermoplastics Machines and devices for heated tool welding of pipes, piping parts and panels
KTW Recommendation	Physiological harmlessness According to the recommendations of the German health authority
VOB Part I C DIN 18381	German construction contract procedures (VOB) - part C: General technical specifications in construction contracts (ATV)- Installation of gas, water and drainage pipework inside buildings
DIN 2999	Witworth pipe threads for pipes and fittings Parallel female thread and tapered male thread
DIN 16928	Pipe joints and piping parts installation General regulations





Warranty Certificate No.

Bänninger Kunststoff-Produkte GmbH • Bänningerstr. 1 • D-35447 Reiskirchen/Germany • Phone + 49 6408 89-0 • Fax + 49 6408 6756

For your security we have covered a product liability insurance with a reputed German insurance company. Compliance with the existing DIN standards, our planning and working instructions as well as professional installation by an approved skilled company are compulsory for any indemnification.

In case of any damage – provided that the damage has verifiably been caused by manufacturing resp. material faults – you will be indemnified up to the below mentioned amounts:

1. **Product liability:** € 30.000.000,--
for personal damages and physical damages at buildings and machinery
2. **Costs for installation and disassembly:** € 1.000.000,-- without any consequential charges
3. **Damages caused to the environment:** € 10.000.000,-- caused by products influencing soil, air or water

The warranty starts on the day of installation and will end 10 years after the production date of the installed Bänninger products.

This certificate is valid after the performing company has confirmed the professional installation with their signature and stamp and Bänninger has countersigned it.

Please fill in the warranty certificate after installation has been completed and send it to **Bänninger Kunststoff-Produkte GmbH, Bänningerstrasse 1, 35447 Reiskirchen, Germany.** Bänninger will countersign the certificate and return it to you.

Received at Bänninger

Policy-N°:	13294786-01018113 13294786-01031133
Handled by:	Date:
Back to:	<input type="checkbox"/> Sender <input type="checkbox"/> Constructor <input type="checkbox"/> Installation Company

Reiskirchen, _____

(No legal right can be derived from this warranty certificate.)

This is to confirm that the used Bänninger products have been installed professionally according to the DIN standards and the planning and working instructions.

Full address _____

Name of constructor resp. project _____

Installed material: **PP-R/PP-RCT** approx. _____ meters of pipe

Installed material: **PE**

Installed material: **PVC-U**

Assigned purpose:
(e.g. residential house, hotel etc.) _____

Installation has been carried out and completed by us on: _____

Delivery / commissioning date: _____

Full address: _____

Stamp installation company _____

Mandatory signature _____

04/12

Starting at the day of installation of the PP-R / PP-RCT piping system PN 20 we grant a warranty of 10 years.
 This product liability includes personal and physical damages, installation costs and costs for disassembly up to 30 Mio EURO per damage event. This will be confirmed by issuing the warranty certificate related to the project.

DVGW CERT

DVGW-Baumusterprüfzertifikat
DVGW type examination certificate

DW-8317AS2791
Registernummer
registration number

Anwendungsbereich
field of application: Produkte der Wasserversorgung
products of water supply

Zertifikatinhaber
owner of certificate: Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1, D-35447 Reiskirchen

Vertreiber
distributor: Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1, D-35447 Reiskirchen

Produktart
product category: Kunststoffrohre für die Trinkwasserinstallation: PP-R, SDR 6 (PN 20)
(8317)

Produktbezeichnung
product description: Kunststoffrohre für die Trinkwasserinstallation Kunststoffrohre
aus Polypropylen PP-R für die Trinkwasserversorgung

Modell
model: PP-R-Rohr "Bänninger"

Prüfberichte
test reports: Mechanikprüfung: 251209/1.1/88046 vom 26.10.2009 (SKZ)
Mechanikprüfung: 251204/1.1/64828 vom 19.11.2004 (SKZ)
KTW-Prüfung: 04108_03 vom 11.04.2008 (TZW)
Mikrobiologische Prüfung: 136633-06-SI vom 15.02.2006 (WHY)

Prüfgrundlagen
basis of type examination: DVGW W 544 (01.05.2007)
UBA KTW (16.05.2007)
DVGW W 270 (01.11.2007)

Ablaufdatum / AZ
date of expiry / file no.: 05.02.2015 / 10-0201-WNV

DVGW CERT GmbH
Josef-Wormel-Strasse 1-3
53123 Bonn
Telefon: +49 228 91 88-888
Telefax: +49 228 91 88-993
e-Mail: info@dvgw-cert.com

DVGW CERT

DVGW-Baumusterprüfzertifikat
DVGW type examination certificate

DW-8511AL2115
Registernummer
registration number

Anwendungsbereich
field of application: Produkte der Wasserversorgung
products of water supply

Zertifikatinhaber
owner of certificate: Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1, D-35447 Reiskirchen

Vertreiber
distributor: Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1, D-35447 Reiskirchen

Produktart
product category: Installationsysteme und Systemverbinder: Rohrverbinder für
Trinkwasserinstallationsysteme (8511)

Produktbezeichnung
product description: Systemverbinder als Schweißverbinder aus PP-R (grün) für Rohre aus
PP-R gemäß DVGW-Arbeitsblatt W 544

Modell
model: Fittings "Bänninger"

Prüfberichte
test reports: Mechanikprüfung: 251309/2.1/90516 vom 08.04.2010 (SKZ)
Mechanikprüfung: 251309/2.2/90517 vom 08.04.2010 (SKZ)
Mechanikprüfung: 251309/2.3/90518 vom 08.04.2010 (SKZ)
Mechanikprüfung: 251309/2.4/90519 vom 08.04.2010 (SKZ)
KTW-Prüfung: KR 152/09 vom 13.11.2009 (TZW)
Mikrobiologische Prüfung: M145A/06 vom 30.07.2006 (TZW)

Prüfgrundlagen
basis of type examination: DVGW W 534 (01.05.2004)
UBA KTW (16.05.2007)
DVGW W 270 (01.11.2007)

Ablaufdatum / AZ
date of expiry / file no.: 24.10.2015 / 10-0321-WNV

DVGW CERT GmbH
Josef-Wormel-Strasse 1-3
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Telefon: +49 228 91 88-888
Telefax: +49 228 91 88-993
e-Mail: info@dvgw-cert.com

DIN CERTCO
Gesellschaft für Konformitätsbewertung mbH

ZERTIFIKAT

Der Firma
Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1
35447 Reiskirchen

wird für das im Herstellwerk
Stabfurt
hergestellte Produkt
Mehrschicht-Verbundrohr aus PP-RCT/ALPP-R
Außen-Durchmesser bis 63 mm

EG 111
vom Typ
entfällt
die Konformität mit
DIN 8077:2007-05
DIN 8078:2007-08
DIN 15874-2:2004-03
DIN EN ISO 15874-2:2004-03
Zertifizierungsprogramm ZP 9.18.1
bestätigt und das Nutzungsrecht für die Zeichen

DIN plus **KO**

In Verbindung mit der unten genannten Registernummer erteilt.
Registernummer: **P1R0201**
Dieses Zertifikat ist unbefristet gültig,
solange die erforderlichen Überwachungen mit positivem Ergebnis durchgeführt werden.

2007-07-03
Dipl.-Ing. Dipl.-Wl.-Ing. Sören Scholz
- Stellv. Leiter der Zertifizierungsstelle -

Weitere Angaben siehe Anhang
DIN CERTCO Gesellschaft für
Konformitätsbewertung mbH
Alboinstraße 56, 12103 Berlin

DIN CERTCO
Gesellschaft für Konformitätsbewertung mbH

ZERTIFIKAT

Der Firma
Bänninger Kunststoff-Produkte GmbH
Bänningerstr. 1
35447 Reiskirchen

wird für das im Herstellwerk
Stabfurt
hergestellte Produkt
Mehrschicht-Verbundrohr aus PP-RCT/ALPP-R
Außen-Durchmesser ab 75 mm

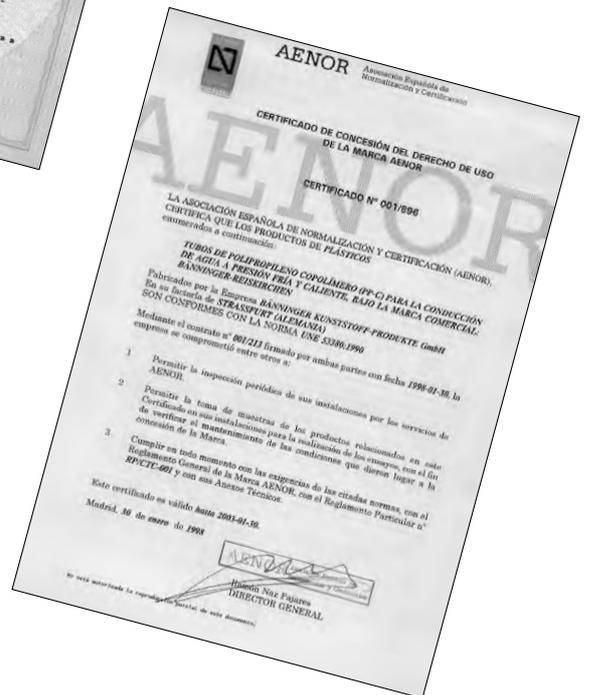
EG 112
vom Typ
entfällt
die Konformität mit
DIN 8077:2007-05
DIN 8078:2007-08
DIN 15874-2:2004-03
DIN EN ISO 15874-2:2004-03
Zertifizierungsprogramm ZP 9.18.1
bestätigt und das Nutzungsrecht für die Zeichen

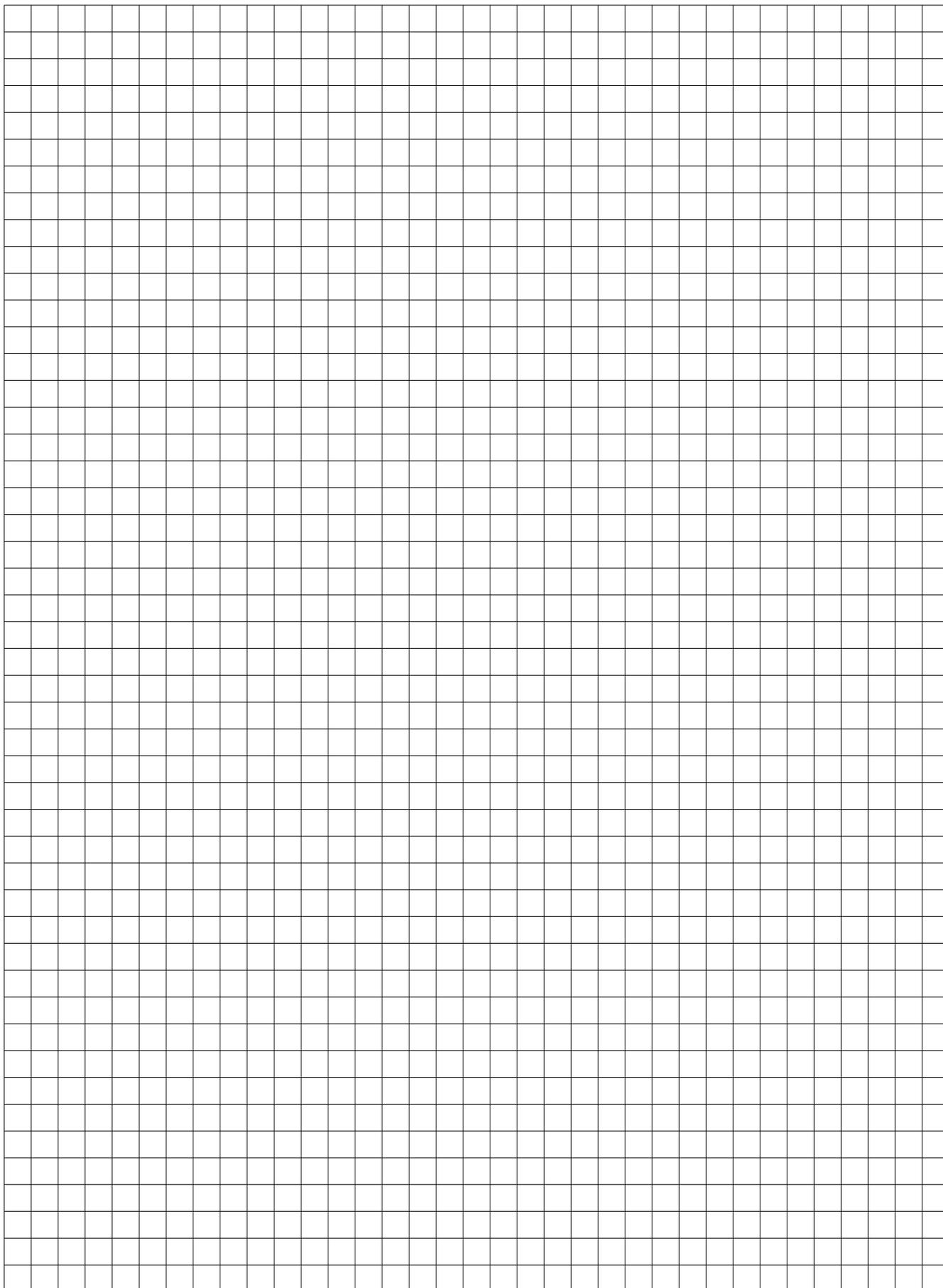
DIN plus **KO**

In Verbindung mit der unten genannten Registernummer erteilt.
Registernummer: **P1R0202**
Dieses Zertifikat ist unbefristet gültig,
solange die erforderlichen Überwachungen mit positivem Ergebnis durchgeführt werden.

2007-07-03
Dipl.-Ing. Dipl.-Wl.-Ing. Sören Scholz
- Stellv. Leiter der Zertifizierungsstelle -

Weitere Angaben siehe Anhang
DIN CERTCO Gesellschaft für
Konformitätsbewertung mbH
Alboinstraße 56, 12103 Berlin





Planning and Working Instructions

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Pressure Test	76 – 79
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Material:

PP-R (Polypropylene Random-Copolymerisate) of high molecular weight and stabilized to high temperature. The material corresponds to KTW-recommendation of the German Board of Health.

Joining:

Welding joints

Socket welding by heating-elements according to DVS (German Welding Inst.) specifications: leaflet 2207, part 11, section 3.2.

Tools and devices for socket-welding by heating-elements according to DVS leaflet 2208, part 1, section 5, schedule 2, type A.

Threaded joints:

The threaded joints of adaptor pipe-fittings correspond to the requirements of DIN 2999 resp. ISO 7, i. e. cylindrical female thread, conical male thread. Male threads for connecting backnuts correspond to the requirements of DIN-ISO 228, part 1.

Dimensions:

Pipes: According to DIN 8077 (Pipes of polypropylene PP).

Fittings: According to DIN 16962, part 6 to 9 (Pipe connections and fittings for polypropylene PP) injection moulded fittings, z-dimensions tolerance ± 3 mm, we reserve the right to modify dimensions without prior notice.

Quality:

Pipes: according to DIN 8078 for PP-R (polypropylene PP pipes).

General quality standards, test.

Fittings: according to DIN 16962 part 5 A (E type 3)

(Pipe connections and fittings for polypropylene PP pressure pipeline.)

General quality standards, test.

Operating pressure:

For cold water at 20° C: up to 20 bar¹⁾

for hot water at 70° C: up to 10 bar¹⁾

for heating at 70° C: up to 3 bar.

The regulations and guide-lines dealing with the different fields of application are to be observed.

Chemical Resistance:

Detailed information regarding the chemical resistance of polypropylene pipes and pipelines are available in annex 1 to DIN 8078. Please note the explanations on page 1 of annex.

Orders:

When ordering please state dimensions and number and part number in addition to the designation of the piece required.

Example: Elbow 90°, d 32, No. 8090

Marking:

The fittings are marked as follows:

Example: **B•R**, d, PP-R, P

Signs and Symbols:

d = nominal size = pipe diameter

R = male thread-conical

Rp = female thread-cylindric

Rc = female thread-conical

G = male thread-cylindric

Stp = standard packing

® = registered trade mark

AL = number of screw holes

Utilization

The system of tubing of PP-R, as described in this catalogue, has primarily been developed for application in the sanitary field for cold and hot water.

