



2015

TAKAB ETTESAL CO.

Polyethylene Pipes & Fittings Manufacturer

TAKAB

Technical & Products

CATALOGUE

2015

ABOUT TAKAB ETTESAL COMPANY
о Takab Ettesal компани

1

UNIQUE PRODUCTS LINEUP
уникальная линия продуктов до

4

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PROLOGUE.

Our Vision

Takab Ettesal Co. is leading manufacturer of injection polyethylene in Iran.

We started the activity to provide and supply the segments and equipment of watering system at 1992 in Tehran, Iran. After 8 years Takab Ettesal established producing factory with 220 (Mt) nominal capacity.

Our aims are create unique products based on high level of quality with support technical work and increase different kind of fittings.

Now a days Takab Ettesal after 13 years of producing can produce with 840 (Mt) nominal capacity.

This Company will be able to produce a wide range of fittings in a same time due to having 14 lines which are made up in Germany and Austria:

1. Electro fusion
2. Butt fusion
3. Flanged joints
4. Special fittings

Наше видение

Компания Текаб Этесаль начала свою деятельность в области поставки запасных частей и оборудовани для водных проектов и установок в 1994 году и после 8 лет активной деятельности создала производственный блок мощностью 220 тонн в год.

Эта компания преуспела в производстве высококачественной продукции в области качества и техники и после 12 лет своей деятельности, а так-же на сегодняшний день смогла повысить производительную мощность до 840 тонн в разработке серии фитингов Полиэтилена в 4 группах:

1. Электросварочная
2. Стыковая сварка
3. Фланец
4. Специальные соединения

ACHIEVEMENTS.

Takab Ettesal Company is manufacturer of injection polyethylene fittings for water and gas services, in accordance with below standards:

- . ISO 4427
- . DIN 8074
- . DIN 8075
- . DIN 16963
- . INSO 14427
- . DIN 2501
- . EN 12201
- . EN 1555

Takab Ettesal is also a very well recognized Polyethylene fittings manufacturer nationwide, recognized by the following achievements:

- Approval from agriculture ministry's testing of Machinery and Equipment Group
- Register the invention of Steel Core Hole Flange Certification
- Approval from Polymer Central Group of Amirkabir University
- The best factory of Iran by Iranian Standard Certificate for year 2008

AWARDS.

In recognition of years of service and unprecedented quality, **Takab Ettesal** company has been honored to receive the following Awards and Certifications:



IUI Certification for Steel Core Hole Flange



ISO 9001: 2008



ISO 17025



Register the Invention of Steel Core Hole Flange in Iranian Research Organization for Science and Technology



Certification of products in Iranian organization of agriculture



Register the Invention of Steel Core Hole Flange

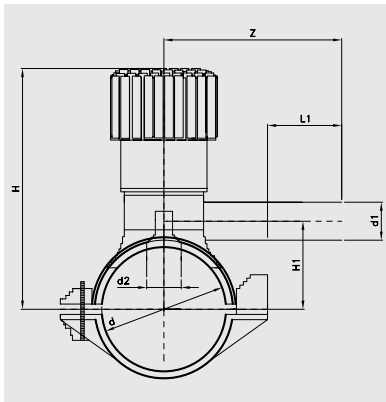


 **UNIQUE
PRODUCTS**



HDPE 100
EN 1555
EN 12201

کمر بند الکتروفیوژن
Tapping Saddle
Электросварные Отводы

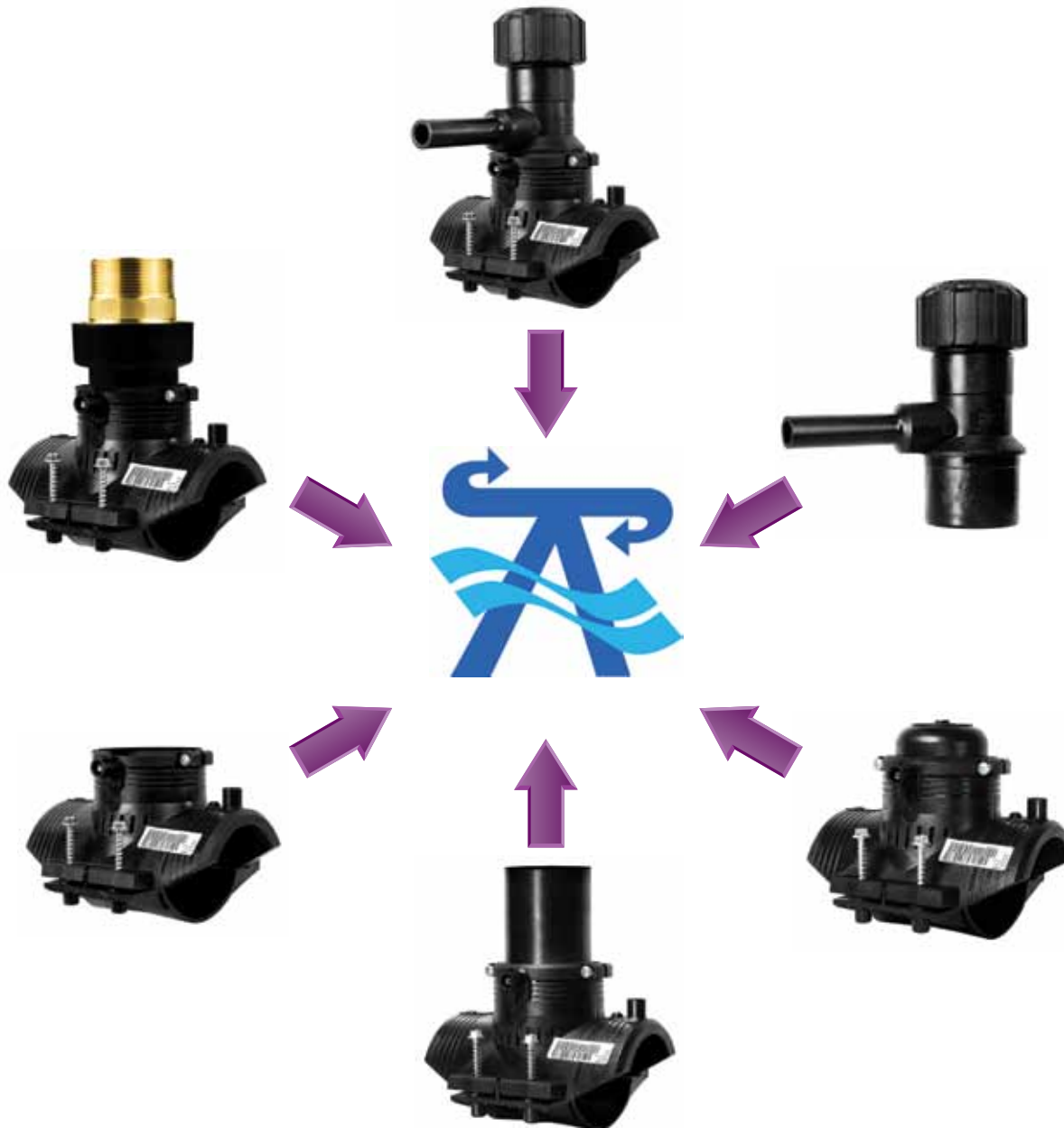


| d | d1 | Code | d2 | H | H1 | L | L1 | z |
|------|----|--------------|----|-----|-----|-----|-----|-----|
| 63 | 25 | EF04-063-025 | 32 | 186 | 108 | 165 | 71 | 130 |
| 63 | 32 | EF04-063-032 | 32 | 186 | 108 | 165 | 76 | 130 |
| 63 | 40 | EF04-063-040 | 32 | 186 | 108 | 165 | 81 | 137 |
| 63 | 50 | EF04-063-050 | 32 | 186 | 108 | 165 | 86 | 137 |
| 63 | 63 | EF04-063-063 | 32 | 134 | 112 | 165 | 100 | 160 |
| 75 | 25 | EF04-075-025 | 32 | 191 | 113 | 165 | 71 | 130 |
| 75 | 32 | EF04-075-032 | 32 | 191 | 113 | 165 | 76 | 130 |
| 75 | 40 | EF04-075-040 | 32 | 191 | 113 | 165 | 81 | 137 |
| 75 | 50 | EF04-075-050 | 32 | 191 | 113 | 165 | 86 | 137 |
| 75 | 63 | EF04-075-063 | 32 | 240 | 118 | 165 | 100 | 160 |
| 90 | 25 | EF04-090-025 | 32 | 199 | 121 | 165 | 71 | 130 |
| 90 | 32 | EF04-090-032 | 32 | 199 | 121 | 165 | 76 | 130 |
| 90 | 40 | EF04-090-040 | 32 | 199 | 121 | 165 | 81 | 137 |
| 90 | 50 | EF04-090-050 | 32 | 199 | 121 | 165 | 86 | 137 |
| 90 | 63 | EF04-090-063 | 32 | 248 | 126 | 165 | 100 | 160 |
| 110 | 25 | EF04-110-025 | 32 | 209 | 131 | 165 | 71 | 130 |
| 110 | 32 | EF04-110-032 | 32 | 209 | 131 | 165 | 76 | 130 |
| 110 | 40 | EF04-110-040 | 32 | 209 | 131 | 165 | 81 | 137 |
| 110 | 50 | EF04-110-050 | 32 | 209 | 131 | 165 | 86 | 137 |
| 110 | 63 | EF04-110-063 | 35 | 258 | 136 | 165 | 100 | 160 |
| 125 | 25 | EF04-125-025 | 32 | 216 | 138 | 165 | 71 | 130 |
| 125 | 32 | EF04-125-032 | 32 | 216 | 138 | 165 | 76 | 130 |
| 125 | 40 | EF04-125-040 | 32 | 216 | 138 | 165 | 81 | 137 |
| 125 | 50 | EF04-125-050 | 32 | 216 | 138 | 165 | 86 | 137 |
| 125 | 63 | EF04-125-063 | 35 | 265 | 143 | 165 | 100 | 160 |
| 160 | 25 | EF04-160-025 | 32 | 243 | 156 | 165 | 71 | 130 |
| 160 | 32 | EF04-160-032 | 32 | 243 | 156 | 165 | 76 | 130 |
| 160 | 40 | EF04-160-040 | 32 | 243 | 156 | 165 | 81 | 137 |
| 160 | 50 | EF04-160-050 | 32 | 243 | 156 | 165 | 86 | 137 |
| 160 | 63 | EF04-160-063 | 35 | 283 | 161 | 165 | 100 | 160 |
| 200 | 25 | EF04-200-025 | 32 | 254 | 176 | 165 | 71 | 130 |
| 200 | 32 | EF04-200-032 | 32 | 254 | 176 | 165 | 76 | 130 |
| 200 | 40 | EF04-200-040 | 32 | 254 | 176 | 165 | 81 | 137 |
| 200 | 50 | EF04-200-050 | 32 | 254 | 176 | 165 | 86 | 137 |
| 200 | 63 | EF04-200-063 | 35 | 303 | 181 | 165 | 100 | 160 |
| *250 | 25 | EF04-250-025 | 32 | 279 | 201 | 165 | 76 | 130 |
| *250 | 32 | EF04-250-032 | 32 | 279 | 201 | 165 | 76 | 130 |
| *250 | 40 | EF04-250-040 | 32 | 279 | 201 | 165 | 81 | 137 |
| *250 | 50 | EF04-250-050 | 32 | 279 | 201 | 165 | 86 | 137 |
| *250 | 63 | EF04-250-063 | 35 | 328 | 206 | 165 | 100 | 160 |

*Futuer Product

HDPE 100
EN 1555
EN 12201

کمر بند الکترو فیوژن
Tapping Saddle
Электросварные Отводы



Saddles

- Available with 110mm to 250 Saddle size.
- 16Bar Rated
- Available with 25, 32, 40, 50 and 63 branch sizes.

Branch Saddle Modular System

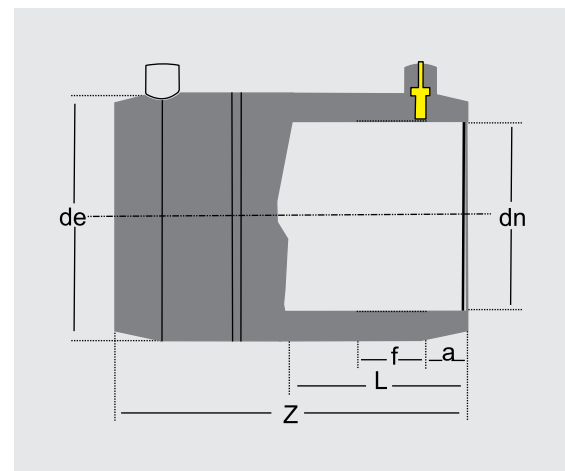
- Consists of Branch Saddles with a 63mm outlet.
- Connection in to outlet of the following:
 - 360Deg Rotating Tapping Tee
 - Pipe sections
 - Transitions fittings
- Cap section

HDPE 100
EN 1555
INSO 14427

كوپلر الكتروفیوژن
Electrofusion Coupler
Электросварные Муфты

| dn | Code | de | L | f | a | z |
|------|----------|-----|-----|----|----|-----|
| 20* | EF01-020 | 32 | 33 | 21 | 10 | 70 |
| 25* | EF01-025 | 37 | 33 | 19 | 10 | 70 |
| 32* | EF01-032 | 47 | 37 | 23 | 10 | 80 |
| 40* | EF01-040 | 56 | 44 | 26 | 12 | 90 |
| 50* | EF01-050 | 67 | 49 | 29 | 13 | 100 |
| 63 | EF01-063 | 82 | 54 | 28 | 13 | 111 |
| 75 | EF01-075 | 99 | 60 | 36 | 14 | 120 |
| 90 | EF01-090 | 116 | 65 | 37 | 14 | 130 |
| 110 | EF01-110 | 145 | 70 | 36 | 18 | 140 |
| 125 | EF01-125 | 163 | 76 | 39 | 18 | 151 |
| 160 | EF01-160 | 207 | 86 | 53 | 20 | 172 |
| 180* | EF01-180 | 228 | 97 | 56 | 23 | 193 |
| 200 | EF01-200 | 252 | 101 | 61 | 22 | 203 |
| 225 | EF01-225 | 276 | 112 | 67 | 22 | 223 |
| 250 | EF01-250 | 312 | 122 | 60 | 30 | 244 |
| 315 | EF01-315 | 392 | 142 | 70 | 35 | 284 |
| 355* | EF01-355 | 430 | 156 | 60 | 45 | 312 |
| 400* | EF01-400 | 461 | 170 | 60 | 41 | 340 |

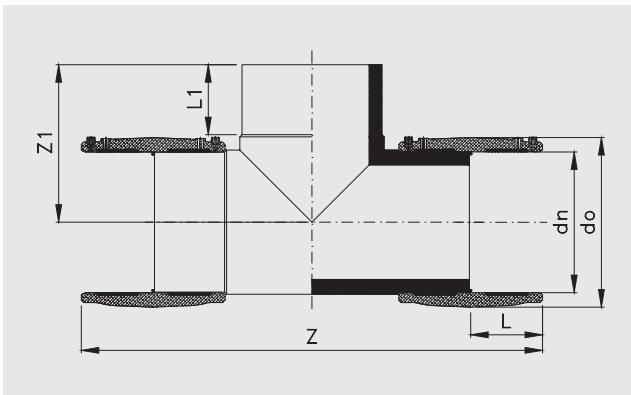
*Future Product



HDPE 100
EN 1555
INSO 14427

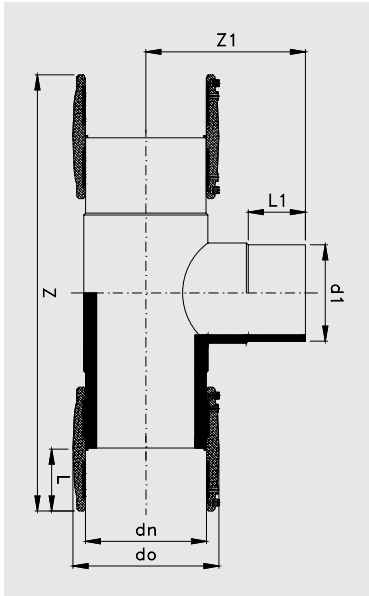
سه راهی ۹۰° مساوی الکتروفیوژن
Electrofusion Equal Tee 90°
Электросварные Равные Тройники 90°

| d_n | Code | Z | Z_1 | L_1 | d_o | L |
|-------|--------------|-----|-------|-------|-------|-----|
| 32 | EF03-032-032 | 230 | 80 | 30 | 47 | 37 |
| 40 | EF03-040-040 | 245 | 80 | - | 56 | 44 |
| 50 | EF03-050-050 | 285 | 90 | 55 | 67 | 49 |
| 63 | EF03-063-063 | 325 | 115 | 65 | 80 | 46 |
| 75 | EF03-075-075 | 370 | 132 | 72 | 95 | 52 |
| 90 | EF03-090-090 | 415 | 145 | 81 | 112 | 61 |
| 110 | EF03-110-110 | 445 | 140 | 60 | 136 | 72 |
| 125 | EF03-125-125 | 525 | 180 | 90 | 146 | 78 |
| 160 | EF03-160-160 | 605 | 210 | 100 | 184 | 89 |
| 200 | EF03-200-200 | 720 | 260 | 125 | 231 | 101 |
| 225 | EF03-225-225 | 765 | 270 | 122 | 262 | 110 |
| 250 | EF03-250-250 | 745 | 255 | 100 | 292 | 116 |
| 315 | EF03-315-315 | 860 | 298 | 94 | 317 | 131 |