This system can be applied as well in the industrial section.

Pipes and fittings are dimensioned in a way to assure, according to actual results of long-term tests, a utilisation of at least 50 years, based on max. 10 bar and a constant temperature of 70 degrees Celsius.

For hot water piping according to DIN 1988 the pipe row 6 (PN 20) according to DIN 8077 is valid, for dimensions according to table 1.

Pipes are available in lengths of 4 m.

Plastic pipes and fittings of PP-R generally offer all advantages which have been registered in all sections of industry and of installation technics. Above all the excellent resistance of corrosion gives proof of an extensively long utilization of installation tubing in the building technic, without risk of damages known from metallic materials. Therefore PP-R as installation-material represents an excellent choice for piping of cold and hot water.

Material Properties of PP-R and PP-RCT

Properties	Measuring technique	Unit	PP - R Value	PP - RCT Value
Melting index MFR 190/5 MFR 230/2,16	ISO / R 1133	g/10 min. g/10 min.	0,5 0,24 – 0,36	0,5 0,24 – 0,36
Density	ISO / R 1183	g/cm ³	0,895	0,905
Melting range	polarizing microscope	0°C 0° F	140 – 150 289 – 302	140 – 150 284 – 302
Yield stress Tensile strength Tensile expansion	ISO / R 527 feed speed Test bar	N/mm ² N/mm ² %	21 40 600	25 45 300
Bending stress at 3,5% Marginal fibre expansion	ISO 178 test specimen 5.1	N/mm ²	20	23
Modulus of elasticity	ISO 178	N/mm ²	800	900
Mechanical properties following impact bending test at 0° C	DIN 8078		no fracture	no fracture
Expansion coefficient	VDE 0304 Part 1 § 4	K ⁻¹	1,5 x 10 ⁻⁴	1,5 x 10 ⁻⁴
Thermal conductivity at 20° C/58° F	DIN 52612	W/m K	0,24	0,24
Specific heat at 20° C/68° F	adiabatic calorimeter	kJ/kg K	2,0	2,0
Pipe friction factor	--		0,007	0,007

Chemical Resistance

	Conc. %	TEMPERATURE				Conc. %	TEMPERATURE		
		20°C	60°C	100°C			20°C	60°C	100°C
Acetone	TR	+	+		Ethyl acetate	TR	+	•	-
Alum	GL	+	+		Butyl acetate	TR	•	-	-
Alum of all kinds, hydr.	all	+	+		Ether				
Formic acid		+	•		Ethyl benzene	TR	•	-	-
	85	+	•	-	Ethyl chloride	TR	-	-	-
	10	+	+	•					
Ammonia, gaseous	TR	+	+		Pine needle oil	H	+	•	
Ammonia, hydr.	conc.	+	+		Hydrofluoric acid solution	40	+	+	
Ammoniumacetate	GL	+	+		Formaldehyde, hydr.	40	+	+	
Ammonium carbonate	GL	+	+		Antifreezing solution (motor vehicles)	H	+	+	+
Ammonium chloride	GL	+	+		Fruit juices	H	+	+	+
Ammonium nitrate	GL	+	+	+					
Ammonium phosphate	GL	+	+	+	Glycerine	TR	+	+	+
Ammonium sulphate	GL	+	+	+					
Amylcohol, pure	TR	+	+	+	Urea, hydr.	GL	+	+	
Aniline	TR	•	•		Fuel oil	H	+	•	
Apple juice	H	+	+	+	Heptane	TR	+	•	-
					Hexane	TR	+	•	
Batterie acid		+	+						
Barium salts	GL	+	+	+	Iso-octane	TR	+	•	-
Benzaldehyde	GL	+	+						
Benzine	H	•	-	-	Jodine salution	H	+	•	
Benzoic acid	GL	+	+						
Benzene	TR	•	+	-	Caustic potash solution (potassium hydroxide)	50	+	+	+
Succinic acid, hydr.	GL	+	-		Potassium carbonate (Potash)	GL	+	+	
Beer	H	+	+	+	Potassium chlorate	GL	+	+	
Bleaching solution	20	•	•	-	Potassium chloride	GL	+	+	
Borax	L	+	+		Bichromate of potash	GL	+	+	
Boric acid	GL	+	+	+	Potassium iodide	GL	+	+	
Bromine, liquid	TR	-	-		Potassium nitrate, hydr.	GL	+	+	
Bromine, vapours	all	•	-	-	Potassium permanganate	GL	+	-	
Bromine water	GL	•	-	-	Potassium persulphate	GL	+	+	
Butane gas	TR	+	+		Coconut oil	TR	+		
Butyl acetate					Cresol	90	+	+	
Calcium chloride	GL	+	+	+	LANOLIN®	H	+	•	
Calcium nitrate	GL	+	+		Linseed oil	H	+	+	+
Corn oil	TR	+	•		Lactic acid	90	+	+	
Chlor, liquid	TR	-	-	-					
Chlorine, gaseous wet	1	-	-	-	Magnesium salts	GL	+	+	
Chlorobenzene	TR	•			Menthol	TR	+	•	
Chloride of lime	all	+	+		Methanol	TR	+	+	
Chloroform	TR	•	-	-	Methylene chloride	TR	•	-	-
Chlorosulphonic acid	TR	-	-	-	Methyl ethyl ketone	TR	+	•	
Chlorine water	GL	•	-	-	Milk	H	+	+	+
Hydrogen chloride, gaseous	TR	+	+		Motor oil (motor vehicles)	TR	+	•	
Chromic sulphuric acid		-	-	-	Nickle salts, hydr.	GL	+	+	
Cyclohexane	TR	+							
Cyclohexanol	TR	+	•		Sodium carbonate	50	+	+	•
Cyclohexanone	TR	•	-	-	Sodium chlorate	GL	+	+	
					Sodium chloride	VL	+	+	+
Dekahydronaphtaline	TR	•	-	-	Sodium chlorite, hydr.	2 - 20	+	•	-
Dibutyl phthalate	TR	•	-	-	Sodium hydrochlorite, hydr.	10	+		
Diesel oil	H	+	•		Sodium nitrate	GL	+	+	
Diethylether	TR	+	•		Sodium nitrite	G	+	+	
1,4-Dioxane	TR	•	•		Sodium phosphate	GL	+	+	+
					Sodium sulphate	GL	+	+	
Peanut oil	TR	+	+		Sodium sulphide	GL	+	+	
Vinegar	H	+	+	+	Sodium sulphite	40	+	+	+
Acetic acid (glacial acetic acid)	TR	+	•	-	Sodium thiosulphate	GL	+	+	
Acetic acid, hydr.	50	+	+	•	Caustic soda solution	up to 60	+	+	+
Acetic acid anhydride	TR	+							

Chemical Resistance

	Conc. %	TEMPERATURE				Conc. %	TEMPERATURE		
		20°C	60°C	100°C			20°C	60°C	100°C
Oleum	TR	-	-	-	Xylene	TR	•	-	-
Olive oil	TR	+	+	•	Zinc salts, hydr.	GL	+	+	
Oleic acid	GL	+	•	-	Stannous chloride	GL	+	+	
Oxalic	GL	+	+	•	Citric acid, hydr.	VL	+	+	+
Ozone	0,5 ppm	+	•		Sugar sirup	H	+	+	
Paraffin	H	+	+						
Paraffin oil	TR	+	•	-					
Perchloroethylene									
Petroleum ether	TR	+	•						
Petroleum	TR	+	•						
Peppermint oil	TR	+							
Phenol (hydr. phase)	5	+	+						
Phosphoric acid	85	+	+	+					
Photographic developer	H	+	+						
Propane, gaseous	TR	+	•						
Pyridine	TR	•	•						
Mercury	TR	+	+						
Mercury salts	GL	+	+						
Castor oil	TR	+	+						
Nitric acid, hydr.	10	+	•	-					
Hydrochloric acid, hydr.	up to 20	+	+						
	20 - 36	+	•						
Sulphur dioxide	TR	+	+						
Carbonum disulphide	TR	-	-	-					
Sulphuric acid, hydr.	80-TR	•	-						
	10 - 80	+	+						
	10	+	+	+					
Hydrogen sulphide	TR	+	+						
Sea water	H	+	+	+					
Silver salts	GL	+	+						
Silicone oil	TR	+	+	+					
Sodium carbonate (soda)	50	+	+	•					
Soybean oil	TR	+	•						
Starch solution, hydr.	all	+	+						
Turpentine oil	TR	-	-	-					
Turpentine substitute	TR	+	•	-					
Tetrachloroethane	TR	•	-	-					
Tetrachloroethylene (Perchloroethylen)	TR	•	•						
Carbon Tetrachloride	TR	-	-	-					
Tetrahydrofurane	TR	•	-	-					
Tetrahydronaphthalene (Tetralin)	TR	-	-	-					
Toluene	TR	•	-	-					
Transformer oil	TR	•	-	-					
Trichloroethylene	TR	-	-	-					
Petroleum jelly	TR	+	•						
Detergent	VL	+	+						
Water	H	+	+	+					
Hydrogen peroxide, hydr.	30	+	•						
Tricresyl phosphate	TR	+	•						
Trioctyl phosphate	TR	+							
Wine	H	+	+						
Tartaric acid, hydr.	10	+	+						

Signs and symbols:

VL = moderate loosening, mass-part ≤ 10%

L = moderate loosening, mass-part > 10%

GL = Saturated (with 20°C), hydrous solution

TR = medium rate flow is minimum-technical pure

H = usual in trade composition

+ = resistant

• = limited resistant

- = inconstant



Application Areas / max. Operating Pressures

Application areas for fittings and pipes made of PP-R and PP-RCT according to DIN 8077

Cold water pipelines:

Continuous operation temperature up to 20°C
Continuous operation pressure up to 20 bar

Hot water pipelines:

Continuous operation temperature up to 70°C
Continuous operation pressure up to 10 bar

Heating pipelines:

Continuous operation temperature up to 70°C
Continuous operation pressure up to 3 bar
(Installation pressure according to
DIN EN 12828)

Temperature °C	Operating years					
	1	5	10	25	50	100
	Max. Operating pressure (bar) according to DIN 8077					

Field of application: Drinking water and sanitary installation

G 8160 B PP-RCT Pressure Pipe 20° C/1,6 MPa, 60° C/0,8 MPa	20	16,6	16,0	15,8	15,5	15,3	15,1
	40	12,3	11,9	11,7	11,5	11,3	11,1
60	8,9	8,6	8,4	8,2	8,1	-	
70	7,5	7,2	7,0	6,9	6,8	-	
80	6,2	6,0	5,9	5,7	-	-	
95	4,7	4,4	4,3	-	-	-	

G 8200 B PP-RCT Pressure Pipe 20° C/2,0 MPa, 70° C/1,0 MPa	20	26,3	25,4	25,1	24,6	24,3	24,0
	40	19,6	18,9	18,6	18,2	17,9	17,6
60	14,2	13,6	13,4	13,1	12,8	-	
70	11,9	11,4	11,2	10,9	10,7	-	
80	9,9	9,5	9,3	9,1	-	-	
95	7,4	7,1	6,9	-	-	-	

G 8200 PP-R Pressure Pipe 20° C/2,0 MPa, 70° C/1,0 MPa	20	29,9	28,1	27,4	26,4	25,7	25,0
	40	21,6	20,2	19,6	18,8	18,3	17,8
60	15,4	14,3	13,9	13,3	12,9	-	
70	12,9	12,0	11,6	10,0	8,5	-	
80	10,8	9,6	8,1	6,5	-	-	
95	7,6	5,2	4,3	-	-	-	

G 8215 B PP-RCT Stabi composite pipe 20° C/2,0 MPa, 70° C/1,0 MPa	20	25,0	24,2	23,9	23,5	23,1	22,8
	40	18,6	18,0	17,7	17,3	17,1	16,8
60	13,5	13,0	12,7	12,4	12,2	-	
70	11,3	10,9	10,7	10,4	10,2	-	
80	9,5	9,0	8,9	8,6	-	-	
95	7,1	6,7	6,6	-	-	-	

Application Areas / max. Operating Pressures

Application areas for fittings and pipes made of PP-R and PP-RCT according to DIN 8077

Cold water pipelines:

Continuous operation temperature up to 20°C
Continuous operation pressure up to 20 bar

Hot water pipelines:

Continuous operation temperature up to 70°C
Continuous operation pressure up to 10 bar

Heating pipelines:

Continuous operation temperature up to 70°C
Continuous operation pressure up to 3 bar
(Installation pressure according to
DIN EN 12828)

Temperature °C	Operating years					
	1	5	10	25	50	100
	Max. Operating pressure (bar) according to DIN 8077					

Field of application: Drinking water and sanitary installation

G 8200 FW PP-RCT Fiber composite pipe Watertec 20° C/2,0 MPa, 70° C/1,0 MPa	20	25,0	24,2	23,9	23,5	23,1	22,8
	40	18,6	18,0	17,7	17,3	17,1	16,8
	60	13,5	13,0	12,7	12,4	12,2	–
	70	11,3	10,9	10,7	10,4	10,2	–
	80	9,5	9,0	8,9	8,6	–	–
	95	7,1	6,7	6,6	–	–	–

G 8200 FW PP-RCT Fiber composite pipe Watertec 20° C/1,6 MPa, 70° C/0,8 MPa	20	19,9	19,3	19,0	18,6	18,4	18,1
	40	14,8	14,3	14,1	13,8	13,6	13,3
	60	10,7	10,3	10,1	9,9	9,7	–
	70	9,0	8,6	8,5	8,3	8,1	–
	80	7,5	7,2	7,0	6,9	–	–
	95	5,6	5,3	5,2	–	–	–

Field of application:

Air conditioning, Industrial plants, Drinking water and sanitary installation

G 8160 FC PP-RCT Fiber composite pipe Climatec 20° C/1,6 MPa, 70° C/0,8 MPa	20	19,9	19,3	19,0	18,6	18,4	18,1
	40	14,8	14,3	14,1	13,8	13,6	13,3
	60	10,7	10,3	10,1	9,9	9,7	–
	70	9,0	8,6	8,5	8,3	8,1	–
	80	7,5	7,2	7,0	6,9	–	–
	95	5,6	5,3	5,2	–	–	–

G 8160 FC PP-RCT Fiber composite pipe Climatec 20° C/1,0 MPa, 70° C/0,5 MPa	20	12,5	12,1	12,0	11,7	11,6	11,4
	40	9,3	9,0	8,8	8,7	8,5	8,4
	60	6,7	6,5	6,4	6,2	6,1	–
	70	5,7	5,4	5,3	5,2	5,1	–
	80	4,7	4,5	4,4	4,3	–	–
	95	3,5	3,3	3,3	–	–	–

Operating Conditions

Classification of operating conditions according to DIN EN ISO 15874-1

The selection of a particular application class according to the following table should be agreed among the contracting parties.

For each application class an allowable operating pressure p_D of 4 bar²⁾, 6 bar, 8 bar or 10 bar applies, depending on the application.

Application class	Calculation-temperature T_D °C	Service life ^b at T_D Years	T_{max} °C	Service life at T_{max} Year(s)	T_{mal} °C	Service life at T_{mal} h	Typical application area	PP-R pipe system SDR 6	PP-RCT pipe system SDR 7,4
1 ^a	60	49	80	1	95	100	Hot water supply (60°C)	10 bar	10 bar
2 ^a	70	49	80	1	95	100	Hot water supply (70°C)	8 bar	10 bar
4 ^b	20 Followed by 40 Followed by 60 Followed by (see next column)	2,5 20 25	70 Followed by (see next column)	2,5	100	100	Floor heating and Low temperature radiator connections	10 bar	10 bar
5 ^b	20 Followed by 60 Followed by 80 Followed by (see next column)	14 25 10	90 Followed by (see next column)	1	100	100	High temperature radiator connections	6 bar	8 bar

^a Pertinent to the national regulations either application class 1 or application class 2 may be selected.