HDPE 100
EN 1555
INSO 14427

سه راهی ۹۰° نامساوی الکتروفیوژن
Electrofusion Reduced Tee 90°
Электросварные не равные тройники 90°

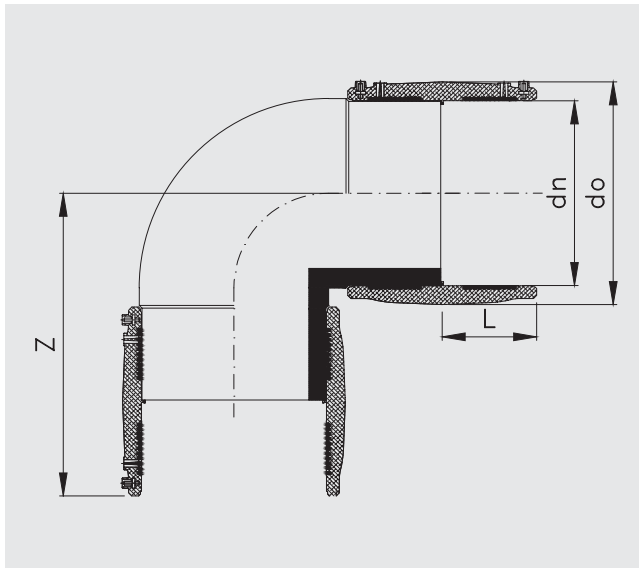


| d_n-d_1 | Code | Z | Z ₁ | L ₁ | d _o | L |
|-----------|--------------|-----|----------------|----------------|----------------|-----|
| 63*50 | EF03-063-050 | 310 | 103 | 50 | 80 | 46 |
| 75*50 | EF03-075-050 | 350 | 108 | 50 | 95 | 52 |
| 75*63 | EF03-075-063 | 350 | 117 | 60 | 95 | 52 |
| 90*63 | EF03-090-063 | 395 | 145 | 66 | 112 | 61 |
| 90*75 | EF03-090-075 | 395 | 145 | 72 | 112 | 61 |
| 110*63 | EF03-110-063 | 440 | 140 | 75 | 136 | 72 |
| 110*75 | EF03-110-075 | 440 | 140 | 73 | 136 | 72 |
| 110*90 | EF03-110-090 | 440 | 140 | 73 | 136 | 72 |
| 125*90 | EF03-125-090 | 495 | 170 | 73 | 146 | 78 |
| 125*110 | EF03-125-110 | 500 | 170 | 82 | 146 | 78 |
| 160*63 | EF03-160-063 | 600 | 210 | 65 | 184 | 89 |
| 160*75 | EF03-160-075 | 600 | 210 | 65 | 184 | 89 |
| 160*90 | EF03-160-090 | 600 | 210 | 65 | 184 | 89 |
| 160*110 | EF03-160-110 | 600 | 210 | 70 | 184 | 89 |
| 200*75 | EF03-200-075 | 720 | 235 | 65 | 231 | 101 |
| 200*90 | EF03-200-090 | 720 | 255 | 115 | 231 | 101 |
| 200*110 | EF03-200-110 | 720 | 265 | 135 | 231 | 101 |
| 200*160 | EF03-200-160 | 720 | 265 | 95 | 231 | 101 |
| 225*90 | EF03-225-090 | 770 | 250 | 122 | 262 | 110 |
| 225*110 | EF03-225-110 | 770 | 250 | 122 | 262 | 110 |
| 225*125 | EF03-225-125 | 770 | 250 | 122 | 262 | 110 |
| 225*160 | EF03-225-160 | 770 | 250 | 122 | 262 | 110 |
| 250*90 | EF03-250-090 | 745 | 265 | 80 | 291 | 116 |
| 250*110 | EF03-250-110 | 745 | 265 | 85 | 291 | 116 |
| 250*125 | EF03-250-125 | 745 | 265 | 90 | 291 | 116 |
| 250*160 | EF03-250-160 | 745 | 265 | 95 | 291 | 116 |
| 250*200 | EF03-250-200 | 745 | 265 | 113 | 291 | 116 |
| 315*160 | EF03-315-160 | 860 | 298 | 95 | 317 | 131 |
| 315*200 | EF03-315-200 | 860 | 298 | 86 | 317 | 131 |
| 315*250 | EF03-315-250 | 860 | 298 | 86 | 317 | 131 |

HDPE 100
EN 1555
INSO 14427

زانوی ۹۰° الکتروفیوژن
Electrofusion Elbow 90°
Электросварные Угольники 90°

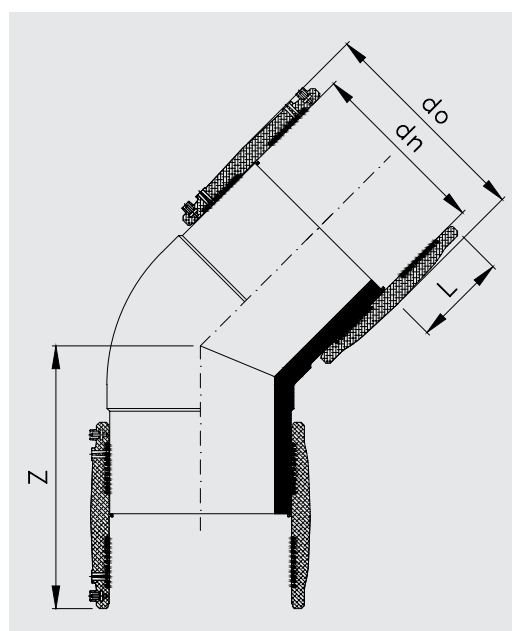
| d_n | Code | Z | d_o | L |
|-------|--------------|-----|-------|-----|
| 32 | EF02-032-090 | 150 | 47 | 37 |
| 40 | EF02-040-090 | 155 | 56 | 44 |
| 50 | EF02-050-090 | 160 | 67 | 49 |
| 63 | EF02-063-090 | 160 | 80 | 46 |
| 75 | EF02-075-090 | 175 | 95 | 52 |
| 90 | EF02-090-090 | 215 | 112 | 61 |
| 110 | EF02-110-090 | 215 | 136 | 72 |
| 125 | EF02-125-090 | 260 | 146 | 78 |
| 160 | EF02-160-090 | 300 | 184 | 89 |
| 200 | EF02-200-090 | 360 | 231 | 101 |
| 225 | EF02-225-090 | 380 | 262 | 110 |
| 250 | EF02-250-090 | 365 | 291 | 116 |
| 315 | EF02-315-090 | 445 | 317 | 131 |



HDPE 100
EN 1555
INSO 14427

زانوی ۴۵° الکتروفیوژن
Electrofusion Elbow 45°
Электросварные Угольники 45°

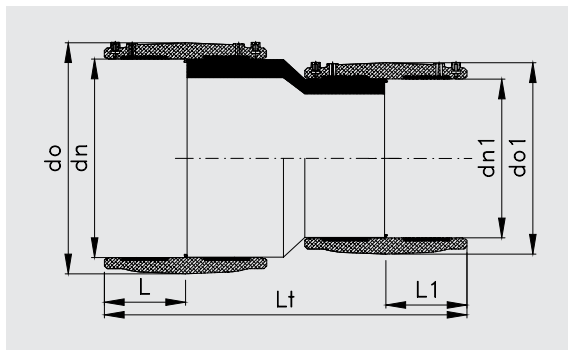
| d_n | Code | Z | d_o | L |
|-------|--------------|-----|-------|-----|
| 32 | EF02-032-045 | 150 | 47 | 37 |
| 40 | EF02-040-045 | 155 | 56 | 44 |
| 50 | EF02-050-045 | 160 | 67 | 49 |
| 63 | EF02-063-045 | 145 | 80 | 46 |
| 75 | EF02-075-045 | 155 | 95 | 52 |
| 90 | EF02-090-045 | 185 | 112 | 61 |
| 110 | EF02-110-045 | 175 | 136 | 72 |
| 125 | EF02-125-045 | 220 | 146 | 78 |
| 160 | EF02-160-045 | 240 | 184 | 89 |
| 200 | EF02-200-045 | 290 | 231 | 101 |
| 225 | EF02-225-045 | 310 | 262 | 110 |
| 250 | EF02-250-045 | 335 | 291 | 116 |
| 315 | EF02-315-045 | 390 | 317 | 131 |



HDPE 100
EN 1555
INSO 14427

تبدیل الکتروفیوژن
Electrofusion Reducer
Электросварные Переходники

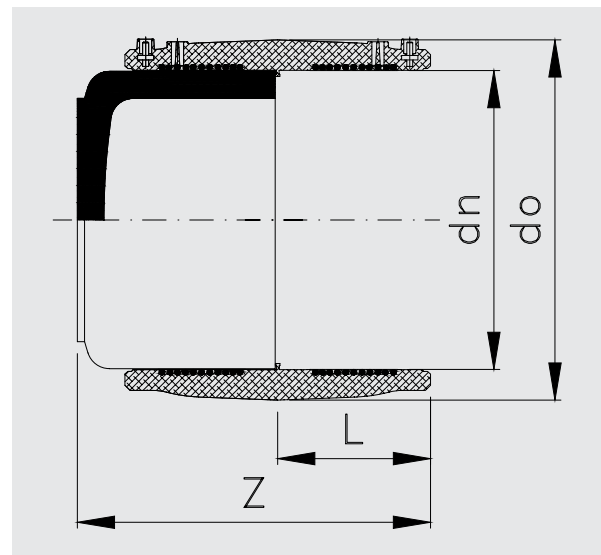
| $d_n - d_{n1}$ | Code | L_t | L | L_1 | $d_o - d_{o1}$ |
|----------------|--------------|-------|-----|-------|----------------|
| 40*32 | EF05-040-032 | 175 | 44 | 37 | 56-47 |
| 50*32 | EF05-050-032 | 185 | 49 | 37 | 67-47 |
| 50*40 | EF05-050-040 | 195 | 49 | 44 | 67-56 |
| 63*32 | EF05-063-032 | 190 | 46 | 37 | 80-47 |
| 63*40 | EF05-063-040 | 200 | 46 | 44 | 80-56 |
| 63*50 | EF05-063-050 | 205 | 46 | 49 | 80-67 |
| 75*50 | EF05-075-050 | 245 | 52 | 49 | 95-67 |
| 75*63 | EF05-075-063 | 245 | 52 | 46 | 95-80 |
| 90*63 | EF05-090-063 | 255 | 61 | 46 | 112-80 |
| 90*75 | EF05-090-075 | 270 | 61 | 52 | 112-95 |
| 110*63 | EF05-110-063 | 265 | 72 | 46 | 136-80 |
| 110*75 | EF05-110-075 | 290 | 72 | 52 | 136-95 |
| 110*90 | EF05-110-090 | 260 | 72 | 61 | 136-112 |
| 125*90 | EF05-125-090 | 300 | 78 | 61 | 146-112 |
| 125*110 | EF05-125-110 | 315 | 78 | 72 | 146-136 |
| 160*90 | EF05-160-090 | 320 | 89 | 61 | 184-112 |
| 160*110 | EF05-160-110 | 345 | 89 | 72 | 184-136 |
| 160*125 | EF05-160-125 | 360 | 89 | 78 | 184-146 |
| 200*110 | EF05-200-110 | 360 | 101 | 72 | 231-136 |
| 200*125 | EF05-200-125 | 375 | 101 | 78 | 231-146 |
| 200*160 | EF05-200-160 | 390 | 101 | 89 | 231-184 |
| 250*110 | EF05-250-110 | 395 | 116 | 72 | 291-136 |
| 250*160 | EF05-250-160 | 435 | 116 | 89 | 291-184 |
| 250*200 | EF05-250-200 | 470 | 116 | 101 | 291-231 |



HDPE 100
EN 1555
INSO 14427

كپ الكتروفيوژن
Electrofusion Cap
Электросварные Заглушки

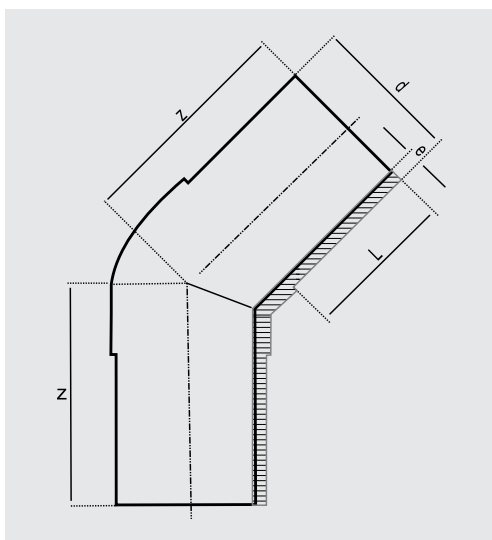
| d_n | Code | Z | L | do |
|-------|--------------|-----|-----|-----|
| 25 | EF06-025-000 | 100 | 33 | 37 |
| 32 | EF06-032-000 | 100 | 37 | 47 |
| 40 | EF06-040-000 | 110 | 44 | 56 |
| 50 | EF06-050-000 | 115 | 49 | 67 |
| 63 | EF06-063-000 | 110 | 46 | 80 |
| 75 | EF06-075-000 | 130 | 52 | 95 |
| 90 | EF06-090-000 | 150 | 61 | 112 |
| 110 | EF06-110-000 | 170 | 72 | 136 |
| 125 | EF06-125-000 | 180 | 78 | 146 |
| 160 | EF06-160-000 | 205 | 89 | 184 |
| 200 | EF06-200-000 | 235 | 101 | 231 |
| 250 | EF06-250-000 | 270 | 116 | 291 |
| 315 | EF06-315-000 | 295 | 131 | 317 |



| d | Code | Z | L* | e | | | | |
|-----|-------------|-----|-----|---------|-------|--------|--------|--------|
| | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR 22 |
| 32 | F02-032-045 | 110 | 65 | 4.4 | 3.6 | 3 | 2.0 | - |
| 40 | F02-040-045 | 110 | 65 | 5.5 | 4.5 | 3.7 | 2.4 | 1.9 |
| 50 | F02-050-045 | 110 | 60 | 6.9 | 5.6 | 4.6 | 3.0 | 2.3 |
| 63 | F02-063-045 | 95 | 60 | 8.6 | 7.1 | 5.8 | 3.8 | 2.9 |
| 75 | F02-075-045 | 100 | 60 | 10.3 | 8.4 | 6.8 | 4.5 | 3.5 |
| 90 | F02-090-045 | 120 | 80 | 12.3 | 10.1 | 8.2 | 5.4 | 4.1 |
| 110 | F02-110-045 | 100 | 63 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F02-125-045 | 140 | 88 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 160 | F02-160-045 | 150 | 90 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F02-180-045 | 170 | 107 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F02-200-045 | 185 | 113 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F02-225-045 | 200 | 122 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F02-250-045 | 215 | 130 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 315 | F02-315-045 | 256 | 177 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F02-355-045 | 232 | 120 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F02-400-045 | 232 | 120 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |

*Could be weld with electrofusion welding

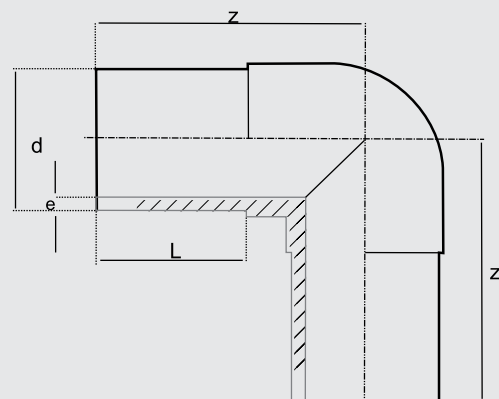
Note: 315- 400 mm SDR 7.4 and 9 are produced according to customer order.



| d | Code | Z | L* | e | | | | |
|-----|-------------|-----|-----|---------|-------|--------|--------|--------|
| | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR 22 |
| 32 | F02-032-090 | 110 | 65 | 4.4 | 3.6 | 3 | 2.0 | - |
| 40 | F02-040-090 | 110 | - | 5.5 | 4.5 | 3.7 | 2.4 | 1.9 |
| 50 | F02-050-090 | 110 | 60 | 6.9 | 5.6 | 4.6 | 3.0 | 2.3 |
| 63 | F02-063-090 | 110 | 60 | 8.6 | 7.1 | 5.8 | 3.8 | 2.9 |
| 75 | F02-075-090 | 120 | 60 | 10.3 | 8.4 | 6.8 | 4.5 | 3.5 |
| 90 | F02-090-090 | 150 | 80 | 12.3 | 10.1 | 8.2 | 5.4 | 4.1 |
| 110 | F02-110-090 | 140 | 68 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F02-125-090 | 180 | 90 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 160 | F02-160-090 | 210 | 100 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F02-180-090 | 170 | 100 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F02-200-090 | 255 | 100 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F02-225-090 | 270 | 122 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F02-250-090 | 245 | 95 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 315 | F02-315-090 | 310 | 120 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F02-355-090 | 328 | 120 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F02-400-090 | 362 | 130 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |
| 450 | F02-450-090 | 395 | 120 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 |
| 500 | F02-500-090 | 395 | 120 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 |

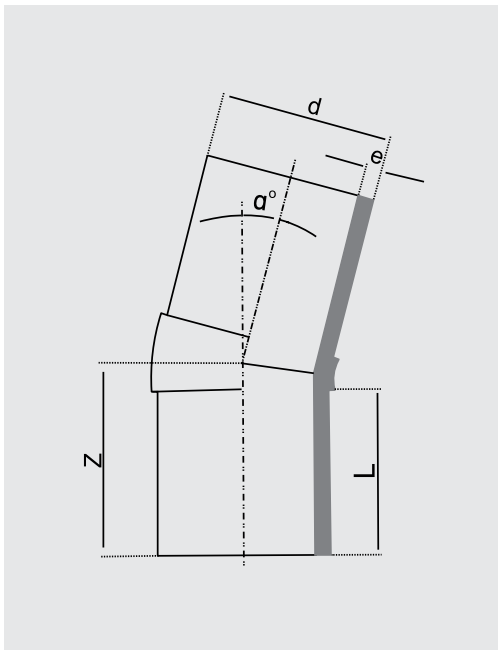
*Could be weld with electrofusion welding

Note: 315- 500 mm SDR 7.4 and 9 are produced according to customer order.



| d | Code | Z | L | e | | |
|-----|-------------|-----|-----|-------|-------|-------|
| | | | | SDR11 | SDR17 | SDR22 |
| 50 | F10-050-050 | 90 | 60 | 4.6 | 3.0 | 2.3 |
| 63 | F10-063-063 | 90 | 60 | 5.8 | 3.8 | 2.9 |
| 75 | F10-075-075 | 95 | 60 | 6.8 | 4.5 | 3.5 |
| 90 | F10-090-090 | 110 | 80 | 8.2 | 5.4 | 4.1 |
| 110 | F10-110-110 | 95 | 63 | 10.0 | 6.6 | 5.0 |
| 125 | F10-125-125 | 130 | 88 | 11.4 | 7.4 | 5.7 |
| 160 | F10-160-160 | 140 | 90 | 14.6 | 9.5 | 7.3 |
| 180 | F10-180-180 | 160 | 107 | 16.4 | 10.7 | 8.2 |
| 200 | F10-200-200 | 170 | 113 | 18.2 | 11.9 | 9.1 |
| 225 | F10-225-225 | 185 | 122 | 20.5 | 13.4 | 10.3 |
| 250 | F10-250-250 | 200 | 130 | 22.7 | 14.8 | 11.4 |
| 315 | F10-315-315 | 230 | 177 | 28.6 | 18.7 | 14.4 |
| 355 | F10-355-355 | 210 | 120 | 32.2 | 21.1 | 16.2 |
| 400 | F10-400-400 | 210 | 120 | 36.3 | 23.7 | 18.2 |

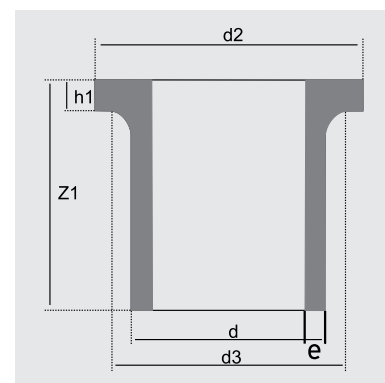
$\alpha=11.25^\circ/22.5^\circ/30^\circ$



| d | d ₂ | d ₃ | Code | h ₁ |
|-----|--------------------|----------------|-------------|----------------|
| | SDR 7.4/9/11/17/22 | | | |
| 25 | 58 | 33 | F01-025-000 | 9 |
| 32 | 68 | 40 | F01-032-000 | 10 |
| 40 | 78 | 48 | F01-040-000 | 11 |
| 50 | 88 | 61 | F01-050-000 | 12 |
| 63 | 102 | 75 | F01-063-000 | 14 |
| 75 | 122 | 89 | F01-075-000 | 16 |
| 90 | 138 | 105 | F01-090-000 | 17 |
| 110 | 158 | 125 | F01-110-000 | 18 |
| 125 | 158 | 132 | F01-125-000 | 25 |
| 140 | 188 | 155 | F01-140-000 | 25 |
| 160 | 212 | 175 | F01-160-000 | 25 |
| 180 | 212 | 180 | F01-180-000 | 30 |
| 200 | 268 | 232 | F01-200-000 | 32 |
| 225 | 268 | 235 | F01-225-000 | 32 |
| 250 | 320 | 285 | F01-250-000 | 35 |
| 280 | 320 | 291 | F01-280-000 | 35 |
| 315 | 370 | 335 | F01-315-000 | 35 |
| 355 | 430 | 373 | F01-355-000 | 40 |
| 400 | 482 | 427 | F01-400-000 | 46 |
| 450 | 585 | 514 | F01-450-000 | 60 |
| 500 | 585 | 530 | F01-500-000 | 60 |
| 560 | 685 | 642 | F01-560-000 | 60 |
| 630 | 685 | 642 | F01-630-000 | 60 |



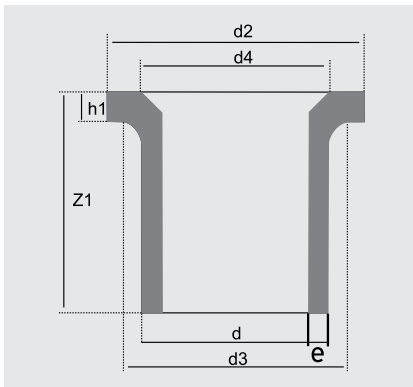
TYPE A



Note:
355-630mm SDR 7.4 and 9 are produced
according to customer order.

Suitable for butt and electrofusion.
*Type A without chamfer suitable for flanged connection.
*Type B with chamfer suitable for butterfly valve.

| d ₄ | Z ₁ | | e | | | | | Type* |
|----------------|----------------|------|--------|------|-------|-------|-------|-------|
| | Normal | Long | SDR7.4 | SDR9 | SDR11 | SDR17 | SDR22 | |
| - | - | 33 | 3.5 | 3 | 2.3 | - | - | A |
| - | - | 37 | 4.4 | 3.6 | 3 | 2.0 | - | A |
| - | - | 44 | 5.5 | 4.5 | 3.7 | 2.4 | 1.9 | A |
| - | - | 85 | 6.9 | 5.6 | 4.6 | 3.0 | 2.3 | A |
| - | - | 95 | 8.6 | 7.1 | 5.8 | 3.8 | 2.9 | A |
| - | - | 125 | 10.3 | 8.4 | 6.8 | 4.5 | 3.5 | A |
| - | 100 | 138 | 12.3 | 10.1 | 8.2 | 5.4 | 4.1 | A |
| 100 | 120 | 160 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 | A,B |
| 114 | 125 | 125 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 | A,B |
| - | 80 | 185 | 19.2 | 15.7 | 12.7 | 8.3 | 6.4 | A |
| 151 | 127 | 200 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 | A,B |
| - | 120 | 140 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 | A |
| 203 | 140 | 215 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 | A,B |
| - | 140 | 160 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 | A |
| 245 | 145 | 210 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 | A,B |
| - | - | 165 | 38.3 | 31.3 | 25.4 | 16.6 | 12.8 | A |
| 300 | - | 140 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 | A,B |
| 340 | - | 140 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 | A,B |
| 385 | - | 155 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 | A,B |
| - | - | 165 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 | A |
| - | - | 170 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 | A |
| - | - | 180 | - | 62.5 | 50.8 | 33.2 | 36.2 | A |
| - | - | 140 | - | - | 57.2 | 37.4 | 28.7 | A |



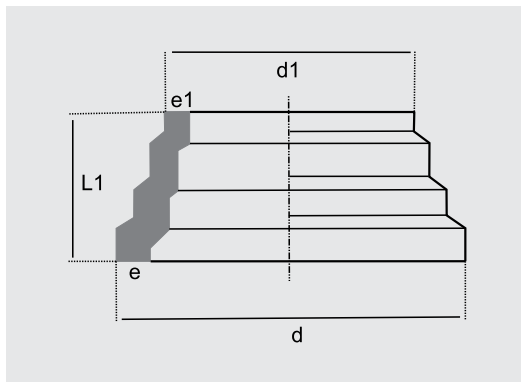
TYPE B



| d-d ₁ | Code | L ₁ | SDR 7.4 | | SDR 9 | | SDR 11 | | SDR 17 | | SDR 22 | |
|------------------|---------------|----------------|---------|----------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|
| | | | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ |
| 90*75 | F05-090-075 | 75 | 12.3 | 10.3 | 10.1 | 8.4 | 8.2 | 6.8 | 5.4 | 4.5 | 4.1 | 3.5 |
| 110*63 | F05-110-063 | 295 | 15.1 | 8.6 | 12.3 | 7.1 | 10.0 | 5.8 | 6.6 | 3.8 | 5.0 | 2.9 |
| 110*75 | F05-110-075 | 122 | 15.1 | 10.3 | 12.3 | 8.4 | 10.0 | 6.8 | 6.6 | 4.5 | 5.0 | 3.5 |
| 110*90 | F05-110-090 | 73 | 15.1 | 12.3 | 12.3 | 10.1 | 10.0 | 8.2 | 6.6 | 5.4 | 5.0 | 4.1 |
| 125*75 | F05-125-075 | 170 | 17.1 | 10.3 | 14.0 | 8.4 | 11.4 | 6.8 | 7.4 | 4.5 | 5.7 | 3.5 |
| 125*90 | F05-125-090 | 120 | 17.1 | 12.3 | 14.0 | 10.1 | 11.4 | 8.2 | 7.4 | 5.4 | 5.7 | 4.1 |
| 125*110 | F05-125-110 | 73 | 17.1 | 15.1 | 14.0 | 12.3 | 11.4 | 10.0 | 7.4 | 6.6 | 5.7 | 5.0 |
| 125*110 | F05-125-110-1 | 65 | 17.1 | 15.1 | 14.0 | 12.3 | 11.4 | 10.0 | 7.4 | 6.6 | 5.7 | 5.0 |
| 140*75 | F05-140-075 | 212 | 19.2 | 10.3 | 15.7 | 8.4 | 12.7 | 6.8 | 8.3 | 4.5 | 6.4 | 3.5 |
| 140*90 | F05-140-090 | 164 | 19.2 | 12.3 | 15.7 | 10.1 | 12.7 | 8.2 | 8.3 | 5.4 | 6.4 | 4.1 |
| 140*110 | F05-140-110 | 118 | 19.2 | 15.1 | 15.7 | 12.3 | 12.7 | 10.0 | 8.3 | 6.6 | 6.4 | 5.0 |
| 140*125 | F05-140-125 | 73 | 19.2 | 17.1 | 15.7 | 14.0 | 12.7 | 11.4 | 8.3 | 7.4 | 6.4 | 5.7 |
| 160*90 | F05-160-090 | 300 | 21.9 | 12.3 | 17.9 | 10.1 | 14.6 | 8.2 | 9.5 | 5.4 | 7.3 | 4.1 |
| 160*110 | F05-160-110 | 120 | 21.9 | 15.1 | 17.9 | 12.3 | 14.6 | 10.0 | 9.5 | 6.6 | 7.3 | 5.0 |
| 160*110 | F05-160-110-1 | 135 | 21.9 | 15.1 | 17.9 | 12.3 | 14.6 | 10.0 | 9.5 | 6.6 | 7.3 | 5.0 |
| 160*125 | F05-160-125 | 80 | 21.9 | 17.1 | 17.9 | 14.0 | 14.6 | 11.4 | 9.5 | 7.4 | 7.3 | 5.7 |
| 180*110 | F05-180-110 | 165 | 24.6 | 15.1 | 20.1 | 12.3 | 16.4 | 10.0 | 10.7 | 6.6 | 8.2 | 5.0 |
| 180*125 | F05-180-125 | 125 | 24.6 | 17.1 | 20.1 | 14.0 | 16.4 | 11.4 | 10.7 | 7.4 | 8.2 | 5.7 |
| 180*160 | F05-180-160 | 73 | 24.6 | 21.9 | 20.1 | 17.9 | 16.4 | 14.6 | 10.7 | 9.5 | 8.2 | 7.3 |
| 200*110 | F05-200-110 | 210 | 27.4 | 15.1 | 22.4 | 12.3 | 18.2 | 10.0 | 11.9 | 6.6 | 9.1 | 5.0 |
| 200*110 | F05-200-110-1 | 205 | 27.4 | 15.1 | 22.4 | 12.3 | 18.2 | 10.0 | 11.9 | 6.6 | 9.1 | 5.0 |
| 200*125 | F05-200-125 | 170 | 27.4 | 17.1 | 22.4 | 14.0 | 18.2 | 11.4 | 11.9 | 7.4 | 9.1 | 5.7 |
| 200*160 | F05-200-160 | 118 | 27.4 | 21.9 | 22.4 | 17.9 | 18.2 | 14.6 | 11.9 | 9.5 | 9.1 | 7.3 |
| 200*160 | F05-200-160-1 | 135 | 27.4 | 21.9 | 22.4 | 17.9 | 18.2 | 14.6 | 11.9 | 9.5 | 9.1 | 7.3 |
| 200*180 | F05-200-180 | 74 | 27.4 | 24.6 | 22.4 | 20.1 | 18.2 | 16.4 | 11.9 | 10.7 | 9.1 | 8.2 |
| 225*160 | F05-225-160 | 130 | 30.8 | 21.9 | 25.2 | 17.9 | 20.5 | 14.6 | 13.4 | 9.5 | 10.3 | 7.3 |
| 225*200 | F05-225-200 | 70 | 30.8 | 27.4 | 25.2 | 22.4 | 20.5 | 18.2 | 13.4 | 11.9 | 10.3 | 9.1 |
| 225*200 | F05-225-200-1 | 100 | 30.8 | 27.4 | 25.2 | 22.4 | 20.5 | 18.2 | 13.4 | 11.9 | 10.3 | 9.1 |
| 250*110 | F05-250-110 | 300 | 34.2 | 15.1 | 27.9 | 12.3 | 22.7 | 10.0 | 14.8 | 6.6 | 11.4 | 5.0 |
| 250*160 | F05-250-160 | 170 | 34.2 | 21.9 | 27.9 | 17.9 | 22.7 | 14.6 | 14.8 | 9.5 | 11.4 | 7.3 |
| 250*160 | F05-250-160-1 | 215 | 34.2 | 21.9 | 27.9 | 17.9 | 22.7 | 14.6 | 14.8 | 9.5 | 11.4 | 7.3 |
| 250*200 | F05-250-200 | 110 | 34.2 | 27.4 | 27.9 | 22.4 | 22.7 | 18.2 | 14.8 | 11.9 | 11.4 | 9.1 |
| 250*200 | F05-250-200-1 | 155 | 34.2 | 27.4 | 27.9 | 22.4 | 22.7 | 18.2 | 14.8 | 11.9 | 11.4 | 9.1 |
| 250*200 | F05-250-200-2 | 130 | 34.2 | 27.4 | 27.9 | 22.4 | 22.7 | 18.2 | 14.8 | 11.9 | 11.4 | 9.1 |
| 250*225 | F05-250-225 | 65 | 34.2 | 30.8 | 27.9 | 25.2 | 22.7 | 20.5 | 14.8 | 13.4 | 11.4 | 10.3 |