^b If there is more than one operational temperature for one application area the corresponding service life time should be summed (for example the temperature collective for class 5 for a period of 50 years consists of:

- 20°C over 14 years followed by
- 60°C over 25 years followed by
- 80°C over 10 years followed by
- 90°C over 1 year followed by
- 100°C over 100 h)

Explanation:

The column T_{mal} indicates the highest allowed temperature (for example at disruption of the controlling), max 100° C

The column **Service life at T_{mal}** shows that this breakdown temperature allows a max period of 100 h (over 50 years) whereas single breakdown segments should not exceed 3 hours.

REMARK:

This norm does not apply when higher values are assigned to T_D , T_{max} and T_{mal} than those quoted on the table.

2) 1 bar = 10^5 N/m² = 0,1 MPa

Allowed Operating Overpressures

Allowed operating pressures

for hot water and heating water pipelines made of PP-R and PP-RCT

Time-Temperature collective	Temperature	Operating period (Years)	PP-R	PP-RCT		
			Allowed operating pressures • Nominal pressure			
			SDR 6 ¹⁾ (bar)	SDR 7,4 (bar)	SDR 9 (bar)	SDR11 (bar)
Continuous temperature 70°C including 30 days per year with ➔	75°C	5	14,12	13,30	10,50	8,40
		10	13,66	13,00	10,30	8,20
		25	11,69	12,70	10,10	8,00
		45	10,13	12,50	9,90	7,90
	80°C	5	13,80	12,20	9,70	7,70
		10	13,36	12,00	9,50	7,50
		25	11,04	11,70	9,30	7,30
		42,5	9,70	11,50	9,10	7,20
	85°C	5	13,28	11,10	8,80	7,00
		10	12,53	10,90	8,70	6,90
		25	10,03	10,60	8,40	6,70
		37,5	9,09	10,50	8,30	6,60
	90°C	5	12,57	10,10	8,00	6,40
		10	10,94	9,90	7,90	6,20
		25	8,76	9,60	7,60	6,10
		35	8,07	9,50	7,60	6,00
Continuous temperature 70°C including 60 days per year with ➔	75°C	5	14,06	13,10	10,40	8,20
		10	13,32	12,80	10,20	8,10
		25	11,30	12,50	9,90	7,90
		45	9,83	12,30	9,80	7,80
	80°C	5	13,09	12,00	9,50	7,50
		10	12,44	11,70	9,30	7,40
		25	10,52	11,50	9,10	7,20
		40	9,31	11,30	9,00	7,10
	85°C	5	11,96	10,90	8,70	6,90
		10	11,33	10,40	8,30	6,60
		25	9,04	10,40	8,30	6,60
		35	8,32	10,30	8,20	6,50
	90°C	5	10,79	9,90	7,90	6,20
		10	9,66	9,70	7,70	6,10
		25	7,71	9,40	7,50	5,90
		30	7,39	9,40	7,40	5,90
Continuous temperature 70°C including 90 days per year with ➔	75°C	5	13,85	13,00	10,30	8,20
		10	13,40	12,70	10,10	8,00
		25	11,13	12,40	9,80	7,80
		45	9,65	12,20	9,70	7,70
	80°C	5	13,19	11,80	9,40	7,50
		10	12,32	11,60	9,20	7,30
		25	8,86	11,30	9,00	7,10
		37,5	8,94	11,20	8,90	7,00
	85°C	5	12,36	10,80	8,60	6,80
		10	10,52	10,60	8,40	6,60
		25	8,42	10,30	8,20	6,50
		32,5	7,90	10,20	8,10	6,40
	90°C	5	10,40	9,80	7,80	6,20
		10	8,79	9,60	7,60	6,00
		25	7,03	9,30	7,40	5,90

¹⁾ SDR = Standard Dimension Ratio = diameter / wall thickness



Allowed Operating Overpressures

Allowed operating pressures

for hot water and heating water pipelines made of PP-R and PP-RCT

Time-Temperature collective	Temperature	Operating period (Years)	PP-R	PP-RCT		
			Allowed operating pressures • Nominal pressure			
			SDR 6 ¹⁾ (bar)	SDR 7,4 (bar)	SDR 9 (bar)	SDR11 (bar)
Continuous temperature 70°C including 120 days per year with →	75°C	5		12,90	10,20	8,10
		10		12,60	10,00	7,90
		25		12,30	9,70	7,70
		45		12,10	9,60	7,60
	80°C	5		11,70	9,30	7,40
		10		11,50	9,10	7,20
		25		11,20	8,90	7,10
		35		11,10	8,80	7,00
	85°C	5		10,70	8,50	6,70
		10		10,50	8,30	6,60
		25		10,20	8,10	6,40
		30		10,10	8,00	6,40
	90°C	5		9,70	7,70	6,10
		10		9,50	7,50	6,00
		25		9,20	7,30	5,80
	Continuous temperature 70°C including 150 days per year with →	75°C	5		12,80	10,10
10				12,50	10,00	7,90
25				12,20	9,70	7,70
40				12,10	9,60	7,60
80°C		5		11,70	9,30	7,30
		10		11,40	9,10	7,20
		25		11,20	8,90	7,00
		35		11,10	8,80	7,00
85°C		5		10,60	8,40	6,70
		10		10,40	8,20	6,50
		25		10,10	8,00	6,40
90°C		5		9,60	7,60	6,00
		10		9,40	7,50	5,90
		20		9,30	7,30	5,80

Allowed Operating Overpressures

Allowed operating pressures

for hot water and heating water pipelines made of PP-R and PP-RCT

Time-Temperature collective	Temperature	Operating period (Years)	PP-R	PP-RCT			
			Allowed operating pressures • Nominal pressure				
			SDR 6 ¹⁾ (bar)	SDR 7,4 (bar)	SDR 9 (bar)	SDR11 (bar)	
Continuous temperature 70°C including 180 days per year with →	75°C	5		12,70	10,10	8,00	
		10		12,50	9,90	7,90	
		25		12,20	9,70	7,70	
		45		12,00	9,50	7,60	
	80°C	5		11,60	9,20	7,30	
		10		11,40	9,00	7,20	
		25		11,10	8,80	7,00	
		30		11,00	8,80	6,90	
	85°C	5		10,50	8,40	6,60	
		10		10,30	8,20	6,50	
		25		10,10	8,00	6,30	
	90°C	5		9,60	7,60	6,00	
		10		9,40	7,40	5,90	
		18		9,20	7,30	5,80	
	Continuous temperature 70°C including 210 days per year with →	75°C	5		12,70	10,10	8,00
			10		12,40	9,90	7,80
25				12,10	9,60	7,60	
40				12,00	9,50	7,50	
80°C		5		11,60	9,20	7,30	
		10		11,30	9,00	7,10	
		25		11,10	8,80	7,00	
		30		11,00	8,70	6,90	
85°C		5		10,50	8,30	6,60	
		10		10,30	8,20	6,50	
		25		10,00	8,00	6,30	
90°C		5		9,50	7,60	6,00	
		10		9,30	7,40	5,90	
		15		9,20	7,30	5,80	

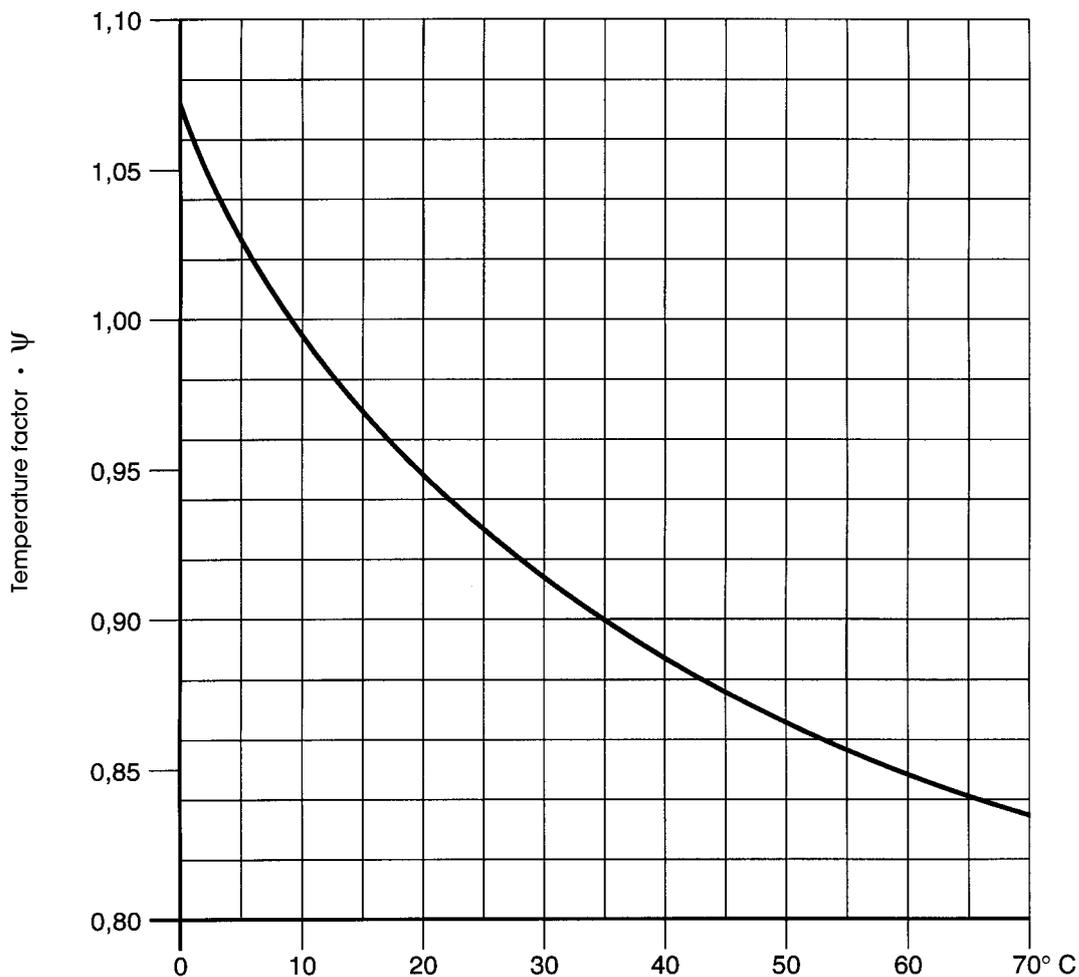


Fig. 2: Temperature of the flow medium

For the individual fitting resistance the values given in the chart below (fig. 3) can be applied by approximation. The individual joint resistance values can be determined altogether. As a standard value add an extra of 3% to 5% to the overall pressure drop.

Outside pipe diameter d mm	16	20	32	50	≥ 63
	25	40	63		
Fitting Type	Drag coefficient ζ				
	1,5	1,0	0,6	0,5	
	2,0	1,7	1,1	0,8	
	0,3				
	1,5				
	0,5				
	1,0				

Fig. 3: Pressure drop in fittings

Minimum Flow Pressures

Reference values for the minimum flow pressures and calculated flows for generally used drinking water service points

Minimum flow pressure $P_{\min FI}$ bar	Type of drinking water service points		Calculated flow for outlet of			
			Mixed water		Either cold or hot water	
			Volume flow cold l/s	Volume flow hot l/s	Volume flow l/s	
0.5	Outlet valve without air whirler	DN 15	-	-	0.30	
0.5		DN 20	-	-	0.50	
0.5		DN 25	-	-	1.00	
1.0		with air whirler	DN 10	-	-	0.15
1.0			DN 15	-	-	0.15
1.0	Shower heads for clinsing showers	DN 15	0.10	0.10	0.20	
1.2	Pressure rinser in acc.to DIN 3265 part 1	DN 15	-	-	0.70	
1.2		DN 20	-	-	1.00	
0.4		DN 25	-	-	1.00	
1.0		DN 15	-	-	0.30	
0.5	Corner valve for urinals	DN 15	-	-	0.30	
1.0	Household dishwasher	DN 15	-	-	0.15	
1.0	Household washing machine	DN 15	-	-	0.25	
1.0	Mixer for showers	DN 15	0.15	0.15	-	
1.0		bath tubs	DN 15	0.15	0.15	-
1.0		kitchen sinks	DN 15	0.07	0.07	-
1.0		wash-stands	DN 15	0.07	0.07	-
1.0		bidet	DN 15	0.07	0.07	-
1.0	Mixer	DN 20	0.30	0.30	-	
0.5	Flushing box acc.to DIN 19542	DN 15	-	-	0.13	
1.0	Heater for drinking water for supply of service point (incl. fitting for mixed outlet) electric water boiler	DN 15	-	-	0.10*	
1.1**		Electric hot water tank and boiler with nominal contents 5 – 15 l	DN 15	-	-	0.10
1.2**			DN 15	-	-	0.20
1.5	Electric flow water heater with hydraulic test, without flow limitation nominal capacity	12 kW	-	-	0.06	
1.9		18 kW	-	-	0.08	
2.1		21 kW	-	-	0.09	
2.4		24 kW	-	-	0.10	
1.0	Gas flow water heater	12 kW	-	-	0.10	

* with fully opened throttle valve - ** values under unfavourable conditions (shower)

Note: Service points which are not included in the table and devices of similar kind with larger armature flows than indicated are to be taken into account according to the recommendations of the manufacturer as far as determination of pipe diameter is concerned

Linear Deformation of PP-R/PP-RCT Pipes under Heat Influence

Thermoplastic plastics PP-R and PP-RCT pipes are exposed to thermal expansion. The linear extension of such pipes is higher than that of steel pipes. This fact must by all means be taken into consideration in the laying process. Already in the pipe arrangement planning stage each possibility should therefore be fully utilized to compensate all extension processes within a pipe section.

The linear thermal expansion coefficient for PP-R and PP-RCT pipes is:

$$\epsilon t = 1.5 \cdot 10^{-4} \quad (\text{K}^{-1})$$

Polypropylene pipes mechanically stabilized by an aluminum coating on the pipe periphery (Stabi-Rohr/Stabi-Pipe) have a reduced thermal expansion coefficient. The aluminium coating prevents linear extension by about 4/5.

The linear thermal expansion coefficient for PP-R and PP-RCT Stabi-Pipes can by approximation assumed as:

$$\epsilon t = 0.3 \cdot 10^{-4} \quad (\text{K}^{-1})$$

The linear thermal expansion coefficient for PP-RCT Fibre-Pipes is:

$$\epsilon t = 0.35 \cdot 10^{-4} \quad (\text{K}^{-1})$$

Δl = Linear extension in (mm)

ϵt = Thermal expansion coefficient in $\left(\frac{\text{mm}}{\text{m} \cdot ^\circ\text{C}}\right)$

L = Pipe length (m)

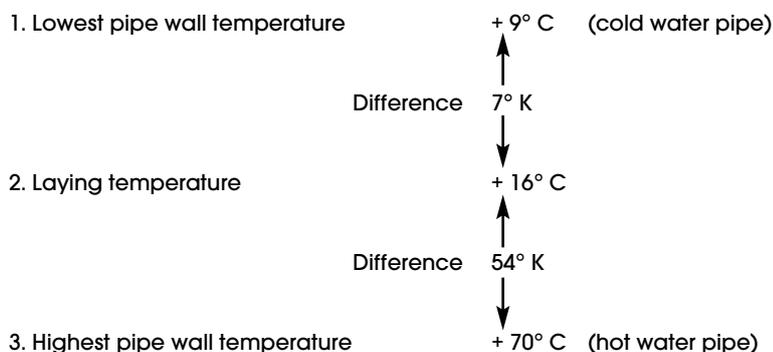
Δt = Temperature difference ($^\circ\text{K}$)

The linear deformation of a pipe is thus calculated according to the following formula:

$$\Delta l = \epsilon t \cdot L \cdot \Delta t \quad (\text{mm})$$

The calculation of the linear deformation is based on the laying temperature. The following example gives you an idea of how to calculate.

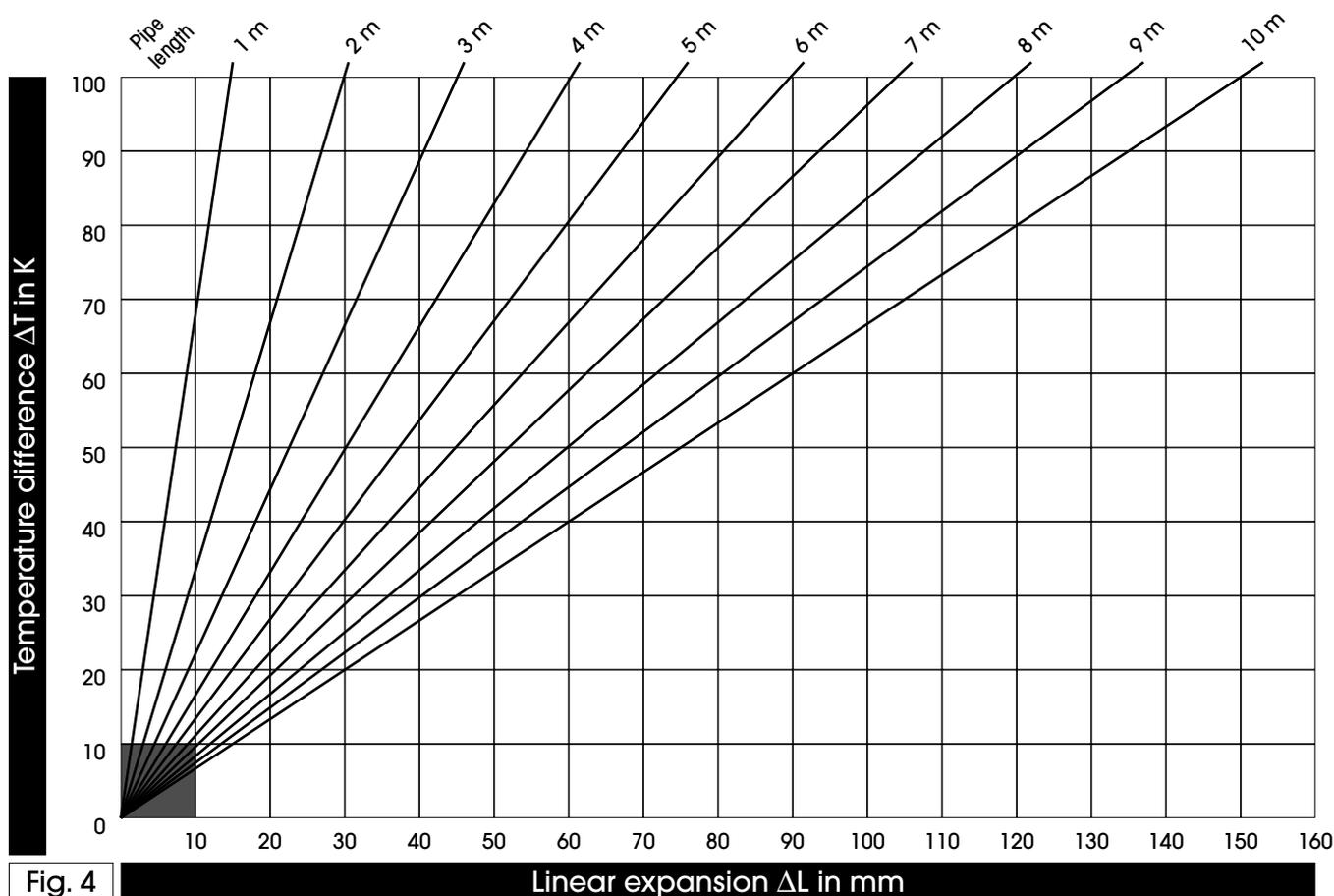
Example for a pipe length of 8m:



To 1. Shortening of the pipe: $8 \text{ m} \cdot 7^\circ \cdot 0,03 = 1,68 \text{ mm}$

To 3. Extension of the pipe: $8 \text{ m} \cdot 54^\circ \cdot 0,03 = 12,96 \text{ mm}$

Diagram and Chart to determine the temperature-dependent linear Expansion of PP-R and PP-RCT Pipes.

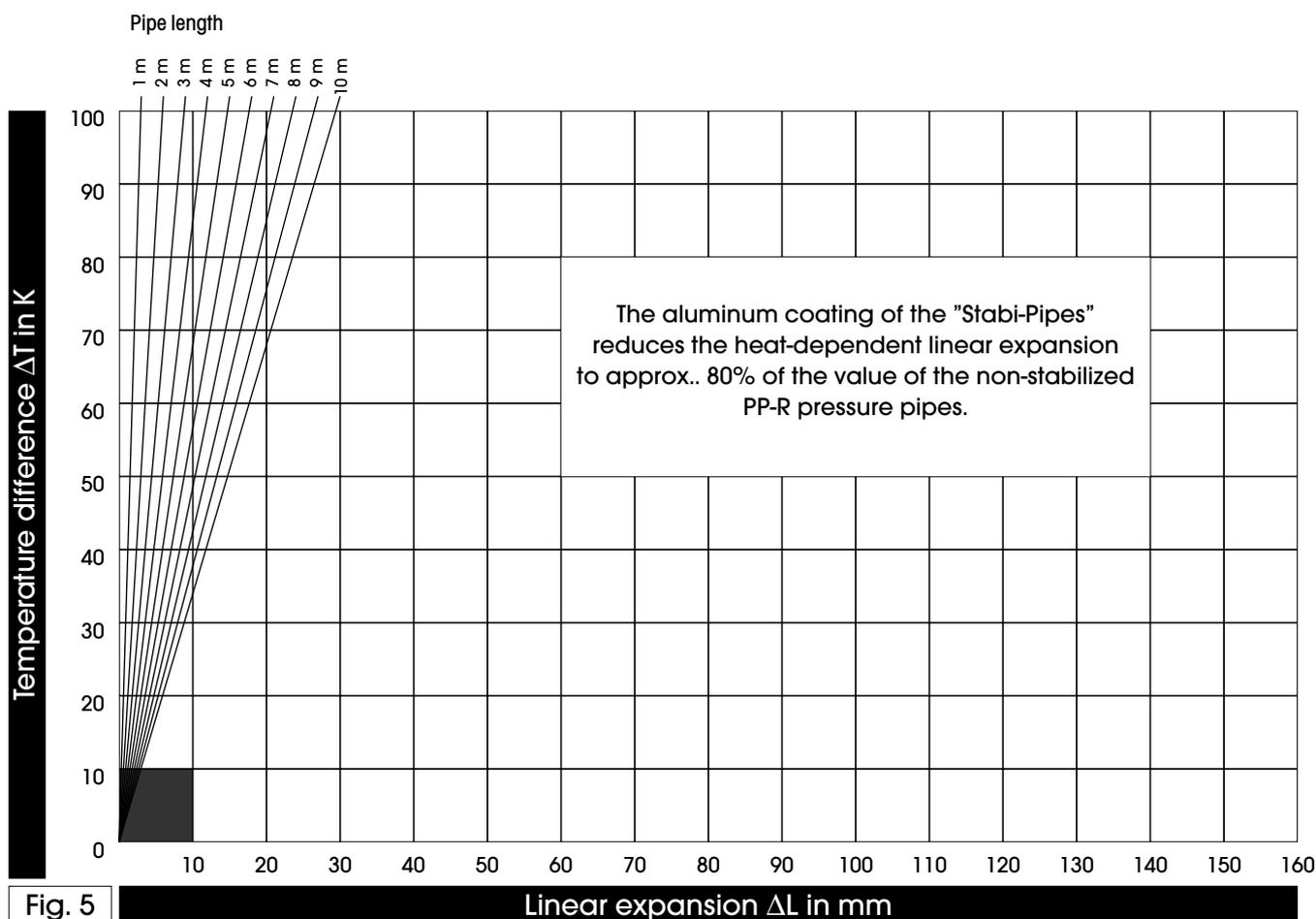


Pipe length	Temperature difference ΔT in K									
	10	20	30	40	50	60	70	80	90	100
0,1 m	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	1,50
0,2 m	0,30	0,60	0,90	1,20	1,50	1,80	2,10	2,40	2,70	3,00
0,3 m	0,45	0,90	1,35	1,80	2,25	2,70	3,15	3,60	4,05	4,50
0,4 m	0,60	1,20	1,80	2,40	3,00	3,60	4,20	4,80	5,40	6,00
0,5 m	0,75	1,50	2,25	3,00	3,75	4,50	5,25	6,00	6,75	7,50
0,6 m	0,90	1,80	2,70	3,60	4,50	5,40	6,30	7,20	8,10	9,00
0,7 m	1,05	2,10	3,15	4,20	5,25	6,30	7,35	8,40	9,45	10,50
0,8 m	1,20	2,40	3,60	4,80	6,00	7,20	8,40	9,60	10,80	12,00
0,9 m	1,35	2,70	4,05	5,40	6,75	8,10	9,45	10,80	12,15	13,50
1,0 m	1,50	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00
2,0 m	3,00	6,00	9,00	12,00	15,00	18,00	21,00	24,00	27,00	30,00
3,0 m	4,50	9,00	13,50	18,00	22,50	27,00	31,50	36,00	40,50	45,00
4,0 m	6,00	12,00	18,00	24,00	30,00	36,00	42,00	48,00	54,00	60,00
5,0 m	7,50	15,00	22,50	30,00	37,50	45,00	52,50	60,00	67,50	75,00
6,0 m	9,00	18,00	27,00	36,00	45,00	54,00	63,00	72,00	81,00	90,00
7,0 m	10,50	21,00	31,50	42,00	52,50	63,00	73,50	84,00	94,50	105,00
8,0 m	12,00	24,00	36,00	48,00	60,00	72,00	84,00	96,00	108,00	120,00
9,0 m	13,50	27,00	40,50	54,00	67,50	81,00	94,50	108,00	121,50	135,00
10,0 m	15,00	30,00	45,00	60,00	75,00	90,00	105,00	120,00	135,00	150,00

Fig. 4a Linear expansion ΔL in mm



Diagram and Chart to determine the temperature-dependent linear expansion of "Stabi-Pipes" (aluminium-coated PP-RCT Pipes).



		Temperature difference ΔT in K									
Pipe length	10	20	30	40	50	60	70	80	90	100	
0,1 m	0,03	0,06	0,09	0,12	0,15	0,18	0,21	0,24	0,27	0,30	
0,2 m	0,06	0,12	0,18	0,24	0,30	0,36	0,42	0,48	0,54	0,60	
0,3 m	0,09	0,18	0,27	0,36	0,45	0,54	0,63	0,72	0,81	0,90	
0,4 m	0,12	0,24	0,36	0,48	0,60	0,72	0,84	0,96	1,08	1,20	
0,5 m	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	1,50	
0,6 m	0,18	0,36	0,54	0,72	0,90	1,08	1,28	1,44	1,62	1,80	
0,7 m	0,21	0,42	0,63	0,84	1,05	1,26	1,47	1,68	1,89	2,10	
0,8 m	0,24	0,48	0,72	0,96	1,20	1,44	1,68	1,92	2,16	2,40	
0,9 m	0,27	0,54	0,81	1,08	1,35	1,62	1,89	2,16	2,43	2,70	
1,0 m	0,30	0,60	0,90	1,20	1,50	1,80	2,10	2,40	2,70	3,00	
2,0 m	0,60	1,20	1,80	2,40	3,00	3,60	4,20	4,80	5,40	6,00	
3,0 m	0,90	1,80	2,70	3,60	4,50	5,40	6,30	7,20	8,10	9,00	
4,0 m	1,20	2,40	3,60	4,80	6,00	7,20	8,40	9,60	10,80	12,00	
5,0 m	1,50	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00	
6,0 m	1,80	3,60	5,40	7,20	9,00	10,80	12,80	14,40	16,20	18,00	
7,0 m	2,10	4,20	6,43	8,40	10,50	12,60	14,70	16,80	18,90	21,00	
8,0 m	2,40	4,80	7,20	9,60	12,00	14,40	16,80	19,20	21,60	24,00	
9,0 m	2,70	5,40	8,10	10,80	13,50	16,20	18,90	21,60	24,30	27,00	
10,0 m	3,00	6,00	9,00	12,00	15,00	18,00	21,00	24,00	27,00	30,00	

Fig. 5a Linear expansion ΔL in mm

Diagram and Chart to determine the temperature dependent linear Expansion of PP-RCT Fibre Pipes (PP-RCT with inlayed PP Fibre Glass Layer).

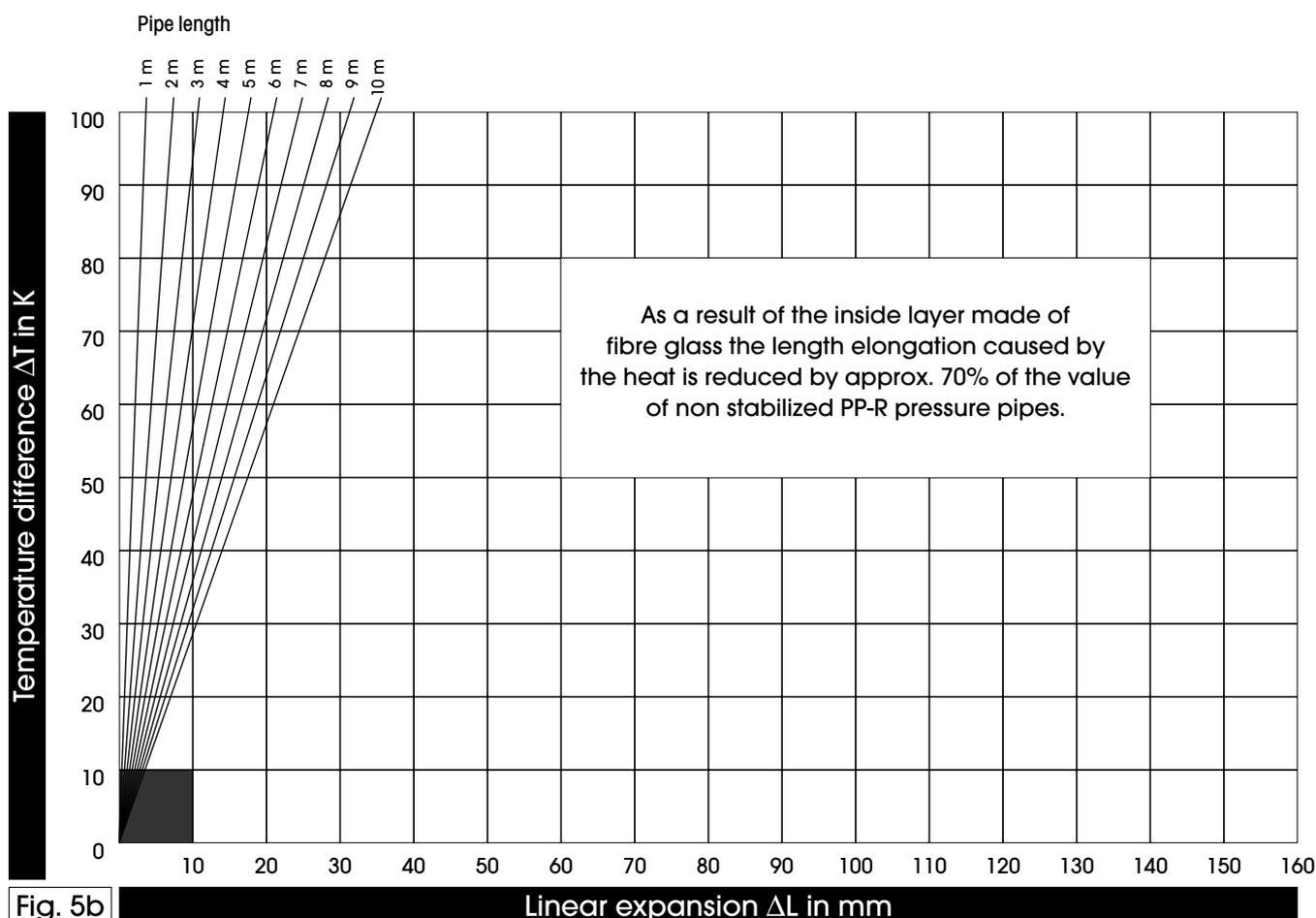


Fig. 5b

Linear expansion ΔL in mm

Pipe length	Temperature difference ΔT in K									
	10	20	30	40	50	60	70	80	90	100
0,1 m	0,04	0,07	0,11	0,14	0,18	0,21	0,25	0,28	0,32	0,35
0,2 m	0,07	0,14	0,21	0,28	0,35	0,42	0,49	0,56	0,63	0,70
0,3 m	0,11	0,21	0,32	0,42	0,53	0,63	0,74	0,84	0,95	1,05
0,4 m	0,14	0,28	0,42	0,56	0,70	0,84	0,98	1,12	1,26	1,40
0,5 m	0,18	0,35	0,53	0,70	0,88	1,05	1,23	1,40	1,58	1,75
0,6 m	0,21	0,42	0,63	0,84	1,05	1,26	1,47	1,68	1,89	2,10
0,7 m	0,25	0,49	0,74	0,98	1,23	1,47	1,72	1,96	2,21	2,45
0,8 m	0,28	0,56	0,84	1,12	1,40	1,68	1,96	2,24	2,52	2,80
0,9 m	0,32	0,63	0,95	1,26	1,58	1,89	2,21	2,52	2,84	3,15
1,0 m	0,35	0,70	1,05	1,40	1,75	2,10	2,45	2,80	3,15	3,50
2,0 m	0,70	1,40	2,10	2,80	3,50	4,20	4,90	5,60	6,30	7,00
3,0 m	1,05	2,10	3,15	4,20	5,25	6,30	7,35	8,40	9,45	10,50
4,0 m	1,40	2,80	4,20	5,60	7,00	8,40	9,80	11,20	12,60	14,00
5,0 m	1,75	3,50	5,25	7,00	8,75	10,50	12,25	14,00	15,75	17,50
6,0 m	2,10	4,20	6,30	8,40	10,50	12,60	14,70	16,80	18,90	21,00
7,0 m	2,45	4,90	7,35	9,80	12,25	14,70	17,15	19,60	22,05	24,50
8,0 m	2,80	5,60	8,40	11,20	14,00	16,80	19,60	22,40	25,20	28,00
9,0 m	3,15	6,30	9,45	12,60	15,75	18,90	22,05	25,20	28,35	31,50
10,0 m	3,50	7,00	10,50	14,00	17,50	21,00	24,50	28,00	31,50	35,00