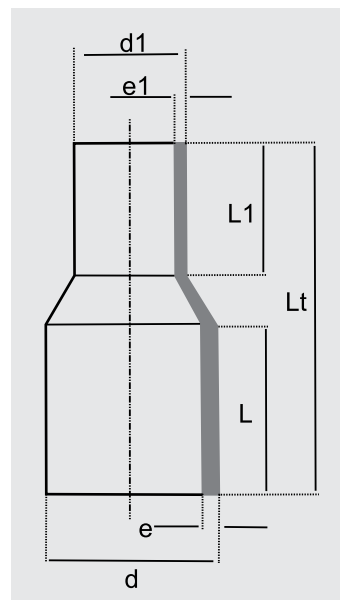
| d-d ₁ | Code | L ₁ | SDR 7.4 | | SDR 9 | | SDR 11 | | SDR 17 | | SDR 22 | |
|------------------|---------------|----------------|---------|----------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|
| | | | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ |
| 250*225 | F05-250-225-1 | 95 | 34.2 | 30.8 | 27.9 | 25.2 | 22.7 | 20.5 | 14.8 | 13.4 | 11.4 | 10.3 |
| 280*160 | F05-280-160 | 215 | 38.3 | 21.9 | 31.3 | 17.9 | 25.4 | 14.6 | 16.6 | 9.5 | 12.8 | 7.3 |
| 280*200 | F05-280-200 | 155 | 38.3 | 27.4 | 31.3 | 22.4 | 25.4 | 18.2 | 16.6 | 11.9 | 12.8 | 9.1 |
| 280*225 | F05-280-225 | 110 | 38.3 | 30.8 | 31.3 | 25.2 | 25.4 | 20.5 | 16.6 | 13.4 | 12.8 | 10.3 |
| 280*250 | F05-280-250 | 70 | 38.3 | 34.2 | 31.3 | 27.9 | 25.4 | 22.7 | 16.6 | 14.8 | 12.8 | 11.4 |
| 315*160 | F05-315-160 | 275 | 43.1 | 21.9 | 35.2 | 17.9 | 28.6 | 14.6 | 18.7 | 9.5 | 14.4 | 7.3 |
| 315*200 | F05-315-200 | 215 | 43.1 | 27.4 | 35.2 | 22.4 | 28.6 | 18.2 | 18.7 | 11.9 | 14.4 | 9.1 |
| 315*200 | F05-315-200-1 | 245 | 43.1 | 27.4 | 35.2 | 22.4 | 28.6 | 18.2 | 18.7 | 11.9 | 14.4 | 9.1 |
| 315*225 | F05-315-225 | 170 | 43.1 | 30.8 | 35.2 | 25.2 | 28.6 | 20.5 | 18.7 | 13.4 | 14.4 | 10.3 |
| 315*225 | F05-315-225-1 | 185 | 43.1 | 30.8 | 35.2 | 25.2 | 28.6 | 20.5 | 18.7 | 13.4 | 14.4 | 10.3 |
| 315*250 | F05-315-250 | 130 | 43.1 | 34.2 | 35.2 | 27.9 | 28.6 | 22.7 | 18.7 | 14.8 | 14.4 | 11.4 |
| 315*250 | F05-315-250-1 | 130 | 43.1 | 34.2 | 35.2 | 27.9 | 28.6 | 22.7 | 18.7 | 14.8 | 14.4 | 11.4 |
| 315*280 | F05-315-280 | 90 | 43.1 | 38.3 | 35.2 | 31.3 | 28.6 | 25.4 | 18.7 | 16.6 | 14.4 | 12.8 |
| 355*200 | F05-355-200 | 310 | 48.5 | 27.4 | 39.7 | 22.4 | 32.2 | 18.2 | 21.1 | 11.9 | 16.2 | 9.1 |
| 355*225 | F05-355-225 | 250 | 48.5 | 30.8 | 39.7 | 25.2 | 32.2 | 20.5 | 21.1 | 13.4 | 16.2 | 10.3 |
| 355*250 | F05-355-250 | 195 | 48.5 | 34.2 | 39.7 | 27.9 | 32.2 | 22.7 | 21.1 | 14.8 | 16.2 | 11.4 |
| 355*315 | F05-355-315 | 110 | 48.5 | 43.1 | 39.7 | 35.2 | 32.2 | 28.6 | 21.1 | 18.7 | 16.2 | 14.4 |
| 400*200 | F05-400-200 | 400 | 54.7 | 27.4 | 44.7 | 22.4 | 36.3 | 18.2 | 23.7 | 11.9 | 18.2 | 9.1 |
| 400*225 | F05-400-225 | 340 | 54.7 | 30.8 | 44.7 | 25.2 | 36.3 | 20.5 | 23.7 | 13.4 | 18.2 | 10.3 |
| 400*250 | F05-400-250 | 285 | 54.7 | 34.2 | 44.7 | 27.9 | 36.3 | 22.7 | 23.7 | 14.8 | 18.2 | 11.4 |
| 400*315 | F05-400-315 | 200 | 54.7 | 43.1 | 44.7 | 35.2 | 36.3 | 28.6 | 23.7 | 18.7 | 18.2 | 14.4 |
| 400*355 | F05-400-355 | 125 | 54.7 | 48.5 | 44.7 | 39.7 | 36.3 | 32.2 | 23.7 | 21.1 | 18.2 | 16.2 |
| 450*400 | F05-450-400 | 150 | 61.5 | 54.7 | 50.3 | 44.7 | 40.9 | 36.3 | 26.7 | 23.7 | 20.5 | 18.2 |
| 500*200 | F05-500-200 | 162 | 68.3 | 27.4 | 55.8 | 22.4 | 45.4 | 18.2 | 29.7 | 11.9 | 22.8 | 9.1 |
| 500*250 | F05-500-250 | 162 | 68.3 | 34.2 | 55.8 | 27.9 | 45.4 | 22.7 | 29.7 | 14.8 | 22.8 | 11.4 |
| 500*400 | F05-500-400 | 150 | 68.3 | 54.7 | 55.8 | 44.7 | 45.4 | 36.3 | 29.7 | 23.7 | 22.8 | 18.2 |
| 560*500 | F05-560-500 | 160 | - | - | 62.5 | 55.8 | 50.8 | 45.4 | 33.2 | 29.7 | 25.5 | 22.8 |
| 630*560 | F05-630-560 | 180 | - | - | - | - | 57.2 | 50.8 | 37.4 | 33.2 | 28.7 | 25.5 |

Note: 315- 630mm SDR 7.4 and 9 are produced according to customer order.



| d-d ₁ | Code | L _t | L* | L ₁ * | SDR 7.4 | | SDR 9 | | SDR 11 | | SDR 17 | | SDR 22 | |
|------------------|---------------|----------------|-----|------------------|---------|----------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|
| | | | | | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ |
| 40*32 | F05-040-032 | 90 | 44 | 37 | 5.5 | 4.4 | 4.5 | 3.6 | 3.7 | 3 | 2.4 | 2 | - | - |
| 50*32 | F05-050-032 | 95 | 49 | 37 | 6.9 | 4.4 | 5.6 | 3.6 | 4.6 | 3 | 3.0 | 2 | - | - |
| 50*40 | F05-050-040 | 100 | 49 | 44 | 6.9 | 5.5 | 5.6 | 4.5 | 4.6 | 3.7 | 3.0 | 2.4 | 2.3 | 1.9 |
| 63*32 | F05-063-032 | 105 | 54 | 37 | 8.6 | 4.4 | 7.1 | 3.6 | 5.8 | 3 | 3.8 | 2 | - | - |
| 63*40 | F05-063-040 | 110 | 54 | 44 | 8.6 | 5.5 | 7.1 | 4.5 | 5.8 | 3.7 | 3.8 | 2.4 | 2.9 | 1.9 |
| 63*50 | F05-063-050 | 110 | 54 | 49 | 8.6 | 6.9 | 7.1 | 5.6 | 5.8 | 4.6 | 3.8 | 3.0 | 2.9 | 2.3 |
| 75*50 | F05-075-050 | 143 | 67 | 49 | 10.3 | 6.9 | 8.4 | 5.6 | 6.8 | 4.6 | 4.5 | 3.0 | 3.5 | 2.3 |
| 75*63 | F05-075-063 | 145 | 68 | 62 | 10.3 | 8.6 | 8.4 | 7.1 | 6.8 | 5.8 | 4.5 | 3.8 | 3.5 | 2.9 |
| 75*63 | F05-075-063-1 | 120 | 50 | 48 | 10.3 | 8.6 | 8.4 | 7.1 | 6.8 | 5.8 | 4.5 | 3.8 | 3.5 | 2.9 |
| 90*63 | F05-090-063 | 148 | 69 | 59 | 12.3 | 8.6 | 10.1 | 7.1 | 8.2 | 5.8 | 5.4 | 3.8 | 4.1 | 2.9 |
| 90*75 | F05-090-075 | 157 | 69 | 70 | 12.3 | 10.3 | 10.1 | 8.4 | 8.2 | 6.8 | 5.4 | 4.5 | 4.1 | 3.5 |
| 110*63 | F05-110-063 | 144 | 70 | 59 | 15.1 | 8.6 | 12.3 | 7.1 | 10.0 | 5.8 | 6.6 | 3.8 | 5.0 | 2.9 |
| 110*75 | F05-110-075 | 165 | 79 | 52 | 15.1 | 10.3 | 12.3 | 8.4 | 10.0 | 6.8 | 6.6 | 4.5 | 5.0 | 3.5 |
| 110*90 | F05-110-090 | 125 | 52 | 46 | 15.1 | 12.3 | 12.3 | 10.1 | 10.0 | 8.2 | 6.6 | 5.4 | 5.0 | 4.1 |
| 125*90 | F05-125-090 | 160 | 76 | 65 | 17.1 | 12.3 | 14.0 | 10.1 | 11.4 | 8.2 | 7.4 | 5.4 | 5.7 | 4.1 |
| 125*110 | F05-125-110 | 161 | 76 | 70 | 17.1 | 15.1 | 14.0 | 12.3 | 11.4 | 10.0 | 7.4 | 6.6 | 5.7 | 5.0 |
| 160*90 | F05-160-090 | 166 | 86 | 65 | 21.9 | 12.3 | 17.9 | 10.1 | 14.6 | 8.2 | 9.5 | 5.4 | 7.3 | 4.1 |
| 160*110 | F05-160-110 | 180 | 86 | 70 | 21.9 | 15.1 | 17.9 | 12.3 | 14.6 | 10.0 | 9.5 | 6.6 | 7.3 | 5.0 |
| 160*125 | F05-160-125 | 190 | 86 | 76 | 21.9 | 17.1 | 17.9 | 14.0 | 14.6 | 11.4 | 9.5 | 7.4 | 7.3 | 5.7 |
| 200*110 | F05-200-110 | 186 | 101 | 70 | 27.4 | 15.1 | 22.4 | 12.3 | 18.2 | 10.0 | 11.9 | 6.6 | 9.1 | 5.0 |
| 200*125 | F05-200-125 | 192 | 101 | 76 | 27.4 | 17.1 | 22.4 | 14.0 | 18.2 | 11.4 | 11.9 | 7.4 | 9.1 | 5.7 |
| 200*160 | F05-200-160 | 200 | 101 | 86 | 27.4 | 21.9 | 22.4 | 17.9 | 18.2 | 14.6 | 11.9 | 9.5 | 9.1 | 7.3 |
| 250*110 | F05-250-110 | 207 | 122 | 70 | 34.2 | 15.1 | 27.9 | 12.3 | 22.7 | 10.0 | 14.8 | 6.6 | 11.4 | 5.0 |
| 250*160 | F05-250-160 | 230 | 122 | 86 | 34.2 | 21.9 | 27.9 | 17.9 | 22.7 | 14.6 | 14.8 | 9.5 | 11.4 | 7.3 |
| 250*200 | F05-250-200 | 250 | 122 | 101 | 34.2 | 27.4 | 27.9 | 22.4 | 22.7 | 18.2 | 14.8 | 11.9 | 11.4 | 9.1 |

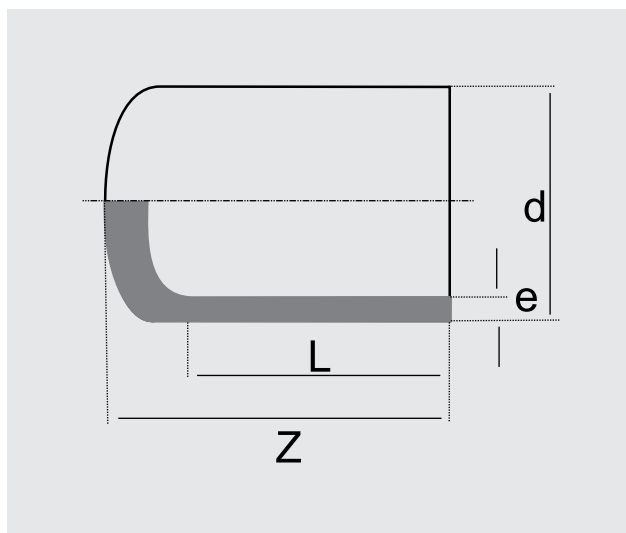
*could be weld with electrofusion fittings.



| d | Code | Z | L* | e | | | | |
|-----|-------------|-----|-----|---------|-------|--------|--------|--------|
| | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR 22 |
| 50 | F06-050-000 | 63 | 63 | 6.9 | 5.6 | 4.6 | 3.0 | 2.3 |
| 63 | F06-063-000 | 62 | 52 | 8.6 | 7.1 | 5.8 | 3.8 | 2.9 |
| 75 | F06-075-000 | 75 | 60 | 10.3 | 8.4 | 6.8 | 4.5 | 3.5 |
| 90 | F06-090-000 | 86 | 70 | 12.3 | 10.1 | 8.2 | 5.4 | 4.1 |
| 110 | F06-110-000 | 95 | 76 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F06-125-000 | 100 | 85 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 160 | F06-160-000 | 115 | 93 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 200 | F06-200-000 | 133 | 103 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 250 | F06-250-000 | 150 | 133 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 315 | F06-315-000 | 160 | 142 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |

*Could be weld with electrofusion welding

Note: 250- 315 mm SDR 7.4 and 9 are produced according to customer order.