Fig. 5c

Linear expansion ΔL in mm

Linear Extension Compensation of PP-R and PP-RCT Pipes

Mostly the linear extension of a PP-R / PP-RCT pipe line can be compensated by changing the direction. Attention has to be paid to the fact that the pipeline can easily move in axial direction. In case linear extension compensation of a changed direction is not possible installation of an expansion bend is necessary. An axial compensation is mostly not suitable and uneconomical.

For spring deflexion of a pipeline the size of the bending limb has to be considered which is calculated with the adjoining formula.

Figures 6 and 7 show the mode of action of a change of length and its compensation. The correct choice of the fixed points with regard to the necessary bending limbs L_s has to be considered.

$$L_s = C \cdot \sqrt{d \cdot \Delta L} \quad (\text{mm})$$

L_s = Length of bending limb (mm)

d = Outside pipe diameter (mm)

ΔL = Linear deformation (mm)

C = Material-depending constant for PP-R = 15

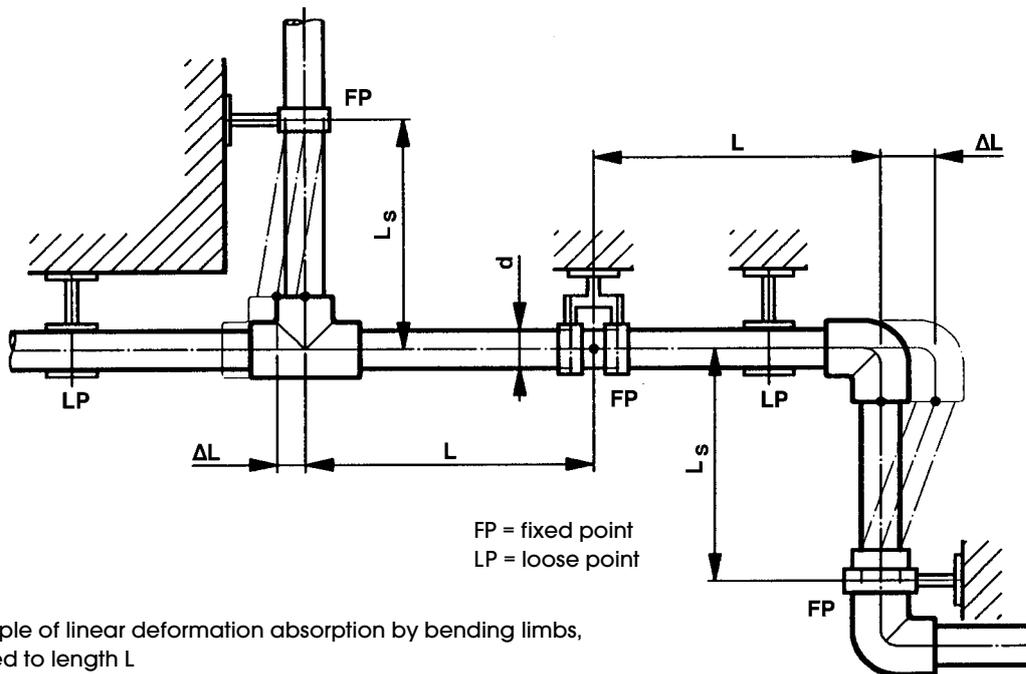


Fig. 6:
Principle of linear deformation absorption by bending limbs, related to length L

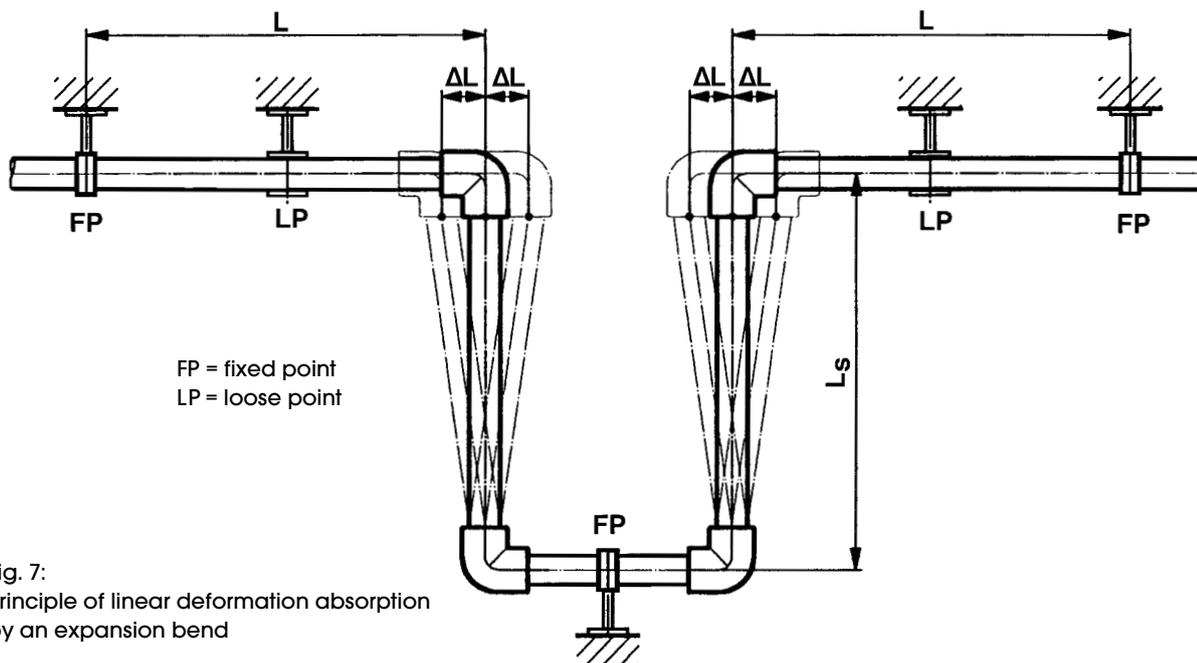


Fig. 7:
Principle of linear deformation absorption by an expansion bend

Construction of Expansion Bends

Expansion bends can easily be made right at the site.

Besides of the required pipe length 4 elbows (8090) or 4 pipe bends(8002a) are needed.

To construct an expansion bend the bending limb L_s is calculated depending on the linear deformation ΔL .

As standard value the L_s value given in the Fig. 8 diagram can be used.

Spacing B_{min} should be at least 210 mm.

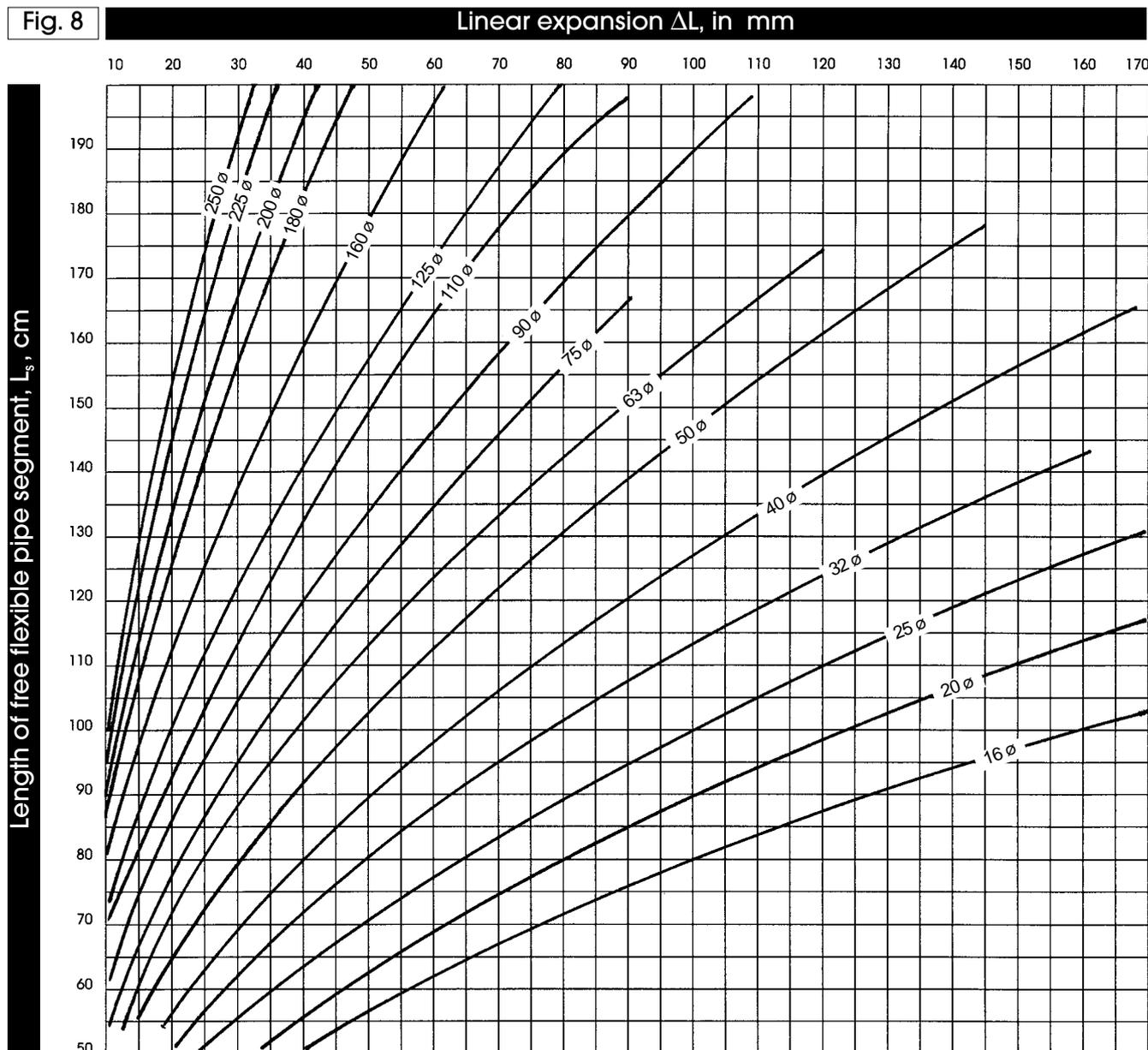
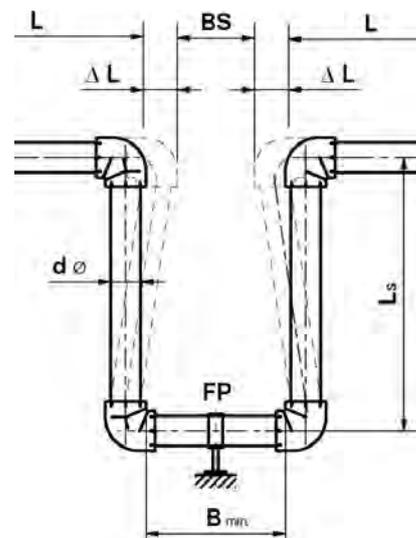
Fig. 7a:

Expansion bend, made of PP-R/PP-RCT pipe and 90° elbow

- d = Outer diameter of pipe
- L = Length of pipe
- ΔL = Linear elongation of pipe (longitudinal)
- L_s = Length of bending shank
- B_{min} = Width of bending shank
- BS = Safety distance (min.150 mm)

Calculation of expansion bend:

$$B_{min} = 2 \times \Delta L + BS$$



Example for in-wall piping

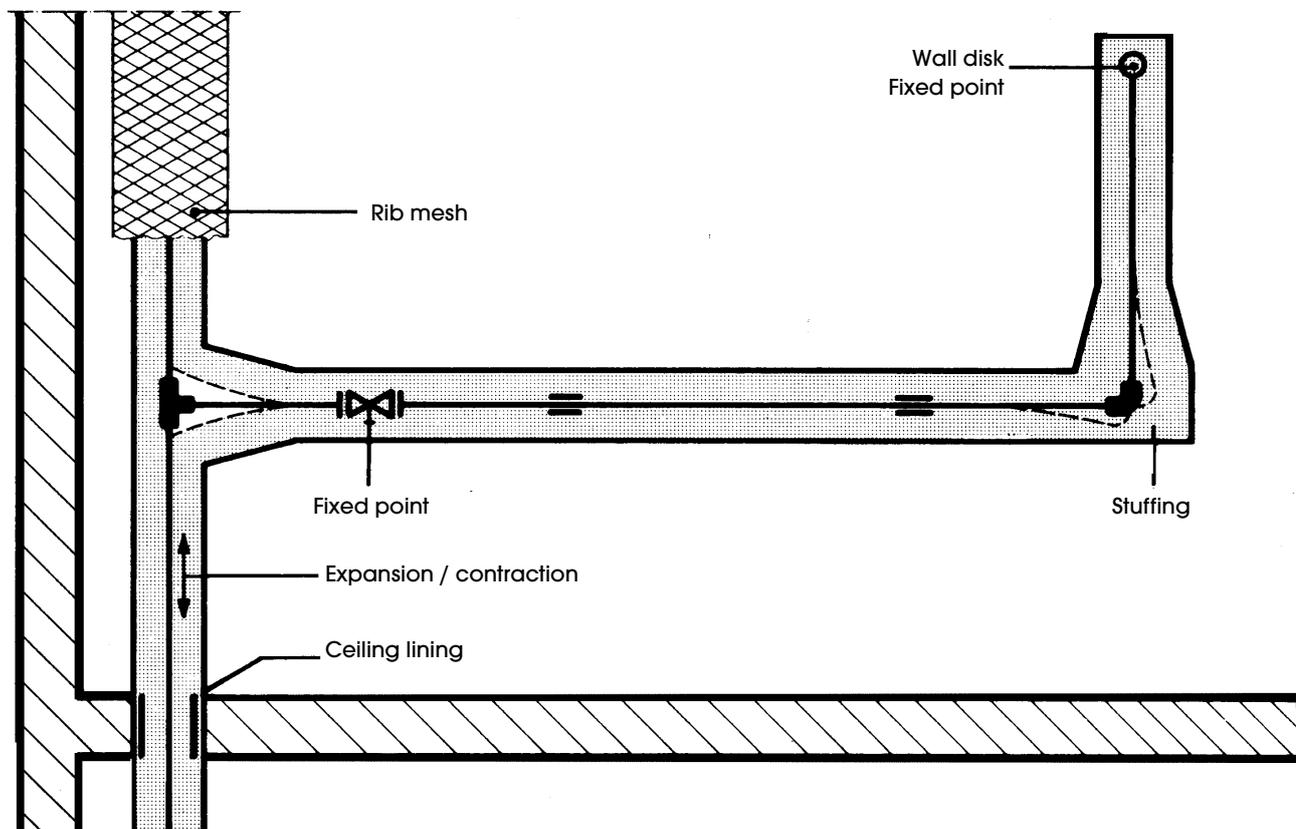


Fig. 9

Installation in Sanitary Installation Shaft:

Risers in pipe shafts have to be installed in such a way that the diverting pipeline can adjust the longitudinal expansion of the risers.

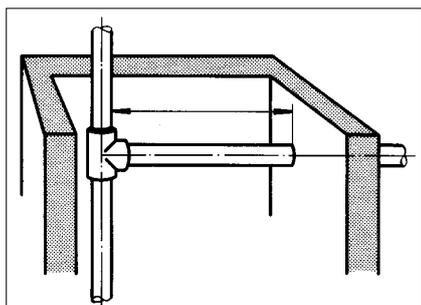


Fig. 1
Best positioning in the pipe shaft.

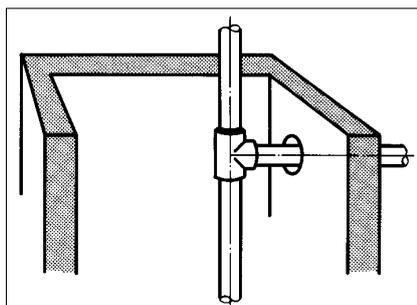


Fig. 2
Sufficient dimensioning of the casing pipe for the diverting pipeline.

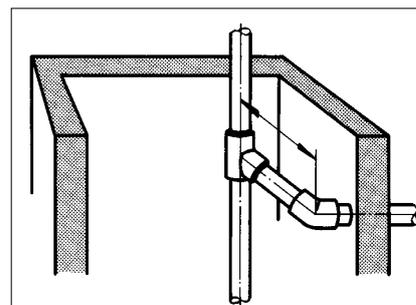


Fig. 3
Installation of a spring leg.

Installation Instructions

The kind and number of pipe fixings depends among other things on the pipe size and linear expansion. Locating points shall divide the pipes into individual pipe sections allowing expansion or contraction. The guidance of such sections is made with loose clips. The clip distances or spans depend on operation conditions, pipe material, and weight of the filled pipe. In practical use the spans given in figures 10, 10a, 11, 11a and 11b proved to be appropriate.

d mm	Spans L at cm bei T°C						
	20°C	30°C	40°C	50°C	60°C	70°C	80°C
16	60	60	60	55	45	45	40
20	65	65	60	60	60	55	50
25	75	75	70	70	65	60	55
32	90	90	85	85	80	75	70
40	110	110	105	100	95	90	85
50	125	120	115	110	105	100	90
63	140	135	130	125	120	115	105
75	155	150	145	135	130	125	115
90	165	160	155	145	140	130	120
110	185	180	170	165	155	150	140
125	190	185	180	170	160	155	150

Fig. 10: Spans for **PP-R and PP-RCT pipes**, nos. G 8200B, G 8200

d mm	Spans L at cm bei T°C				
	20°C	30°C	40°C	50°C	60°C
20	60	55	50	45	40
25	75	70	65	60	55
32	90	85	75	70	65
40	100	95	90	85	75
50	120	115	105	100	90
63	140	130	120	110	100
75	150	145	135	125	115
90	160	155	150	145	130
110	180	170	160	155	140
125	190	185	175	165	150
160	200	195	185	175	160
200	245	235	225	215	205
250	275	265	255	245	235
315	290	280	270	260	250

Fig. 10a: Spans for **PP-RCT Pipes**, no. G 8160B

d mm	Spans L at cm bei T°C						
	20°C	30°C	40°C	50°C	60°C	70°C	80°C
16	115	110	100	95	85	80	80
20	120	115	110	105	105	100	95
25	140	130	125	120	120	110	110
32	160	160	155	150	145	140	135
40	185	175	170	165	160	155	150
50	200	190	185	175	170	165	155
63	210	205	195	190	180	175	165
75	230	225	215	195	180	180	170
90	240	230	220	200	195	190	180
110	250	240	230	210	205	200	190
125	265	255	245	235	225	210	200

Fig. 11: Spans for **PP-RCT Stabi-Pipes**, no. G 8215B

Installation Instructions

d mm	Spans L at cm bei T°C						
	20°C	30°C	40°C	50°C	60°C	70°C	80°C
20	100	90	85	85	80	70	65
25	105	100	95	90	85	80	75
32	120	115	110	105	100	95	90
40	130	125	120	115	110	105	100
50	150	145	140	135	130	125	120
63	160	155	150	145	140	135	130
75	180	175	170	165	160	155	145
90	190	185	180	175	170	165	150
110	200	195	190	180	175	170	160
125	220	210	205	195	185	175	165
160	220	210	205	195	185	175	165
200	245	235	230	220	210	200	190
250	275	265	255	245	235	225	210

Fig. 11a: Spans for **PP-RCT Fibre pipes Watertec**, no. G 8200FW

d mm	Spans L at cm bei T°C						
	20°C	30°C	40°C	50°C	60°C	70°C	80°C
20	80	80	75	75	70	60	55
25	95	90	85	80	75	70	65
32	110	105	100	95	90	85	80
40	120	115	110	105	100	95	90
50	140	135	130	125	120	115	110
63	150	145	140	135	130	125	120
75	165	160	155	150	145	140	130
90	175	170	165	160	155	150	135
110	185	180	175	165	160	155	145
125	205	195	190	180	170	160	150
160	205	195	190	180	170	160	150
200	230	220	210	200	190	180	170
250	250	240	230	220	210	200	185

Fig. 11b: Spans for **PP-RCT Fibre pipes Climatec**, no. G 8160FC

Piping system pipes often require pipes to be bypassed. Cross over connections (Fig. 12) are highly suitable. Similar to manufacturing expansion bends of Bänninger parts cross over bends can easily be made with 2 elbows 45° (8040) male and female and 1 bend (8002a).

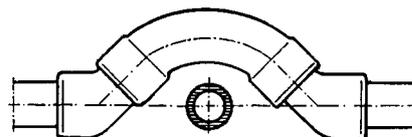


Fig. 12: Cross over connection

For connecting sanitary armatures, shut-off devices or for plastic-metal transition pieces our programme offers the required transition fittings. The threads are according to DIN 2999 and ISO 7: cylindrical female thread and conical male thread. All screw connections, threaded pipe sockets or nipples are designed for easy installation with standard wrenches.

Do not use pipe wrenches for threaded plastic parts to imperatively avoid any damage. Also a possible deformation of the parts by using a pipe wrench must be excluded.

The installation of pipes for cold and hot water supply must be done in accordance with the norms of DIN 1988.

The complete copy of DIN 1988 can be ordered as reprint from Beuth-Verlag GmbH, Burggrafenstrasse 6, 10787 Berlin.

For ceiling installation the use of galvanized or coated metal shells (Fig. 13) is recommended if necessary. In such case the fixing distances are to be extended accordingly.



Fig. 13: Pipe in shell

Equipotential Bonding

Acrylic bath and shower tubs, also with metal water supply and discharge equipment, do not require any earthing if BÄNNINGER PP-R/PP-RCT pipework is used since neither PP-R/PP-RCT nor the tubs are conductive. When using metal tubs, an equipotential bonding must be created. For further information see DIN VDE 0100, part 701.

Welding Procedure

The **Bänninger** PP-R/PP-RCT pipework is coupled by socket fusion welding. The pipes and fittings are connected longitudinally overlapping. The heating of pipe ends and sockets is done by a heating element with fitted bushes. After the necessary welding temperature is reached the joining process is done. The pipe and socket diameter as well as the respective heated bush diameters are matched to build up the necessary pressure during the joining process.

The heating element is electrically heated. It has to comply with DVS Directive 2208 part 1 in construction and accuracy.

Note on the welding process:

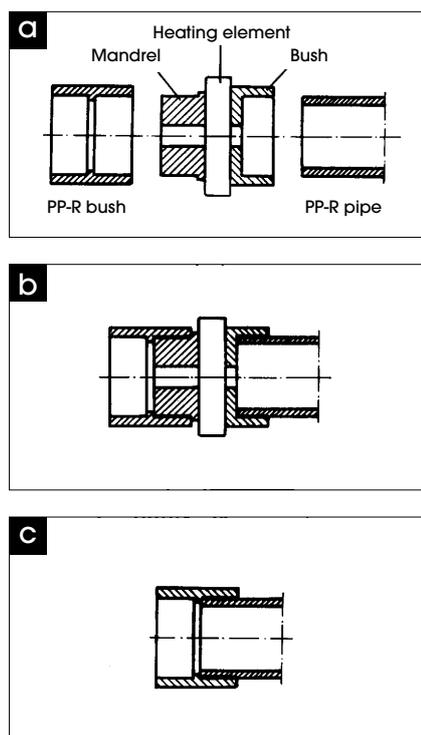
The heating elements (mandrel and bush) must correspond to DVS 2208 part 1, par. 5, table 2, type A (excluding mechanical processing of pipe).

Figures a, b and c schematically show the 3 welding process stages:

a = Welding preparation

b = Warming up

c = Welded joint



Preparations

Cut pipes square into sections. Thoroughly clean both joint faces, the pipe end and socket with spirit and absorbent paper. Mark socket depth on the pipe.

Bring the heating element to 260° C. Check the set temperature before the welding process.

Temperature tolerance $\pm 10^\circ \text{C}$. The heating element should have an integrated thermometer, otherwise the temperature of the heating element must be controlled by an appropriate measuring device.

Do not start heating the joint parts before the heating temperature has reached 260° C. The mandrel and bush must be clean and have to be cleaned before each following welding process.

1	2	3	4
Pipe outside diameter mm	Heating phase s	Switch s	Cooling min
16	5		
20	5	4	2
25	7		
32	8		
40	12	6	4
50	18		
63	24	8	6
75	30		
90	40	10	8
110	50		
125	60		

Fig. 14

Standard values for socket fusion welding at a room temperature of 20° C. At a room temperature below +5° C the heating phases should be increased by up to 100%.

Welding

Push the pipe and fitting quickly and axially up to the stop of the mandrel and the marked insertion depth respectively and hold them fast without torsion. The heating of the joint faces is done according to the table in fig. 14. After the end of the heating period pull the pipe and fitting abruptly off the heating element and join them immediately axially aligned and without torsion. In considering the correct insertion depth (fig. 15). The pipe must be pushed in up to marked insertion depth respectively up to the socket bottom. We recommend to fix the two joint parts again for a certain time (approximately the heating period).

The welded joint must not be stressed mechanically before end of the cooling time.

Pipe Ø d (mm)	Bush depth=Insertion depth (mm)
16	13,0
20	14,5
25	16,0
32	18,0
40	20,5
50	23,5
63	27,5
75	30,0
90	33,0
110	37,0
125	40,0

Fig. 15:
Bush depths for PP-R and PP-RCT fittings

Proceeding Socket Welding



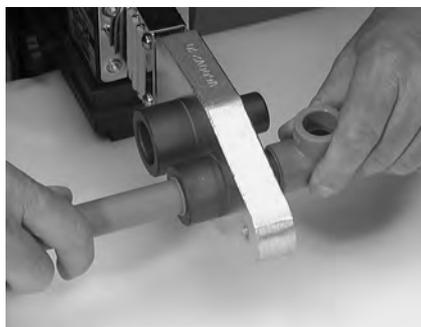
1. Pipes are measured and cut to the required length. Cutting should be rectangular to the pipe axis (90°).



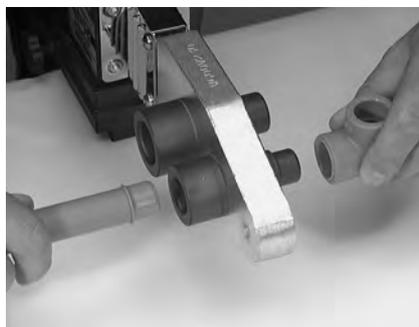
2. Clean the joint area with cleaner. Mark the insert depth of the fitting on the pipe.



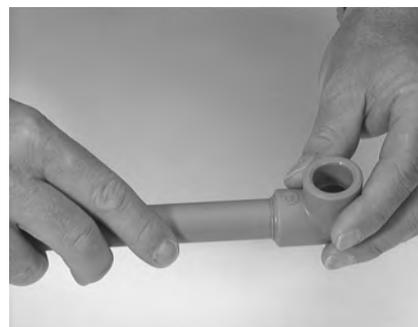
3. When using **Bänninger Stabi-Pipes**, the aluminum coating has to be peeled off before welding them. The length of the peeled zone is determined by the peeling device.



4. Pipe and fitting have to be heated simultaneously. Push in parts to be joined axially.



5. At the end of heating period fitting and pipe end from the heating elements have to be pulled off fully and simultaneously.

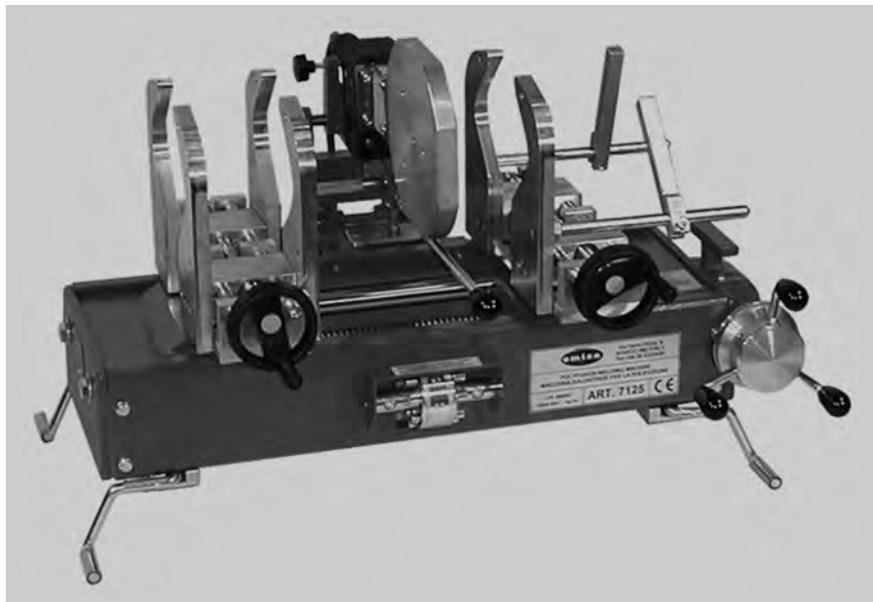


6. Adapt and join pipe and fitting within the max. allowed period without turning the parts against each other.

Immediately after the cooling time the fused joints can fully work under pressure. The fusion of the joint parts results in a unique longitudinally force-locked joint.

Proceeding – Socket Welding with a Welding Machine

The welding machine No. 8988 is suitable for socket welding of pipes and / or fittings made of PP-R/PP-RCT from d = 50 mm to d = 125 mm



The socket welding machine No. 8988 consists of:

- Basic unit with movable slides
- Heating element
- Prism clamping jaws
- Socket and mandrels from d = 50 mm to d = 125 mm according to DVS 2208
- Tripod for pipe support
- Metal transport case

Setting of welding machine:

Put the heat reflector into the holder. Mount the appropriate welding tools (socket and mandrel), install the clamping jaws.