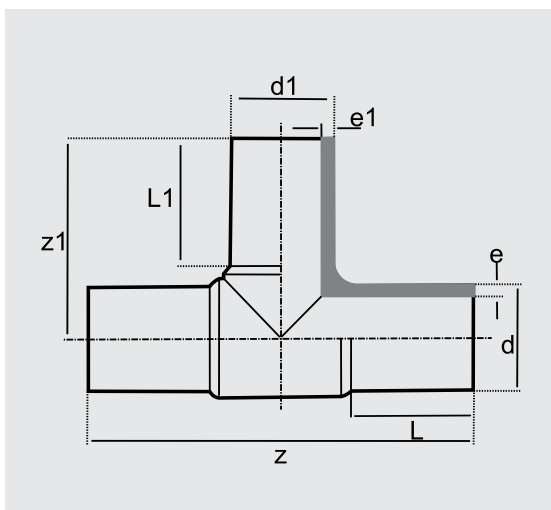


| d-d ₁ | Code | Z | Z ₁ | L* | L ₁ * | SDR 7.4 | | SDR 9 | | SDR 11 | | SDR 17 | | SDR 22 | |
|------------------|-------------|-----|----------------|-----|------------------|---------|----------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|
| | | | | | | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ |
| 63*50 | F03-063-050 | 215 | 103 | 60 | 50 | 8.6 | 6.9 | 7.1 | 5.6 | 5.8 | 4.6 | 3.8 | 3.0 | 2.9 | 2.3 |
| 75*50 | F03-075-050 | 246 | 108 | 70 | 50 | 10.3 | 6.9 | 8.4 | 5.6 | 6.8 | 4.6 | 4.5 | 3.0 | 3.5 | 2.3 |
| 75*63 | F03-075-063 | 246 | 117 | 70 | 60 | 10.3 | 8.6 | 8.4 | 7.1 | 6.8 | 5.8 | 4.5 | 3.8 | 3.5 | 2.9 |
| 90*63 | F03-090-063 | 270 | 145 | 81 | 66 | 12.3 | 8.6 | 10.1 | 7.1 | 8.2 | 5.8 | 5.4 | 3.8 | 4.1 | 2.9 |
| 90*75 | F03-090-075 | 270 | 145 | 81 | 72 | 12.3 | 10.3 | 10.1 | 8.4 | 8.2 | 6.8 | 5.4 | 4.5 | 4.1 | 3.5 |
| 110*63 | F03-110-063 | 295 | 140 | 63 | 75 | 15.1 | 8.6 | 12.3 | 7.1 | 10.0 | 5.8 | 6.6 | 3.8 | 5.0 | 2.9 |
| 110*75 | F03-110-075 | 295 | 140 | 63 | 73 | 15.1 | 10.3 | 12.3 | 8.4 | 10.0 | 6.8 | 6.6 | 4.5 | 5.0 | 3.5 |
| 110*90 | F03-110-090 | 295 | 140 | 63 | 73 | 15.1 | 12.3 | 12.3 | 10.1 | 10.0 | 8.2 | 6.6 | 5.4 | 5.0 | 4.1 |
| 125*90 | F03-125-090 | 335 | 170 | 90 | 73 | 17.1 | 12.3 | 14.0 | 10.1 | 11.4 | 8.2 | 7.4 | 5.4 | 5.7 | 4.1 |
| 125*110 | F03-125-110 | 340 | 170 | 90 | 82 | 17.1 | 15.1 | 14.0 | 12.3 | 11.4 | 10.0 | 7.4 | 6.6 | 5.7 | 5.0 |
| 160*63 | F03-160-063 | 420 | 210 | 100 | 65 | 21.9 | 8.6 | 17.9 | 7.1 | 14.6 | 5.8 | 9.5 | 3.8 | 7.3 | 2.9 |
| 160*75 | F03-160-075 | 420 | 210 | 100 | 65 | 21.9 | 10.3 | 17.9 | 8.4 | 14.6 | 6.8 | 9.5 | 4.5 | 7.3 | 3.5 |
| 160*90 | F03-160-090 | 420 | 210 | 100 | 65 | 21.9 | 12.3 | 17.9 | 10.1 | 14.6 | 8.2 | 9.5 | 5.4 | 7.3 | 4.1 |
| 160*110 | F03-160-110 | 420 | 210 | 100 | 70 | 21.9 | 15.1 | 17.9 | 12.3 | 14.6 | 10.0 | 9.5 | 6.6 | 7.3 | 5.0 |
| 180*63 | F03-180-063 | 420 | 202 | 100 | 60 | 24.6 | 8.6 | 20.1 | 7.1 | 16.4 | 5.8 | 10.7 | 3.8 | 8.2 | 2.9 |
| 180*75 | F03-180-075 | 420 | 202 | 100 | 70 | 24.6 | 10.3 | 20.1 | 8.4 | 16.4 | 6.8 | 10.7 | 4.5 | 8.2 | 3.5 |
| 180*90 | F03-180-090 | 420 | 202 | 100 | 73 | 24.6 | 12.3 | 20.1 | 10.1 | 16.4 | 8.2 | 10.7 | 5.4 | 8.2 | 4.1 |
| 180*110 | F03-180-110 | 430 | 205 | 100 | 82 | 24.6 | 15.1 | 20.1 | 12.3 | 16.4 | 10.0 | 10.7 | 6.6 | 8.2 | 5.0 |
| 200*63 | F03-200-063 | 490 | 245 | 117 | 60 | 27.4 | 8.6 | 22.4 | 7.1 | 18.2 | 5.8 | 11.9 | 3.8 | 9.1 | 2.9 |
| 200*75 | F03-200-075 | 515 | 235 | 120 | 65 | 27.4 | 10.3 | 22.4 | 8.6 | 18.2 | 6.8 | 11.9 | 4.5 | 9.1 | 3.5 |
| 200*90 | F03-200-090 | 515 | 255 | 125 | 115 | 27.4 | 12.3 | 22.4 | 10.1 | 18.2 | 8.2 | 11.9 | 5.4 | 9.1 | 4.1 |
| 200*110 | F03-200-110 | 515 | 265 | 125 | 135 | 27.4 | 15.1 | 22.4 | 12.3 | 18.2 | 10.0 | 11.9 | 6.6 | 9.1 | 5.0 |
| 200*160 | F03-200-160 | 515 | 265 | 125 | 95 | 27.4 | 21.9 | 22.4 | 17.9 | 18.2 | 14.6 | 11.9 | 9.5 | 9.1 | 7.3 |
| 225*110 | F03-225-110 | 540 | 250 | 122 | 122 | 30.8 | 15.1 | 25.2 | 12.3 | 20.5 | 10.0 | 13.4 | 6.6 | 10.3 | 5.0 |
| 225*160 | F03-225-160 | 540 | 250 | 122 | 122 | 30.8 | 21.9 | 25.2 | 17.9 | 20.5 | 14.6 | 13.4 | 9.5 | 10.3 | 7.3 |
| 225*180 | F03-225-180 | 540 | 250 | 122 | 122 | 30.8 | 24.6 | 25.2 | 20.1 | 20.5 | 16.4 | 13.4 | 10.7 | 10.3 | 8.2 |
| 225*200 | F03-225-200 | 540 | 250 | 122 | 122 | 30.8 | 27.4 | 25.2 | 22.4 | 20.5 | 18.2 | 13.4 | 11.9 | 10.3 | 9.1 |
| 250*90 | F03-250-090 | 510 | 265 | 100 | 80 | 34.2 | 12.3 | 27.9 | 10.1 | 22.7 | 8.2 | 14.8 | 5.4 | 11.4 | 4.1 |
| 250*110 | F03-250-110 | 510 | 265 | 100 | 85 | 34.2 | 15.1 | 27.9 | 12.3 | 22.7 | 10.0 | 14.8 | 6.6 | 11.4 | 5.0 |
| 250*125 | F03-250-125 | 510 | 265 | 100 | 90 | 34.2 | 17.1 | 27.9 | 14.0 | 22.7 | 11.4 | 14.8 | 7.4 | 11.4 | 5.7 |
| 250*160 | F03-250-160 | 510 | 265 | 100 | 95 | 34.2 | 21.9 | 27.9 | 17.9 | 22.7 | 14.6 | 14.8 | 9.5 | 11.4 | 7.3 |
| 250*200 | F03-250-200 | 510 | 265 | 100 | 113 | 34.2 | 27.4 | 27.9 | 22.4 | 22.7 | 18.2 | 14.8 | 11.9 | 11.4 | 9.1 |
| 315*110 | F03-315-110 | 595 | 255 | 100 | 82 | 43.1 | 15.1 | 35.2 | 12.3 | 28.6 | 10.0 | 18.7 | 6.6 | 14.4 | 5.0 |
| 315*125 | F03-315-125 | 595 | 255 | 100 | 100 | 43.1 | 17.1 | 35.2 | 14.0 | 28.6 | 11.4 | 18.7 | 7.4 | 14.4 | 5.7 |
| 315*160 | F03-315-160 | 595 | 298 | 94 | 95 | 43.1 | 21.9 | 35.2 | 17.9 | 28.6 | 14.6 | 18.7 | 9.5 | 14.4 | 7.3 |
| 315*200 | F03-315-200 | 595 | 298 | 94 | 86 | 43.1 | 27.4 | 35.2 | 22.4 | 28.6 | 18.2 | 18.7 | 11.9 | 14.4 | 9.1 |

| d-d ₁ | Code | Z | Z ₁ | L* | L ₁ * | SDR 7.4 | | SDR 9 | | SDR 11 | | SDR 17 | | SDR 22 | |
|------------------|-------------|-----|----------------|-----|------------------|---------|----------------|-------|----------------|--------|----------------|--------|----------------|--------|----------------|
| | | | | | | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ | e | e ₁ |
| 315*250 | F03-315-250 | 595 | 298 | 94 | 86 | 43.1 | 34.2 | 35.2 | 27.9 | 28.6 | 22.7 | 18.7 | 14.8 | 14.4 | 11.4 |
| 355*110 | F03-355-110 | 640 | 288 | 120 | 86 | 48.5 | 15.1 | 39.7 | 12.3 | 32.2 | 10.0 | 21.1 | 6.6 | 16.2 | 5.0 |
| 355*160 | F03-355-160 | 640 | 308 | 120 | 102 | 48.5 | 21.9 | 39.7 | 17.9 | 32.2 | 14.6 | 21.1 | 9.5 | 16.2 | 7.3 |
| 355*200 | F03-355-200 | 640 | 328 | 120 | 117 | 48.5 | 27.4 | 39.7 | 22.4 | 32.2 | 18.2 | 21.1 | 11.9 | 16.2 | 9.1 |
| 355*250 | F03-355-250 | 640 | 328 | 120 | 120 | 48.5 | 34.2 | 39.7 | 27.9 | 32.2 | 22.7 | 21.1 | 14.8 | 16.2 | 11.4 |
| 400*160 | F03-400-160 | 650 | 362 | 130 | 130 | 54.7 | 21.9 | 44.7 | 17.9 | 36.3 | 14.6 | 23.7 | 9.5 | 18.2 | 7.3 |
| 400*200 | F03-400-200 | 650 | 362 | 130 | 130 | 54.7 | 27.4 | 44.7 | 22.4 | 36.3 | 18.2 | 23.7 | 11.9 | 18.2 | 9.1 |
| 400*250 | F03-400-250 | 650 | 362 | 130 | 130 | 54.7 | 34.2 | 44.7 | 27.9 | 36.3 | 22.7 | 23.7 | 14.8 | 18.2 | 11.4 |
| 400*315 | F03-400-315 | 650 | 362 | 130 | 130 | 54.7 | 43.1 | 44.7 | 35.2 | 36.3 | 28.6 | 23.7 | 18.7 | 18.2 | 14.4 |
| 450*315 | F03-450-315 | 790 | 120 | 120 | 120 | 61.5 | 43.1 | 50.3 | 35.2 | 40.9 | 28.6 | 26.7 | 18.7 | 20.5 | 14.4 |
| 450*355 | F03-450-355 | 790 | 120 | 120 | 120 | 61.5 | 48.5 | 50.3 | 39.7 | 40.9 | 32.2 | 26.7 | 21.1 | 20.5 | 16.2 |
| 500*200 | F03-500-200 | 790 | 120 | 120 | 120 | 68.3 | 27.4 | 55.8 | 22.4 | 45.4 | 18.2 | 29.7 | 11.9 | 22.8 | 9.1 |
| 500*250 | F03-500-250 | 790 | 120 | 120 | 120 | 68.3 | 34.2 | 55.8 | 27.9 | 45.4 | 22.7 | 29.7 | 14.8 | 22.8 | 11.4 |
| 500*315 | F03-500-315 | 790 | 120 | 120 | 120 | 68.3 | 43.1 | 55.8 | 35.2 | 45.4 | 28.6 | 29.7 | 18.7 | 22.8 | 14.4 |
| 500*355 | F03-500-355 | 790 | 120 | 120 | 120 | 68.3 | 48.5 | 55.8 | 39.7 | 45.4 | 32.2 | 29.7 | 21.1 | 22.8 | 16.2 |
| 500*400 | F03-500-400 | 790 | 120 | 120 | 120 | 68.3 | 54.7 | 55.8 | 44.7 | 45.4 | 36.3 | 29.7 | 23.7 | 22.8 | 18.2 |

*could be weld with electrofusion fittings

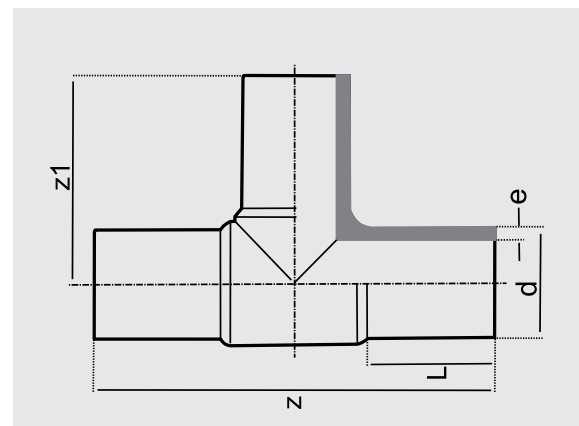
Note: 315- 500mm SDR 7.4 and 9 are produced according to customer order.



| d | Code | Z | Z ₁ | L* | e | | | | |
|-----|-------------|-----|----------------|-----|---------|-------|--------|--------|--------|
| | | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR 22 |
| 32 | F03-032-032 | 155 | 80 | 30 | 4.4 | 3.6 | 3 | 2.0 | - |
| 40 | F03-040-040 | 155 | 80 | - | 5.5 | 4.5 | 3.7 | 2.4 | 1.9 |
| 50 | F03-050-050 | 185 | 90 | 55 | 6.9 | 5.6 | 4.6 | 3.0 | 2.3 |
| 63 | F03-063-063 | 230 | 115 | 65 | 8.6 | 7.1 | 5.8 | 3.8 | 2.9 |
| 75 | F03-075-075 | 264 | 132 | 72 | 10.3 | 8.4 | 6.8 | 4.5 | 3.5 |
| 90 | F03-090-090 | 290 | 145 | 81 | 12.3 | 10.1 | 8.2 | 5.4 | 4.1 |
| 110 | F03-110-110 | 295 | 140 | 60 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F03-125-125 | 365 | 180 | 90 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 160 | F03-160-160 | 425 | 210 | 100 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F03-180-180 | 515 | 260 | 125 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F03-200-200 | 515 | 260 | 125 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F03-225-225 | 540 | 270 | 122 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F03-250-250 | 510 | 255 | 100 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 280 | F03-280-280 | 595 | 298 | 96 | 38.3 | 31.3 | 25.4 | 16.6 | 12.8 |
| 315 | F03-315-315 | 595 | 298 | 94 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F03-355-355 | 656 | 328 | 120 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F03-400-400 | 725 | 362 | 130 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |
| 450 | F03-450-450 | 790 | 395 | 120 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 |
| 500 | F03-500-500 | 790 | 395 | 120 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 |

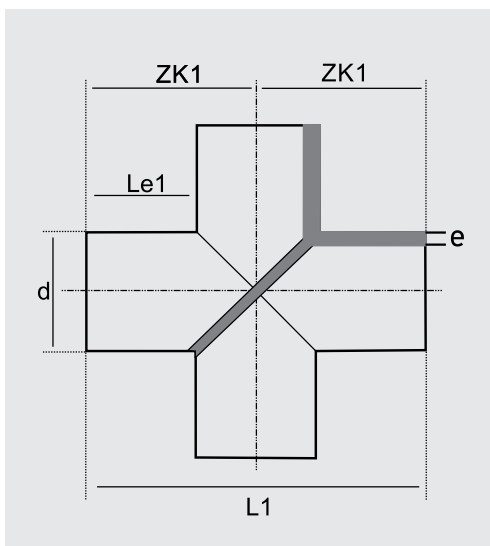
*could be weld with electrofusion fittings

Note: 315 – 500 mm SDR 7.4 and 9 are produced according to customer order.



| d | | Code | e | | L* _{e1} | L ₁ | ZK ₁ |
|-----|-----------|-------------|-------|-------|------------------|----------------|-----------------|
| | | | SDR11 | SDR17 | | | |
| 90 | Injection | H04-090-090 | 8.2 | 5.4 | 81 | 300 | 150 |
| 110 | Injection | H04-110-110 | 10.0 | 6.6 | 86 | 330 | 165 |
| 125 | Injection | H04-125-125 | 11.4 | 7.4 | 90 | 430 | 215 |
| 160 | Injection | H04-160-160 | 14.6 | 9.5 | 102 | 420 | 210 |
| 180 | Injection | H04-180-180 | 16.4 | 10.7 | 120 | 480 | 440 |
| 200 | Injection | H04-200-200 | 18.2 | 11.9 | 117 | 500 | 250 |
| 225 | Injection | H04-225-225 | 20.5 | 13.4 | 125 | 530 | 265 |
| 250 | Injection | H04-250-250 | 22.7 | 14.8 | 148 | 620 | 310 |
| 315 | Injection | H04-315-315 | 28.6 | 18.7 | 94 | 920 | 460 |
| 355 | Injection | H04-355-355 | 32.2 | 21.1 | 120 | 960 | 480 |
| 400 | Injection | H04-400-400 | 36.3 | 23.7 | 130 | 1000 | 500 |
| 450 | Casting | H04-450-450 | 40.9 | 26.7 | - | 1050 | 525 |
| 500 | Casting | H04-500-500 | 45.4 | 29.7 | - | 1200 | 600 |
| 560 | Casting | H04-560-560 | 50.8 | 33.2 | - | 1260 | 630 |
| 630 | Casting | H04-630-630 | 57.2 | 37.4 | - | 1330 | 665 |