Switch-on the device and the energy control lamp turns on. The temperature control lamp extinguishes after reaching the operating temperature (260°).



Fig. 1
Set the heat reflector into the holder



Fig. 2
Place the socket and the mandrel on the heat reflector



Fig. 3
Mount the prism clamping jaws

This is how the push-in depth will be precisely determined:

Select the relevant fitting/pipe diameter on the measuring drum which is situated in the middle of the machine base.

Adjust the position of the slides; arrows in the middle of the machine base must stand one over the other, also on the hand wheel.

Place the fitting into the clamping jaw and seize it with the hand wheel. Lock and seize the stop. Place the pipe axially forwards the fitting into the chunk jaw and position in such a way that it is situated frontally at the fitting. Seize the pipe with the hand wheel.



Fig. 4
Select the pipe / fitting diameter



Fig. 5
Adjust the position of the slides



Fig. 6
Place and adjust the fitting in the clamping jaw



Fig. 7
Adjust the stop to hold the fittings



Fig. 8
Lay the pipe axially into the fitting and place in such a way that it is situated frontally to the fitting

Welding

(According to the DVS regulations 2207, part 11)

Before starting the welding process it has to be checked if the welding temperature has been reached. The first welding can be made 5 minutes after the welding temperature is reached. Split apart the machine slides and close down the heating element. Slowly move the machine slides by turning the hand wheel. Align the heating element so that the pipe and the fitting properly fit into the welding tools. Move the slides with constant forward motion up to the point until the stop is reached. The heating timer of the joint surfaces starts only after the stop is reached. After end of the heating time the slides are separated. The heating element shall be brought into idle position as quickly as possible.

Move the machine slides with the hand wheel at constant forward motion up to stroke end so that the precise joining depth between the pipe and the fitting is reached. The welding may only be removed from the clamping jaws after the cooling time. Unscrew the clamping jaw with the hand wheel and take off the welded part.



Fig. 9
Move the machine slides with the hand wheel, warmup the pipe and the fitting in the welding tools

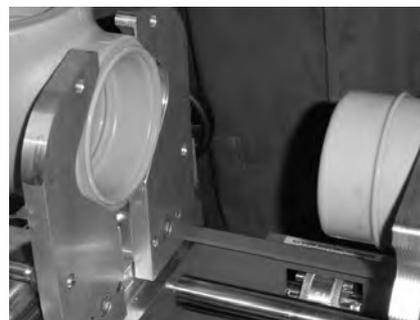


Fig. 10
After the warming time join pipe and fitting



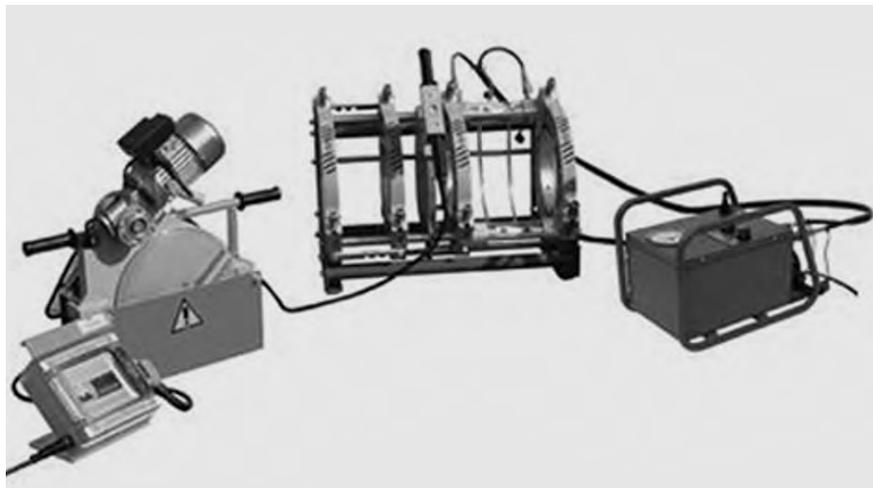
Fig. 11
Move the machine slides up to stroke end



Fig. 12
Remove the welding joint after the end of the cooling time from the clamping jaws

Butt Welding with Heating Element

The welding machine part no. 8989 is suitable for butt welding of pipes and/or fittings made of PP-R / PP-RCT from dia = 90 mm up to dia = 315 mm



The butt welding machine with heating element part no. 8989 includes:

- Basic machine with movable slide
- Heating element
- Hydraulic aggregate
- Electrical planing tool
- Flexible hydraulic hoses
- Metal box for electrical heating elements and planing tool.

Parameters for PP-butt welding with heating element at 20° C outside temperature according to DVS data sheet 2207, part 11

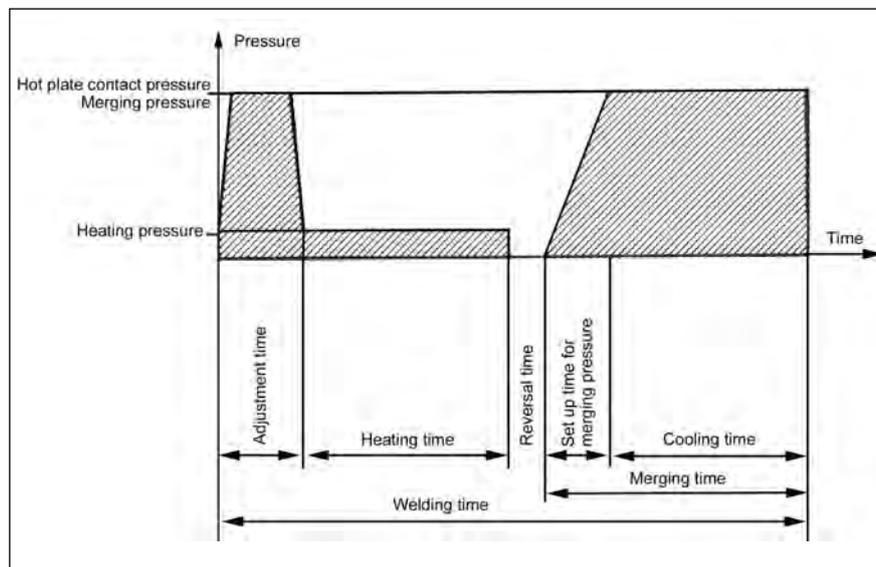


Fig. 1

**Parameters for
Welding Machines
Type OMISA SP**

dia	SDR	Merging pressure bar	Bead height mm	Heating time sec.	Welding pressure bar	Cooling time min.
160	17	8	1	147	8	16
	11	13	1	225	13	24
200	17	13	1	180	13	20
	11	20	1	290	20	30
250	17	21	1	217	21	24
	11	32	1,5	313	32	35
280	17	27	1	259	27	27
	11	40	1,5	329	40	40
315	17	34	1	290	34	30
	11	51	1,5	335	51	41

Permissible misalignment of wall 0,1 x wall thickness (s)

During butt welding with heating elements the areas to be joined are heated up to the welding temperature by means of the heating element and compressed after the heating element has been removed. Heating temperature $210^{\circ}\text{C} \pm 10^{\circ}\text{C}$. The step-by-step welding procedure is shown in Fig. 1.

Welding Procedure:

During butt welding with heating elements the areas to be joined are adjusted with pressure at the heating element (adjusting with merging pressure) until the specified bead height is reached. Following heating up to welding temperature with reduced pressure ($0,10 \pm 0,01\text{ N/mm}^2$) and joining with merging pressure after removal of the heating element (Adaption).

Fig. 2 shows the principle of the welding procedure.

After merging a double bead (K) has to exist over the complete perimeter. The bead formation is an orientation for the uniformity of the weldings among each other.

Fig. 3 shows the bead formation during butt welding with heating elements.

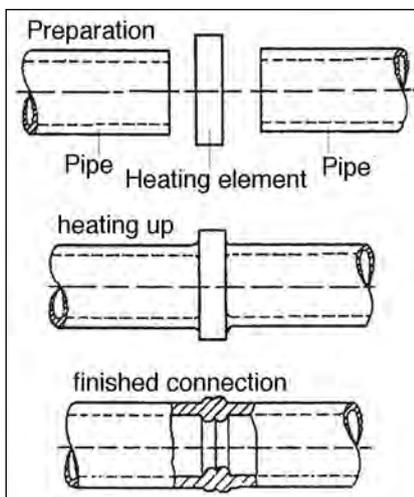


Fig. 2

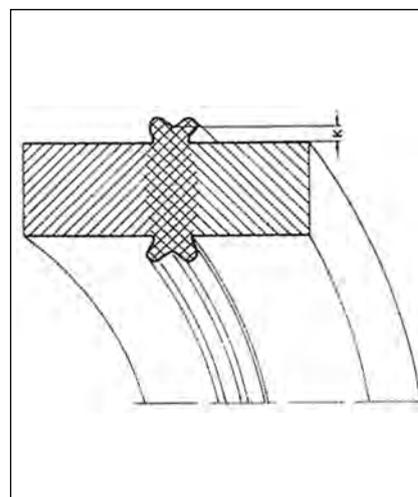


Fig. 3

Instructions for PP-R / PP-RCT Welding Saddle Processing

Application area:

Additional extension of existing pipe systems.
Direct connection of consumer pipe to a supply pipe line.
Alternative for Tees.

Welding preparation:

Heat up the heating element to 260° C.
Control the set temperature prior to the welding process. Temperature difference $\pm 10^{\circ}$ C.
The welding elements must be clean and should be cleaned prior to every welding process.

Fig. 1

Bore the pipe wall with the boring machine (Part no. 8986b)



Fig. 2

For stabi composite pipes (Part no. 8215B) remove the residual aluminium with the chamfering tool (Part no. 8986a)



Fig. 3

Push into the heat nozzle of the welding saddle tool (Part no. 8984e) the bore hole as well as the connecting piece of the welding saddle into the heating socket.
The heating time for all dimensions amounts to 30 seconds.



Fig. 4

Push the stub of the welding saddle quickly into the heated bore hole.
Fix the fitting for about 15 seconds on the pipe.



After a cooling time of 10 minutes the fused joint can fully work under pressure.

The appropriate branch pipe will be assembled by means of socket fusion welding or by using female or male adaptors with the welding saddle.

Processing Instructions for Repair Plug

Application area:

Repair of bored pipes.

Preparations:

Empty and uncover the damaged pipe. Select the heating unit, clean it before every welding process. Heat up the heating unit to 260° C ($\pm 10^\circ$ C). Check the temperature before the welding process.

Selection of welding elements:

Repair -Set: d = 7 mm
For welding of holes up to 6 mm

Repair-Set: d = 11 mm
For welding of holes up to 10 mm

Fig. 1

Mark the degree of the push-in depth (wall thickness) on the repair plug. Distance tool to be fixed according to the wall thickness of the pipe and tighten the grub screw.

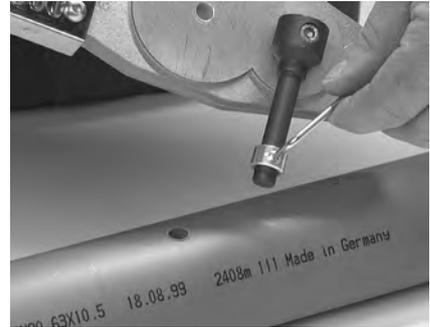


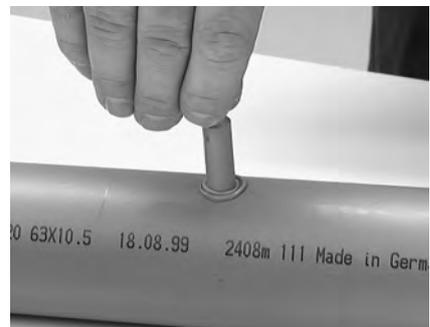
Fig. 2

Heat up the borehole and the welding plugs with the repair-set for 15 seconds.



Fig. 3

Remove the welding device and insert the repair plug precisely without twisting it. After a cooling time of 5 minutes remove the overlying end of the repair plug. The repaired part can again work under pressure.



Electrofusion Socket Welding: The fast Connection



Fig. 1
Cut the pipe rectangularly with plastic scissors or with a pipe cutter.



Fig. 2
Remove the outside oxide layer using a scraper.



Fig. 3
On **Bänninger Stabi-Pipes** the aluminum coating must be peeled off before joining.



Fig. 4
Clean the joint surfaces with a purifying agent (e. g. spirit).



Fig. 5
Mark out the socket depth.



Fig. 6
Push in the socket up to the marked position on the pipe.



Fig. 7
Plug the cable plugs into the contact bushings. Enter the voltage and the welding time in the welding device. The welding data can be seen on the barcode label of the socket. Start the welding device with the switch.

Preparing the welding surfaces.

Cut the PP-R/PP-RCT pipe ends rectangularly to the pipe axis with a pair of plastic pipe scissors. Remove the outer surface oxide layer in chips with a scraper and clean it with non-fuzzing, absorbent paper and purifying agent (e. g.

On **Bänninger Stabi-Pipes** the aluminum coating has to be peeled off before connecting them. For this purpose the **Bänninger** peeling tools (no. 8979) for electrofusion welding sockets must be used. They achieve a greater peeling length than that required for normal socket welding. The pipe ends are pushed into the peeling tool to remove the aluminum coating up to the stop of the peeling tool.

Mounting of the electrofusion welding sockets.

Mark the socket depth on the pipe. After having finished all preparations take the electrofusion welding the socket out of packing and **be careful not to touch the inner surfaces of the socket**. Now shift the socket slowly on the tube up to the marked point.

Fixation of pipes/fittings.

To protect the welding point against tensile and bending stress during the welding process the pipes and fittings to be welded have to be fixed in a clamping device after they have been adjusted in the electrofusion socket. Attention has to be paid to the fact that the position of pipe and fitting is exactly axially parallel.

Connecting the socket cord.

Position the electrofusion welding sockets in a way offering easiest connection of the cord plugs to the contact bushes. Having checked the required generator voltage to be available switch on the device and put the cord plugs on to the contact bushes. Set the diameter of the pipe to be connected and start the welding process with the switch. The electrofusion machine automatically calculates and controls the required welding time and shows the welding indicators after successful welding. The welding indicator does not evidence the welding quality. Its value may differ depending on the slot width between the electrofusion welding socket and the pipe.

Cooling Time

Never disregard the required cooling times. The full loading capacity of the welded section for example for test pressure or working pressure requires a minimum cooling time of 2 hours.

Leak test with water according to DIN 1988.

For completely installed but not yet concealed pipes DIN 1988 (Technische Regeln für Trinkwasser-Installation/Technical Regulations for Drinking Water Installations) requires a hydraulic pressure test. Under pressure testing the properties of the PP-R/PP-RCT pipe material cause an expansion of the pipe affecting the test result.

The difference between pipe and test medium temperatures can additionally influence the test result. Due to the thermal expansion coefficient a change in temperature of 10 K results in a change in pressure of 0,5 to 1 bar. The pressure testing of parts of plastic pipe systems should therefore be done at an as much as possible constant test medium temperature.

Filling of the Pipe System

Fill the pipes with filtered water until they are free of air. Use pressure gauges allowing to clearly read pressure changes of 0.1 bar. Install the pressure gauge at the lowest point of the pipe system.

The pressure test must be done as a preliminary test and a principal test, whereas a preliminary test only may be considered sufficient for smaller installations such as supply and distributing pipes in moist rooms.

Preliminary Test

For the preliminary test a test pressure corresponding to the allowed working pressure plus 5 bar is applied which has to be renewed 2 times at 10-minute intervals within 30 minutes. After another 30 minutes the test pressure shall not have dropped by more than 0.6 bar (0.1 bar per 5 minutes) and no leakage must have occurred.

Principal Test

Directly after the preliminary test the principal test has to be carried out. The test period is 2 hours. The test pressure determined after the preliminary test shall not have dropped by more than 0.2 bar after 2 hours.

No leakage shall be found at any section of the tested installation.

To avoid stagnation of residual water and damages caused by frost a pressure test as dry leak test with compressed air (or inert gas) can be carried out (pages 78 + 79).