*could be weld with electrofusion fittings

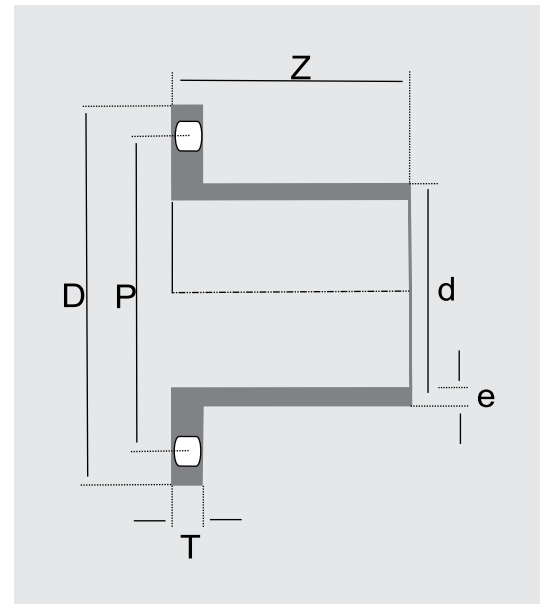


HDPE 100
DIN 2501
DIN 16963

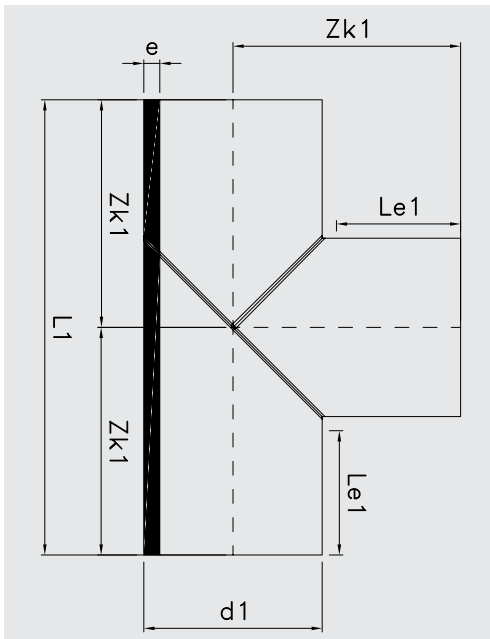
فلنج هسته فولادی
Steel Core Hole Flange
Фланцы Со Стальными Сердечниками

| d | Code | e | | | | D | P | Z | T | Bolt Count |
|-----|-------------|----------|--------|--------|--------|-----|-----|-----|----|------------|
| | | SDR 7.4* | SDR 9* | SDR 11 | SDR 17 | | | | | |
| 63 | F09-063-063 | 8.6 | 7.1 | 5.8 | 3.8 | 165 | 125 | 80 | 18 | 4 |
| 75 | F09-075-075 | 10.3 | 8.4 | 6.8 | 4.5 | 185 | 145 | 85 | 18 | 4 |
| 90 | F09-090-090 | 12.3 | 10.1 | 8.2 | 5.4 | 200 | 160 | 103 | 20 | 8 |
| 110 | F09-110-110 | 15.1 | 12.3 | 10.0 | 6.6 | 220 | 180 | 109 | 20 | 8 |
| 125 | F09-125-125 | 17.1 | 14.0 | 11.4 | 7.4 | 250 | 210 | 121 | 22 | 8 |
| 160 | F09-160-160 | 21.9 | 17.9 | 14.6 | 9.5 | 285 | 240 | 125 | 25 | 8 |
| 200 | F09-200-200 | 27.4 | 22.4 | 18.2 | 11.9 | 340 | 295 | 138 | 25 | 8 |
| 250 | F09-250-250 | 34.2 | 27.9 | 22.7 | 14.8 | 395 | 350 | 165 | 30 | 12 |
| 315 | F09-315-315 | 43.1 | 35.2 | 28.6 | 18.7 | 445 | 400 | 170 | 35 | 12 |

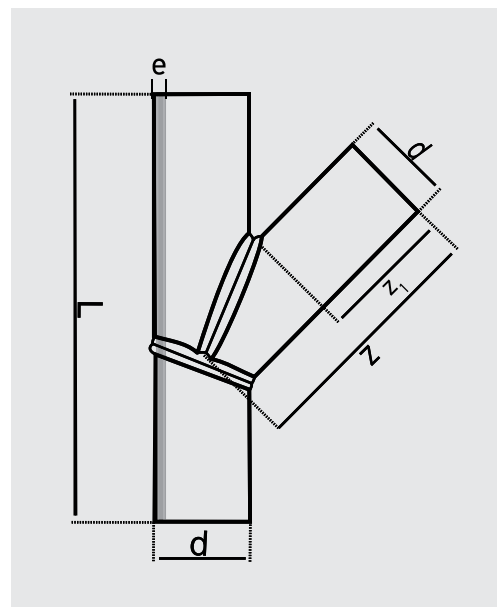
Note: 7.4 and 9 SDR are produced according to customer order.



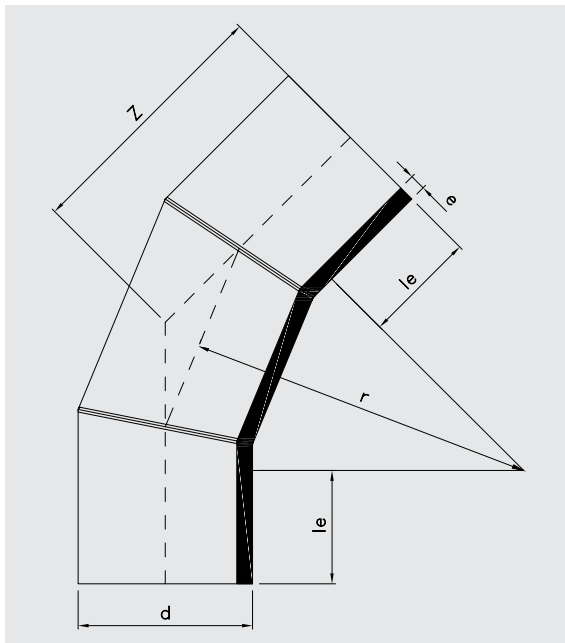
| d1 | Code | Z _{k1} | l ₁ | L _{e1} | e | | | | |
|-----|-------------|-----------------|----------------|-----------------|---------|-------|--------|--------|-------|
| | | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR22 |
| 110 | F13-110-110 | 205 | 410 | 150 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F13-125-125 | 215 | 430 | 150 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 140 | F13-140-140 | 220 | 440 | 150 | 19.2 | 15.7 | 12.7 | 8.3 | 6.4 |
| 160 | F13-160-160 | 230 | 460 | 150 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F13-180-180 | 240 | 480 | 150 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F13-200-200 | 250 | 500 | 150 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F13-225-225 | 265 | 530 | 150 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F13-250-250 | 375 | 750 | 250 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 280 | F13-280-280 | 390 | 780 | 250 | 38.3 | 31.3 | 25.4 | 16.6 | 12.8 |
| 315 | F13-315-315 | 460 | 920 | 300 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F13-355-355 | 480 | 960 | 300 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F13-400-400 | 500 | 1000 | 300 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |
| 450 | F13-450-450 | 525 | 1050 | 300 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 |
| 500 | F13-500-500 | 600 | 1200 | 350 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 |
| 560 | F13-560-560 | 630 | 1260 | 350 | - | 62.5 | 50.8 | 33.2 | 25.5 |
| 630 | F13-630-630 | 665 | 1330 | 350 | - | - | 57.2 | 37.4 | 28.7 |



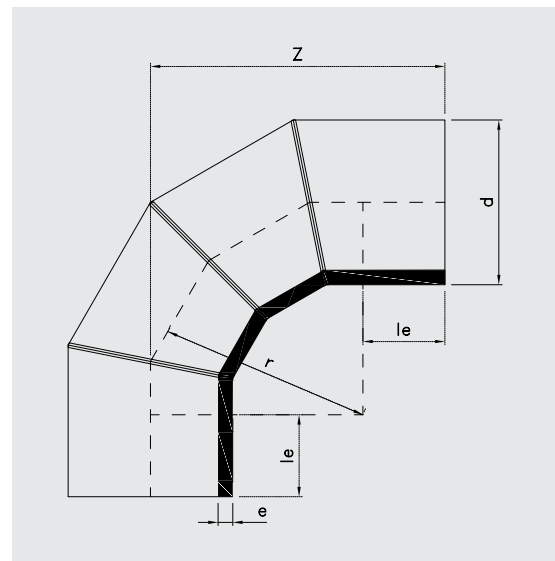
| d | Code | L | Z | Z ₁ | e | | |
|-----|-------------|------|------|----------------|-------|-------|-------|
| | | | | | SDR11 | SDR17 | SDR22 |
| 90 | F04-090-045 | 445 | 295 | 150 | 8.2 | 5.4 | 4.1 |
| 110 | F04-110-045 | 500 | 325 | | 10.0 | 6.6 | 5.0 |
| 125 | F04-125-045 | 545 | 355 | | 11.4 | 7.4 | 5.7 |
| 140 | F04-140-045 | 581 | 375 | | 12.7 | 8.3 | 6.4 |
| 160 | F04-160-045 | 642 | 412 | | 14.6 | 9.5 | 7.3 |
| 180 | F04-180-045 | 700 | 450 | | 16.4 | 10.7 | 8.2 |
| 200 | F04-200-045 | 759 | 487 | | 18.2 | 11.9 | 9.1 |
| 225 | F04-225-045 | 830 | 530 | | 20.5 | 13.4 | 10.3 |
| 250 | F04-250-045 | 905 | 580 | 250 | 22.7 | 14.8 | 11.4 |
| 280 | F04-280-045 | 995 | 630 | | 25.4 | 16.6 | 12.8 |
| 315 | F04-315-045 | 1090 | 690 | 300 | 28.6 | 18.7 | 14.4 |
| 355 | F04-355-045 | 1155 | 730 | | 32.2 | 21.1 | 16.2 |
| 400 | F04-400-045 | 1250 | 800 | | 36.3 | 23.7 | 18.2 |
| 450 | F04-450-045 | 1325 | 850 | | 40.9 | 26.7 | 20.5 |
| 500 | F04-500-045 | 1400 | 900 | 350 | 45.4 | 29.7 | 22.8 |
| 560 | F04-560-045 | 1480 | 950 | | 50.8 | 33.2 | 25.5 |
| 630 | F04-630-045 | 1545 | 1000 | | 57.2 | 37.4 | 28.7 |



| d | Code | Z | r | le | e | | | | |
|-----|-------------|-----|-----|-----|---------|-------|--------|--------|-------|
| | | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR22 |
| 110 | F11-110-045 | 218 | 165 | 150 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F11-125-045 | 228 | 188 | 150 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 140 | F11-140-045 | 237 | 210 | 150 | 19.2 | 15.7 | 12.7 | 8.3 | 6.4 |
| 160 | F11-160-045 | 249 | 240 | 150 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F11-180-045 | 262 | 270 | 150 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F11-200-045 | 274 | 300 | 150 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F11-225-045 | 290 | 338 | 150 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F11-250-045 | 412 | 375 | 250 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 280 | F11-280-045 | 424 | 420 | 250 | 38.3 | 31.3 | 25.4 | 16.6 | 12.8 |
| 315 | F11-315-045 | 498 | 473 | 300 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F11-355-045 | 520 | 533 | 300 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F11-400-045 | 548 | 600 | 300 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |
| 450 | F11-450-045 | 580 | 675 | 300 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 |
| 500 | F11-500-045 | 665 | 750 | 350 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 |
| 560 | F11-560-045 | 698 | 840 | 350 | - | 62.5 | 50.8 | 33.2 | 25.5 |
| 630 | F11-630-045 | 741 | 945 | 350 | - | - | 57.2 | 37.4 | 28.7 |



| d | Code | Z | r | le | e | | | | |
|-----|-------------|------|-----|-----|---------|-------|--------|--------|-------|
| | | | | | SDR 7.4 | SDR 9 | SDR 11 | SDR 17 | SDR22 |
| 110 | F12-110-090 | 315 | 165 | 150 | 15.1 | 12.3 | 10.0 | 6.6 | 5.0 |
| 125 | F12-125-090 | 338 | 188 | 150 | 17.1 | 14.0 | 11.4 | 7.4 | 5.7 |
| 140 | F12-140-090 | 360 | 210 | 150 | 19.2 | 15.7 | 12.7 | 8.3 | 6.4 |
| 160 | F12-160-090 | 390 | 240 | 150 | 21.9 | 17.9 | 14.6 | 9.5 | 7.3 |
| 180 | F12-180-090 | 420 | 270 | 150 | 24.6 | 20.1 | 16.4 | 10.7 | 8.2 |
| 200 | F12-200-090 | 450 | 300 | 150 | 27.4 | 22.4 | 18.2 | 11.9 | 9.1 |
| 225 | F12-225-090 | 488 | 338 | 150 | 30.8 | 25.2 | 20.5 | 13.4 | 10.3 |
| 250 | F12-250-090 | 625 | 375 | 250 | 34.2 | 27.9 | 22.7 | 14.8 | 11.4 |
| 280 | F12-280-090 | 670 | 420 | 250 | 38.3 | 31.3 | 25.4 | 16.6 | 12.8 |
| 315 | F12-315-090 | 773 | 473 | 300 | 43.1 | 35.2 | 28.6 | 18.7 | 14.4 |
| 355 | F12-355-090 | 833 | 533 | 300 | 48.5 | 39.7 | 32.2 | 21.1 | 16.2 |
| 400 | F12-400-090 | 900 | 600 | 300 | 54.7 | 44.7 | 36.3 | 23.7 | 18.2 |
| 450 | F12-450-090 | 975 | 675 | 300 | 61.5 | 50.3 | 40.9 | 26.7 | 20.5 |
| 500 | F12-500-090 | 1100 | 750 | 350 | 68.3 | 55.8 | 45.4 | 29.7 | 22.8 |
| 560 | F12-560-090 | 1190 | 840 | 350 | - | 62.5 | 50.8 | 33.2 | 25.5 |
| 630 | F12-630-090 | 1295 | 945 | 350 | - | - | 57.2 | 37.4 | 28.7 |

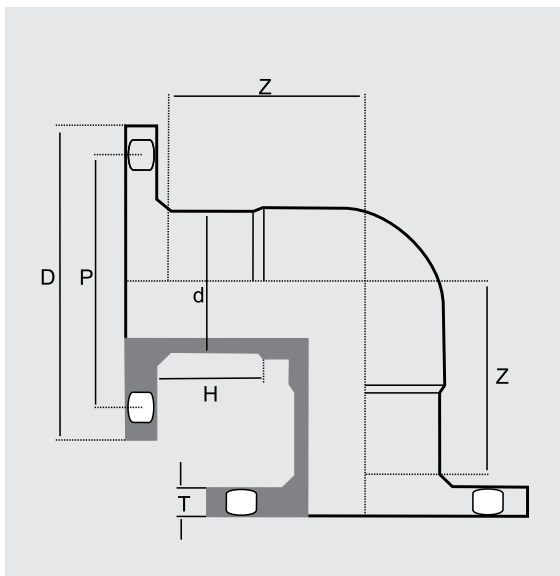


HDPE 100
DIN 2501
DIN 16963

زانوی ۹۰° فلنجدار
Flanged Elbow 90°
Фланцевые Угольники 90°

| d | Code | D | P | Z | H | T* | Bolts Count |
|-----|-------------|-----|-----|-----|-----|----|-------------|
| 90 | F08-090-090 | 200 | 160 | 150 | 65 | 18 | 8 |
| 110 | F08-110-110 | 220 | 180 | 170 | 85 | 20 | 8 |
| 125 | F08-125-125 | 250 | 220 | 215 | 105 | 20 | 8 |
| 160 | F08-160-160 | 285 | 240 | 250 | 115 | 22 | 8 |
| 200 | F08-200-200 | 340 | 295 | 245 | 150 | 24 | 8 |
| 250 | F08-250-250 | 395 | 350 | 300 | 120 | 24 | 12 |
| 315 | F08-315-315 | 445 | 400 | 300 | 70 | 28 | 12 |

*Tolerance ± 2 mm



HDPE 100
 DIN 2501
 DIN 16963

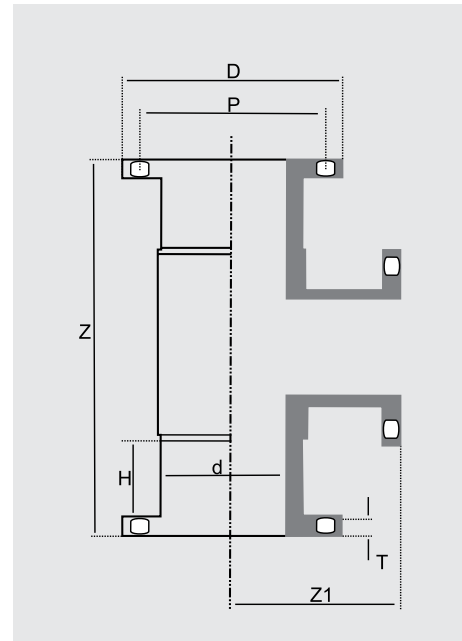
سه راهی ۹۰° مساوی فلنجدار

Flanged Equal Tee 90°

Фланцевые Равные Тройники 90°

| d | Code | D | P | Z | Z ₁ | H | T* | Bolt Count |
|-----|-------------|-----|-----|-----|----------------|-----|----|------------|
| 90 | F07-090-090 | 200 | 160 | 305 | 155 | 65 | 18 | 8 |
| 110 | F07-110-110 | 220 | 180 | 355 | 170 | 85 | 20 | 8 |
| 125 | F07-125-125 | 250 | 220 | 435 | 215 | 105 | 20 | 8 |
| 160 | F07-160-160 | 285 | 240 | 500 | 250 | 115 | 22 | 8 |
| 200 | F07-200-200 | 340 | 295 | 590 | 300 | 150 | 24 | 8 |
| 250 | F07-250-250 | 400 | 350 | 600 | 300 | 120 | 24 | 12 |
| 315 | F07-315-315 | 445 | 400 | 600 | 300 | 70 | 28 | 12 |

*Tolerance $\pm 2\text{mm}$

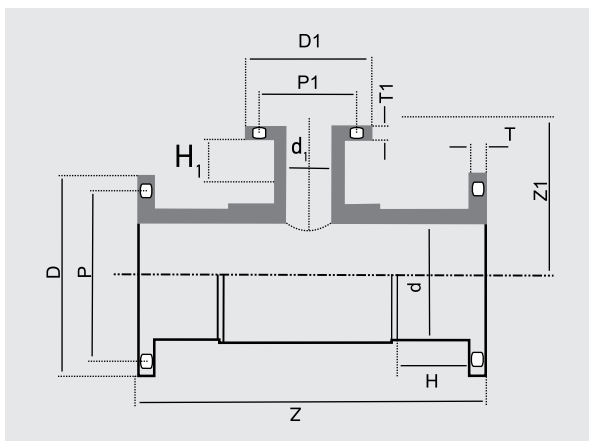


HDPE 100
DIN 2501
DIN 16963

سه راهی ۹۰° نامساوی فلنجدار
Flanged Reduced Tee 90°
Фланцевые Не Равные Тройники 90°

| d-d1 | Code | d | d ₁ | D | D ₁ | P | P ₁ | Z | Z ₁ | H | H ₁ | T* | T ₁ * | Bolt Count |
|---------|-------------|-----|----------------|-----|----------------|-----|----------------|-----|----------------|-----|----------------|----|------------------|------------|
| 110*63 | F07-110-063 | 110 | 63 | 220 | 165 | 180 | 125 | 360 | 170 | 70 | 80 | 18 | 14 | 8-4 |
| 110*75 | F07-110-075 | 110 | 75 | 220 | 185 | 180 | 145 | 360 | 170 | 70 | 80 | 18 | 16 | 8-4 |
| 110*90 | F07-110-090 | 110 | 90 | 220 | 200 | 180 | 160 | 360 | 170 | 70 | 80 | 18 | 18 | 8-8 |
| 125*63 | F07-125-063 | 125 | 63 | 250 | 165 | 210 | 125 | 360 | 180 | 110 | 65 | 20 | 14 | 8-4 |
| 125*75 | F07-125-075 | 125 | 75 | 250 | 185 | 210 | 145 | 360 | 180 | 110 | 72 | 20 | 16 | 8-4 |
| 125*90 | F07-125-090 | 125 | 90 | 250 | 200 | 210 | 160 | 360 | 180 | 110 | 81 | 20 | 18 | 8-8 |
| 125*110 | F07-125-110 | 125 | 110 | 250 | 220 | 210 | 185 | 360 | 180 | 110 | 83 | 20 | 18 | 8-8 |
| 160*63 | F07-160-063 | 160 | 63 | 285 | 165 | 240 | 125 | 490 | 250 | 110 | 80 | 22 | 14 | 8-4 |
| 160*75 | F07-160-075 | 160 | 75 | 285 | 185 | 240 | 145 | 490 | 250 | 110 | 80 | 22 | 16 | 8-4 |
| 160*90 | F07-160-090 | 160 | 90 | 285 | 200 | 240 | 160 | 490 | 250 | 110 | 90 | 22 | 18 | 8-8 |
| 160*110 | F07-160-110 | 160 | 110 | 285 | 220 | 240 | 180 | 490 | 250 | 110 | 90 | 22 | 18 | 8-8 |
| 200*75 | F07-200-075 | 200 | 75 | 340 | 185 | 295 | 145 | 590 | 295 | 140 | 125 | 22 | 16 | 8-8 |
| 200*90 | F07-200-090 | 200 | 90 | 340 | 200 | 295 | 160 | 590 | 295 | 140 | 140 | 22 | 18 | 8-8 |
| 200*110 | F07-200-110 | 200 | 110 | 340 | 220 | 295 | 180 | 590 | 295 | 140 | 150 | 22 | 18 | 8-8 |
| 200*160 | F07-200-160 | 200 | 160 | 340 | 285 | 295 | 240 | 590 | 295 | 140 | 105 | 22 | 22 | 8-8 |
| 250*90 | F07-250-090 | 250 | 90 | 400 | 200 | 350 | 160 | 600 | 300 | 115 | 75 | 26 | 18 | 8-8 |
| 250*110 | F07-250-110 | 250 | 110 | 400 | 220 | 350 | 180 | 600 | 300 | 115 | 85 | 26 | 18 | 12-8 |
| 250*125 | F07-250-125 | 250 | 125 | 400 | 250 | 350 | 210 | 600 | 300 | 115 | 85 | 26 | 20 | 12-8 |
| 250*160 | F07-250-160 | 250 | 160 | 400 | 285 | 350 | 240 | 600 | 300 | 115 | 100 | 26 | 22 | 12-8 |
| 250*200 | F07-250-200 | 250 | 200 | 400 | 340 | 350 | 295 | 600 | 300 | 115 | 110 | 26 | 22 | 12-8 |
| 315*160 | F07-315-160 | 315 | 160 | 445 | 285 | 400 | 240 | 590 | 300 | 60 | 65 | 28 | 22 | 12-8 |
| 315*200 | F07-315-200 | 315 | 200 | 445 | 340 | 400 | 295 | 590 | 300 | 60 | 70 | 28 | 22 | 12-8 |
| 315*250 | F07-315-250 | 315 | 250 | 445 | 395 | 400 | 350 | 590 | 300 | 60 | 70 | 28 | 26 | 12-12 |

*Tolerance ± 2mm

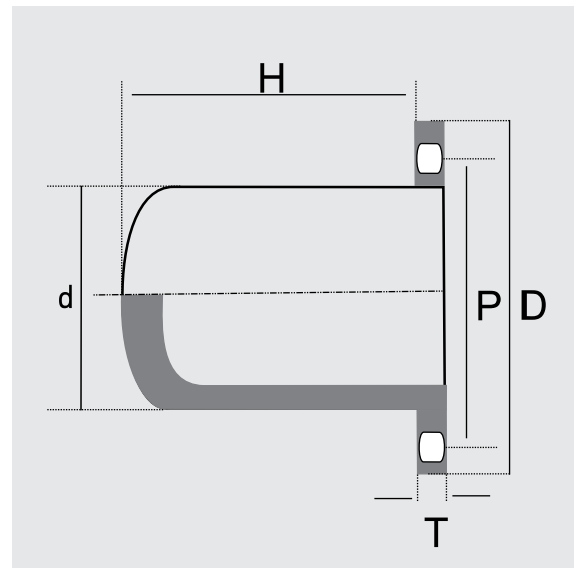


HDPE 100
DIN 2501
DIN 16963

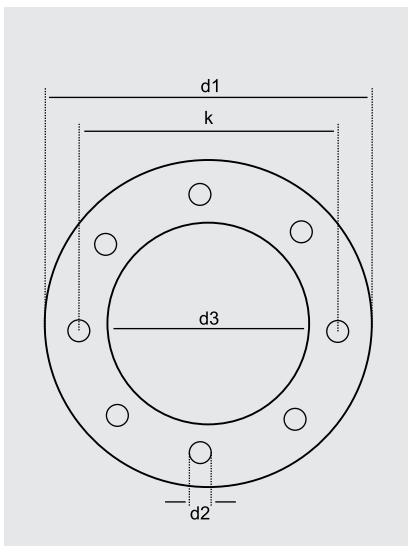
کپ فلنجدار
Flanged Cap
Фланцевые Заглушки

| d | Code | D | P | H | T* | Bolt Count |
|-----|-------------|-----|-----|-----|----|------------|
| 50 | FC6-050-000 | 150 | 110 | 63 | 16 | 4 |
| 63 | FC6-063-000 | 165 | 125 | 70 | 16 | 4 |
| 75 | FC6-075-000 | 185 | 145 | 84 | 18 | 4 |
| 90 | FC6-090-000 | 200 | 160 | 95 | 18 | 8 |
| 110 | FC6-110-000 | 220 | 180 | 100 | 21 | 8 |
| 125 | FC6-125-000 | 250 | 210 | 110 | 21 | 8 |
| 160 | FC6-160-000 | 285 | 240 | 126 | 22 | 8 |
| 200 | FC6-200-000 | 340 | 295 | 145 | 22 | 8 |

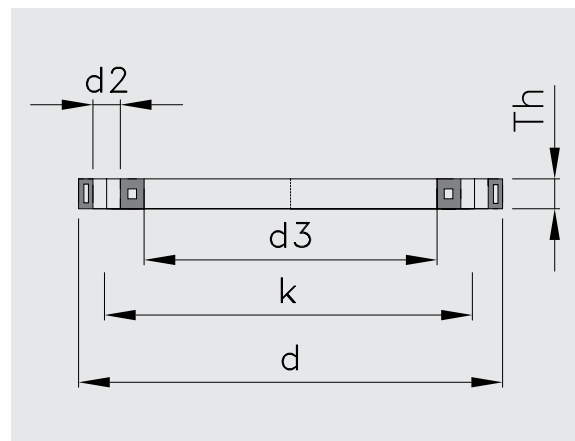
*Tolerance $\pm 2\text{mm}$



| Flange Size | Code | Pipe OutSide | d ₁ | d ₂ | d ₃ | k | Th | | Bolts Count |
|-------------|------------|--------------|----------------|----------------|----------------|-----|------|------|-------------|
| | | | | | | | PN10 | PN16 | |
| 32 | S1-040-000 | 40 | 140 | 18 | 51 | 100 | 12 | 16 | 4 |
| 40 | S1-050-000 | 50 | 150 | 18 | 62 | 110 | 12 | 16 | 4 |
| 50 | S1-063-000 | 63 | 165 | 18 | 78 | 125 | 12 | 16 | 4 |
| 65 | S1-075-000 | 75 | 185 | 18 | 92 | 145 | 12 | 16 | 4 |
| 80 | S1-090-000 | 90 | 200 | 18 | 108 | 160 | 14 | 18 | 8 |
| 100 | S1-110-000 | 110 | 220 | 18 | 128 | 180 | 14 | 18 | 8 |
| 100 | S1-125-000 | 125 | 220 | 18 | 135 | 180 | 14 | 18 | 8 |
| 125 | S1-140-000 | 140 | 250 | 18 | 158 | 210 | 14 | 18 | 8 |
| 150 | S1-160-000 | 160 | 285 | 22 | 178 | 240 | 14 | 18 | 8 |
| 150 | S1-180-000 | 180 | 285 | 22 | 188 | 240 | 14 | 18 | 8 |
| 200 | S1-200-000 | 200 | 340 | 22 | 235 | 295 | 16 | 20 | 8 |
| 200 | S1-225-000 | 225 | 340 | 22 | 235 | 295 | 16 | 20 | 8 |
| 250 | S1-250-000 | 250 | 395 | 22 | 288 | 350 | 20 | 22 | 12 |
| 250 | S1-280-000 | 280 | 395 | 22 | 294 | 350 | 20 | 22 | 12 |
| 300 | S1-315-000 | 315 | 445 | 22 | 338 | 400 | 24 | 26 | 12 |
| 350 | S1-355-000 | 355 | 505 | 22 | 376 | 460 | 26 | 28 | 16 |
| 400 | S1-400-000 | 400 | 565 | 26 | 430 | 515 | 28 | 32 | 16 |
| 500 | S1-450-000 | 450 | 670 | 26 | 517 | 620 | 32 | 38 | 20 |
| 500 | S1-500-000 | 500 | 670 | 26 | 533 | 620 | 32 | 38 | 20 |
| 600 | S1-560-000 | 560 | 780 | 30 | 618 | 725 | 36 | 44 | 20 |
| 600 | S1-630-000 | 630 | 780 | 30 | 645 | 735 | 36 | 44 | 20 |



| Flange Size | PN | Code | $d^{\pm 1.5}$ | $k^{\pm 1}$ | $d2^{\pm 1}$ | Screws | | $d3^{\pm 1.5}$ | $Th^{\pm 1.5}$ |
|-------------|-------|------------|---------------|-------------|--------------|--------|--------|----------------|----------------|
| | | | | | | Number | Thread | | |
| 63 | 10/16 | P1-063-000 | 165 | 125 | 18 | 4 | M 16 | 78 | 18 |
| 75 | 10/16 | P1-075-000 | 187 | 145 | 18 | 4 | M 16 | 92 | 18 |
| 90 | 10/16 | P1-090-000 | 202 | 160 | 18 | 8 | M 16 | 108 | 20 |
| 110 | 10/16 | P1-110-000 | 222 | 180 | 18 | 8 | M 16 | 128 | 20 |
| 125 | 10/16 | P1-125-000 | 222 | 180 | 18 | 8 | M 16 | 135 | 20 |
| 160 | 10/16 | P1-160-000 | 286 | 240 | 22 | 8 | M 20 | 178 | 24 |
| 180 | 10/16 | P1-180-000 | 286 | 240 | 22 | 8 | M 20 | 188 | 24 |
| 200 | 10/16 | P1-200-000 | 340 | 295 | 22 | 8 | M 20 | 235 | 24 |
| 225 | 10/16 | P1-225-000 | 340 | 295 | 22 | 8 | M 20 | 238 | 24 |
| 250 | 10/16 | P1-250-000 | 409 | 350 | 22 | 12 | M 20 | 288 | 30 |
| 315 | 10/16 | P1-315-000 | 463 | 400 | 22 | 12 | M 20 | 338 | 34 |



| d (mm) | Code | R(inch) | SDR 11 | SDR17 |
|--------|-------------|-----------------|--------|-------|
| 32 | T01-032-001 | 1 | | |
| 40 | T01-040-125 | 1 $\frac{1}{4}$ | | |
| 50 | T01-050-150 | 1 $\frac{1}{2}$ | | |
| 63 | T01-063-002 | 2 | | |





We are able to produce special fittings like collectors, E concenteric, etc; according to customer order, technical data and schematics.



A close-up photograph of a person's hands, wearing a dark suit jacket and a watch, operating a piece of laboratory equipment. The hands are positioned over a control panel that features a small digital display showing the number '23.6' in yellow. Below the display is a silver rotary knob and a small rectangular screen displaying the text 'Parameter' and 'Info'. The background is slightly blurred, showing a computer monitor and other lab equipment.

LAB EQUIPMENT

Quality Control

Providing laboratory equipment, Takab Ettesal Company has arranged for different tests to be performed for more than one hundred goods produced by the company under the supervision of quality control unit.

In accordance with Company objectives, our quality management in conformity with ISO 4427, DIN 16963, DIN 8074, 8075 and INSO 14427 is mainly directed towards our customers and the market.

Our internal factory standards with respect to raw material, testing, production survey, and testing finished products, exceeds by far the mandated standards currently used.

Tests are conducted continuously in our own generously equipped

laboratory, guaranteeing a maximum amount of safety. All quality recored are kept, providing precise records of the individual measured data of our production in addition to the product coding.