TEST SHEET (Draft)

(According to the standards as per in DIN 1988)

Object description: _____

Executing company: _____

Client: _____

Object: _____

Raw material: **PP-R / PP-RCT** _____

Pipe length: \varnothing 16 m \varnothing 20 m \varnothing 25 m \varnothing 32 m
 \varnothing 40 m \varnothing 50 m \varnothing 63 m \varnothing 75 m
 \varnothing 90 m \varnothing 110 m \varnothing 125 m \varnothing 140 m
 \varnothing 160 m \varnothing 200 m \varnothing 250 m \varnothing 280 m
 \varnothing 315 m

Joining: Welding pcs. Gluing pcs.

Number of tapping points: pcs. Highest tapping point above pressure gauge: pcs. Total pipe length: m

Preliminary test:

Test pressure _____ bar

1st regulation after 10 minutes _____ bar

2nd regulation after 20 minutes _____ bar

Pressure after 30 minutes _____ bar

Pressure decrease _____ bar

Result of preliminary test:

Principal test:

Test pressure _____ bar

Pressure decrease after 2 hours _____ bar
 (0,2 bar max.)

Result of the principal test:

Pressure test acknowledged:

Test start h End of test h Test period h

Place Date Time

Signatures:

Customer

Contractor

Leak test with compressed air or inert gas

General

Because of compressibility of gases during preceding pressure tests with air the provisions for prevention of accidents "Working on gas facilities" as well as the regulation "Technical rules for gas installations DVGW-TRGI (German Technical and Scientific Association for Gas and Water – Technical rules for gas installations)" should be taken into account because of physical and technical security reasons. In coordination with the responsible professional organization and following this regulation the testing pressure was set at max. 3 bar as during load and leak tests for gas pipelines.

General provisions

New pipeline facilities may only be put into operation if the compulsory pressure test is successfully passed. No leakages are allowed. The pressure test should be carried out before the lines are buried. The tests on the new line facility can be implemented either on the whole facility or in line sections. The division into smaller test sections (small pressure / liter product) provides higher level of reliability and is more precise while testing. On the pressure gauge leaks can be identified faster compared to bigger and widely branched voluminous sections. Hence leak locations can be determined faster. Apparatuses, drinking water warmers, armatures or pressure tanks must be disconnected from the pipelines prior to the air pressure test in case they have larger capacity and can affect reliability and test accuracy. All pipeline openings must be directly closed with metallic plugs, metallic blanking plates or blank flanges that withstand the testing pressure. Closed shut-off valves do not count as leak-proof closures. Exhaust valves for deflation of the testing pressure should be installed in sufficient quantity and on appropriate locations where the air can be deflated in a safe manner.

If leaks are observed during the visual or noise inspections or if a pressure drop is identified above the allowed values all connections should be checked with regard to leak tightness with test equipment that creates bubbles. After removal of possible leaks the pressure test should be repeated. During the testing period no single leak may be detected on any location of the inspected facility.

In exceptional cases a minor pressure drop may be identified on the pressure gauge although during the visual inspection or during the inspection with testing equipment that creates bubbles no leaks could be observed.

Nevertheless the facility can be water proof.

In case of any doubts a water proof test can bring a certainty regarding the leak tightness.

The safety of people and goods during the test should be taken into account as a basic principle.

Because of technical security reasons e. g. slipping away of a defective pipe connection, higher pressures than 3 bar are not permitted.

A gradual pressure increase and a regular visual inspection of the pipe connections are appropriate as additional safety measures.

Leak tightness test

The leak tightness test is implemented with a pressure test of **110 mbar** prior to the load test.

The applied pressure gauge must have an appropriate precision of 1 mbar (10 mmWS) display range for the pressure that will be measured.

For this purpose the U-pipe pressure gauges known from the TRGI test or the standpipes can be used.

The components on the pipeline facility must be suitable for the test pressures or have to be dismantled before the test.

After application of the test pressure the testing period for **up to 100 liter line volume must be at least 30 minutes**. For every additional 100 liters the testing period must be increased by 10 minutes.

The leak tightness test starts once the test pressure is achieved and taking into consideration the respective waiting period for adjusting the medium to the ambient temperature.

Load test

The load test is implemented with a maximum test pressure of **3 bar** and a pressure gauge with a display range of 0,1 bar. The load test is combined with a visual inspection of all pipe connections during which it is checked whether welding, solder pressure and clamp connections as well as adhesive and screwed joints are performed in a proper manner in order to be leak-proof.

The load test with increased pressure should be:

– at nominal up to DN 50 maximum 3 bar and

– at nominal diameter over DN 50 – DN 100 maximum 1 bar.

After application of the test pressure the testing period is 10 minutes.

Selection of the test medium

For leak tightness and load test the following media can be used:

- oil-free compressed air,
- inert gas
 - e. g. Nitrate and carbon dioxide
- inert gas with 5% hydrogen in the nitrogen (applied at the procedure for locating the leakage)

By means of technical security equipment like pressure reducing regulator on compressors it has to be ensured that the specified test pressure for the pipe facility is not exceeded.



Pressure Test Protocol for Drinking Water Installation with Compressed Air or Inert Gas as a Control Medium (Model)

Construction project: _____

Client represented by: _____

Contractor / responsible expert represented by: _____

Material of the pipeline system: _____

Connection type: _____

Pressure on the facility: bar Ambient temperature: °C Temperature of the control medium: °C

Control medium Oil-Free compressed air Nitrogen Carbon dioxide _____

The water supply facility was controlled as a complete facility sectionwise

All lines are closed with metallic plugs, caps, blanking plates or blank flange.
 Aparatusses, pressure tanks or drinking water warmers are disconnected from the lines.
 A visual inspection of all pipe connections was done with regard to the professional construction.

Leak tightness test Test pressure 110 mbar
 Testing period up to 100 l line volume for at least 30 minutes.
 For each additional 100 liters the testing period should be increased by 10 minutes.

Line volume Liters Testing period Minutes

Temperature balance and steady-state condition are awaited, after this the testing period starts.

During the testing period no pressure drop was observed.

Loading test with higher pressure

Testing pressure ≤ 50 DN max. 3 bar > 50 DN max 1 bar

Testing time 10 minutes

Temperature balance and steady-state condition are awaited, after this the testing period starts.

During the testing period no pressure drop was observed.

The pipelines are leak-proof.

Location _____

Date _____

Client / Representative _____

Contractor / Representative _____

Insulation Instructions for Cold- and Hot Water Pipes

Authoritative for the insulation of pipework are DIN 1988 part 2 and the German Heating Installation Regulation of the Energy Saving Act/Heizungsanlagen-Verordnung zum Energieeinsparungsgesetz (HeizAnLV)

Heat insulation according to DIN 1988

Drinking water systems for cold water must be protected against heating and, if necessary, condensation water. For the minimum insulation layer standard values see table (fig. 16).

Installation mode	Insulation layer thickness $\lambda = 0,040 \text{ W}/(\text{m} \cdot \text{K})$
Pipes freely installed, in non-heated room (e. g. cellar)	4 mm
Pipes freely installed, in heated room	9 mm
Pipes in channel, no hot-water pipes	4 mm
Pipes in channel, beside hot-water pipes	13 mm
Pipes in wall slots, risers	4 mm
Pipes in wall recesses, beside hot water pipes	13 mm
Pipes on concrete surface	4 mm

For other heat conductivity values convert insulation layer thickness accordingly by using a diameter of $d = 20 \text{ mm}$.

Fig. 16

Heat insulation according to the Heating installation regulation.

Heat distribution installations must be insulated against heat loss. See figures 17 + 18

Line	Nominal width (NW) of the pipes/fittings in mm	Minimum insulation layer thickness, related to a thermal conductivity of $0,035 \text{ W m}^{-1}\text{K}^{-1}$
1	up to NW 20	20 mm
2	from NW 22 to NW 35	30 mm
3	from NW 40 to NW 100	as NW
4	over NW 100	100 mm
5	Pipes and fittings under lines 1 to 4 in ceiling and wall cut-throughs, pipe-crossing sections, with central distributing pipes, radiator connection pipes of max. 8 m length	1/2 of the requirements as per lines 1 to 4

Fig. 17

	d x s	DN	Insulation layer thickness $\lambda = 0,035 \text{ W}/(\text{m} \cdot \text{K})$
Pipes PN 20	16 x 2,7	10,6	20 mm
	20 x 3,4	13,2	
	25 x 4,2	16,6	
	32 x 5,4	21,2	30 mm
	40 x 6,7	26,6	
	50 x 8,4	33,2	
	63 x 10,5	42,0	42 mm
	75 x 12,5	50,0	50 mm
	90 x 15,0	60,0	60 mm

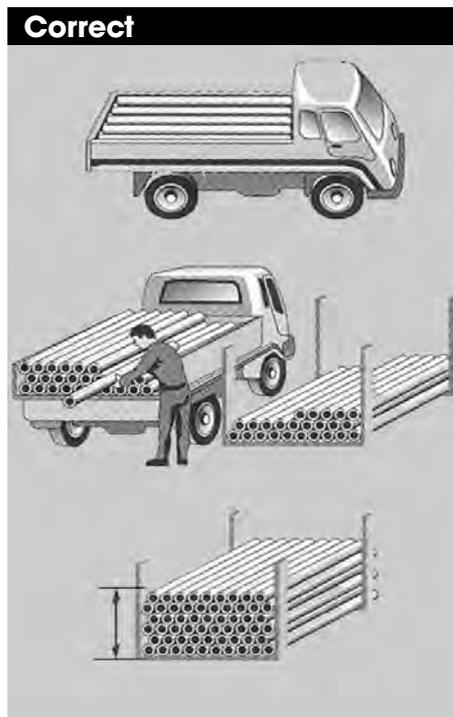
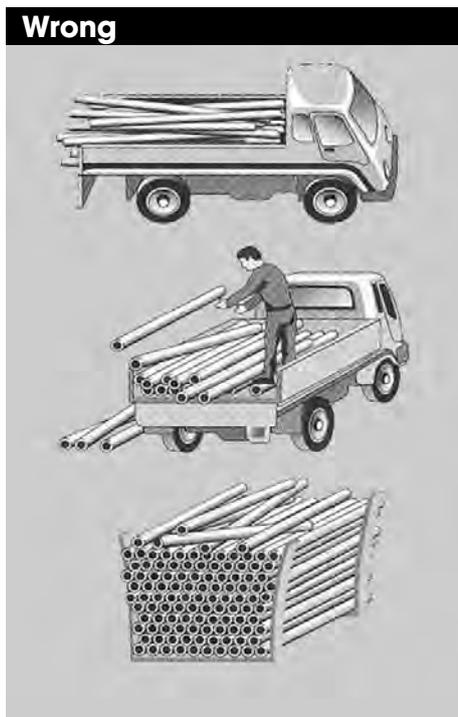
Fig. 18

Polypropylene pipes according to DIN 8077 are highly selfinsulating in respect to their heat transfer. Thus PN 20 PP-R/PP-RCT pipes in continuous operation at a passing medium temperature of 80°C show an about 27°C lower temperature at their outside diameter. This proves their heat insulation to be much more effective than that of metal pipes.

Fire Protection

PP-R/PP-RCT is classified under building material class 2 - normal flammability. The respective national building laws (building regulations on all administrative levels and their implementing regulations) must be adhered to. The application of approved fire protection measures prevent the passing of smoke and fire for the pipes through walls and ceilings.

Transport and Stocking of PP-R and PP-RCT Pipes



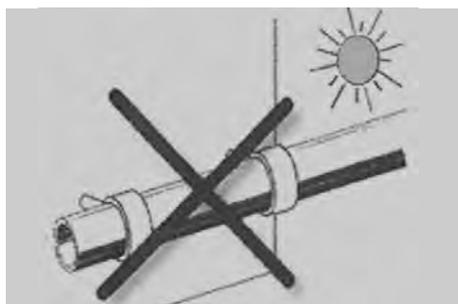
Prevent excessive loads

Prevent wrong lying

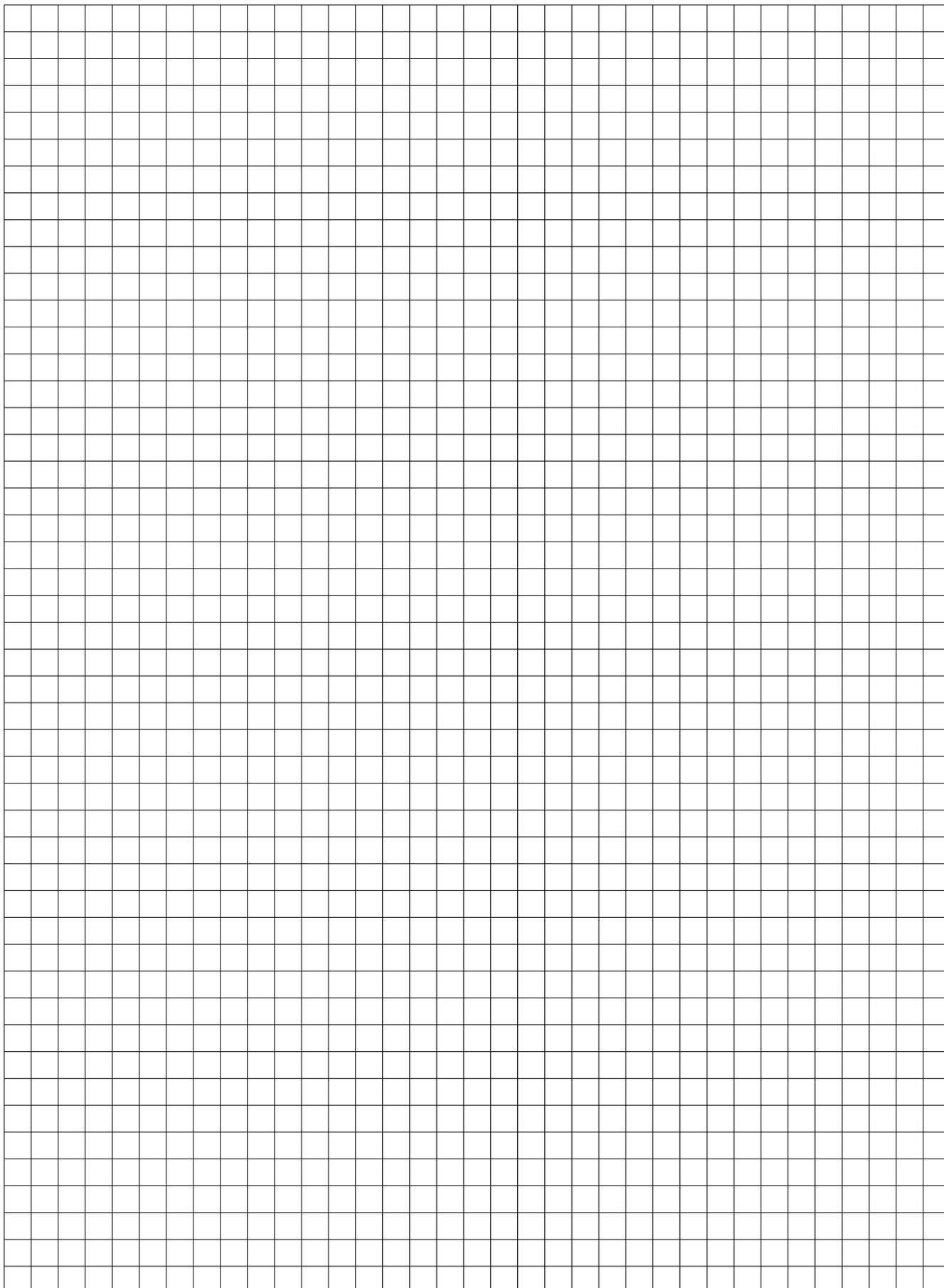
Prevent impacts
(especially against pipe ends)



At temperatures lower than 0° prevent impacts (especially against pipe ends), excessive loads, crushing or bending. Please handle pipes with care at low temperatures.



UV radiation has influence on polymeric plastic products. Protect pipes against weathering and UV radiation to prevent damages. For this reason pipes and fittings are supplied in suitable plastic bags or cardboard boxes.





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