In addition to our own monitoring, independent testing institutes ensure that all our products conform to current applicable specifications and their quality remains at constant high level. In addition, all equipment are being accurately calibrated on a regular basis.

We go the extra mile to achieve customer satisfaction as our main target; to improve technical knowledge, cooperate with technical universities and institutes, and cooperate with other laboratories and facilities.



DENSITY



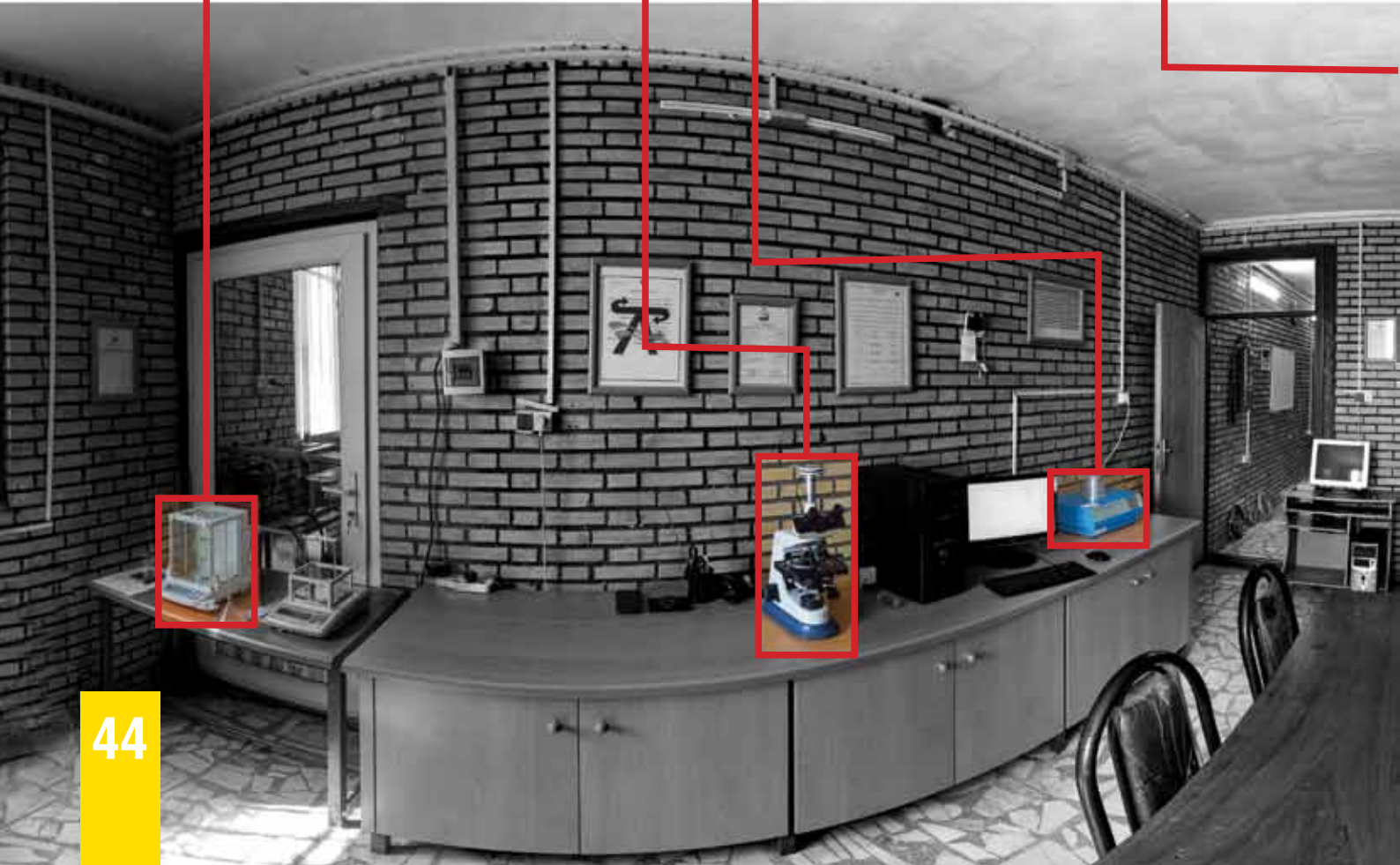
CARBON BLACK DISPERSION



OIT



TENSILE





ESCR



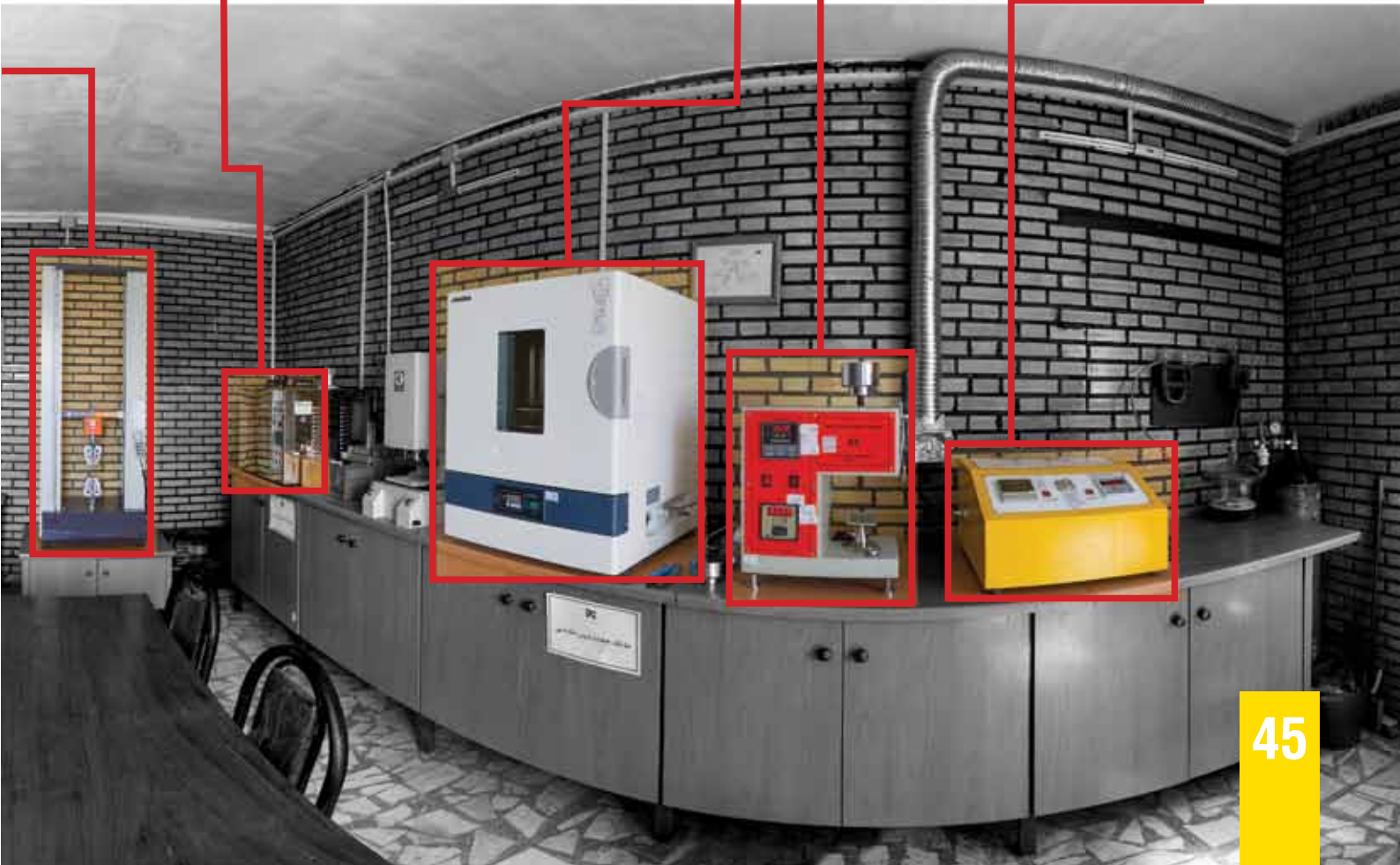
HEAT REVERSION



MFI



**CARBON BLACK
CONTENT**



KraussMaffei

TECHNICAL DATA

CX 350-4300



General Properties of PE

As result of continuous development of PE molding materials, the efficiency of PE pipes and fittings has been improved considerably. This fact has been taken into account by the introduction of new international standards (ISO 9080, EN1555, EN12201), which lead to higher permissible operating pressures.

Polyethylene (PE) is no longer classified by its density (for example PE-LD, PE-MD, PE-HD) as it is now divided into MRS-strength classes.

In comparison to other thermoplastics PE shows an excellent diffusion resistance and has therefore been applied for the safe transport of gases for many years.

Other essential advantages of this material are the UV-stability (if its black colored), and the flexibility of the molding material (flexible piping system).

Physiological non-toxic

With respect to its composition polyethylene complies with the relevant food stuff regulations. PE pipes and fittings are verified and registered regarding potable water suitability according DVGW guideline W270.

Behavior at Radiation Strain

Pipes out of polyethylene may be applied across the range of high energy radiation. Pipes out of PE are well established for drainage of radioactive sewage water from laboratories and as cooling water piping systems for the nuclear energy industry.

The usual radioactive sewage waters contain beta and gamma rays. PE piping systems do not become radioactive, even after many years of use. Also in environment of higher radio activity, pipes out of PE are not damaged if they are not exposed during their complete operation time to a larger, regularly spread radiation dose of < 104 Gray.

Advantages of PE

- UV-resistance
- Flexibility
- Low specific weight of 0.95g/cm³
- Favorable transportation (e.g. coils)

- Very good chemical resistance
- Weathering resistance
- Radiation resistance
- Good weldability
- Very good abrasion resistance
- No deposits and no overgrowth possible due to less frictional resistance less pressure
- Losses in comparison with e.g. metals
- Freeze resistance
- Resistant to rodents
- Resistant to all kinds of microbic corrosion

Polyethylene type PE 100

These materials can also be described as polyethylene types of the third generation (PE-3) resp. Also as MRS 10 materials.

This is a further development of the PE materials which shows by a modified polymerization process an amended mol mass distribution. Therefore PE 100 types have a higher density and by this improved mechanical properties comes a raised stiffness and hardness. Also the creep pressure and the resistance against rapid crack propagation are also increased.

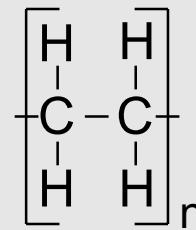
Consequently, this material is suitable for the production of pressure pipes with larger diameters.

In comparison to usual pressure pipes out of PE with less wall thicknesses the corresponding pressure rating will be achieved.

Modified Polyethylene PE 80-el

(Polyethylene, electro-conductable)

Due to the electro-conductibility, PE80-el is often used for the transport of easy combustible media (e.g. fuels) or for the conveying of dust as for these piping systems, a connection to earth can be performed.



Chemical Structure of Polyethylene

General Chemical Properties of PE/PP

In comparison to metals where an attack of chemicals leads to an irreversible chemical change of the material, it's mostly physical processes at plastics which reduce the utility value. Such physical changes are e.g. swelling and solution can be changed in this way that the mechanical properties are affected. There have to be taken reducing factors into consideration at the design of facilities and parts of those in such cases. PE and PP are resistant against diluted solutions of salts, acids and alkalis if these are not strong oxidizing agents. Good resistance is also given against many solvents, such as alcohols, esters and ketones.

At contact with solvents, as aliphatic and aromatic compound, chlorinated hydrocarbon, you have to reckon upon a strong swelling, especially at raised temperatures. But a destruction commences only rarely.

The resistance can be strongly reduced by stress cracking corrosion due to ampholytics (chromic acid, concentrated sulphuric acid).

Lyes

Alkalis

Diluted alkali solutions (e.g. caustic lye), even at higher temperature and with higher concentrations do not react with PP and PE and can therefore be applied without problems, unlike to PVDF or other fluoroplastics.

Bleaching Lye

As these lyes contain active chlorine, only a conditional resistance is given at room temperature.

At higher temperatures and concentrations of the active chlorine. PP and PE are rather only suitable for pressureless piping systems and tanks.

Hydrocarbons

PP is only conditionally resistant against hydrocarbons (benzine as well as other fuels) already at ambient temperature (swelling > 3%). PE however can be used for the conveying up to temperatures of 40°C and for the storage of these media up to temperatures of 60°C. Only at temperatures > 60°C is PE conditionally

resistant as the swelling is > 3%.

Acids

Sulphuric Acid

Concentrations up to approximately 70% change the properties of PP and PE only slightly. Concentrations higher than 80% cause already at room temperature oxidation. At higher temperatures, this oxidation can even go to a carbonization of the surface of the PP semi-finished products.

Hydrochloric Acid, Hydrofluoric Acid

Against concentrated hydrochloric acid and hydrofluoric acid, PP and PE are chemically resistant.

But there appears a diffusion of HCl (concentrations > 20%) and of HF (concentrations > 40%) at PP, which does not damage the material, but causes secondary damages on the surrounding steel constructions.

Double containment piping systems have proven for such applications.

Nitric Acid

Higher concentrated nitric acid has an oxidizing effect on the materials. The mechanical strength properties are reduced at higher concentrations.

Phosphoric Acid

Against this medium, PP and PE is also at higher concentrations and at raised temperatures resistant.

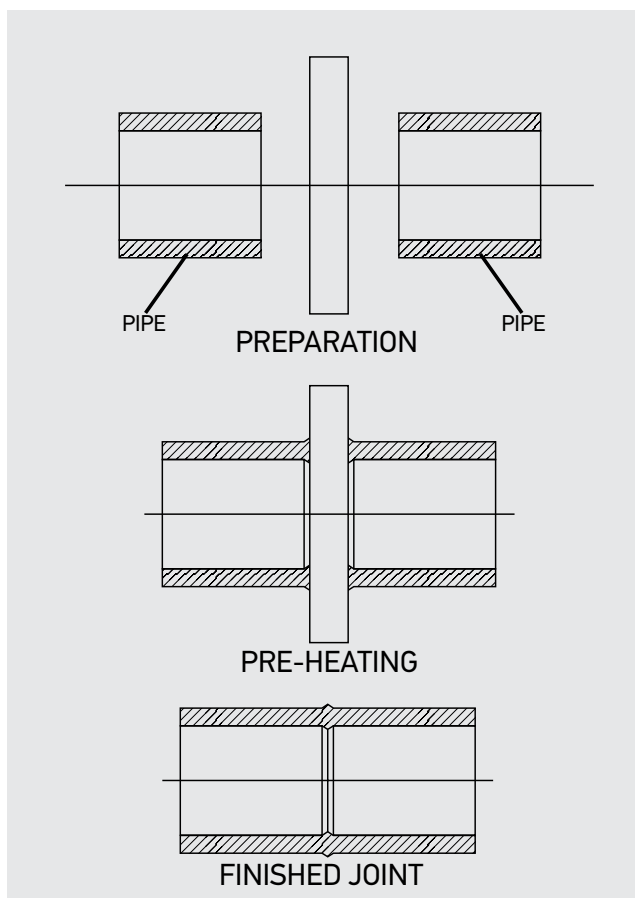
Heating element butt welding

(following to DVS 2207, part 1 for PE-HD and part 11 for PP)

Welding method description

The welding faces of the parts to be joined are aligned under pressure onto the heating element (alignment). Then, the parts are heated up to the

welding temperature under reduced pressure (pre-heating) and joined under pressure after the heating element has been removed (joining).



Principle of the heating element butt welding illustrated by a pipe

All welding must be practiced with machines and devices which correspond to the guidelines of the DVS 2208 part 1.

Preparations before welding

Control the necessary heating element temperature before each welding process. That happens e.g. with a high speed thermometer for surface measurements. The control measurement must happen within the area of the heating element which corresponds to the semi-finished product.

That a thermal balance can be reached the heating element should be used not before 10 minutes after reaching the rated temperature.

For optimal welding clean the heating element with clean, fluffless paper before starting of each welding process. The non-stick coating of the heating element must be undamaged in the working area.

For the used machines the particular joining pressure or joining power must be given. They can refer to e.g. construction information, calculated of measured values. In addition during the pipe welding process by slow movement of the work-pieces occurs a movement pressure or movement power which can be seen on the indicator of the welding machine and should be added to the first determined joining power or joining pressure.

The nominal wall thickness of the parts to be welded must correspond to the joining area.

Before clamping the Pipes and fittings in the welding machine they must be axial aligned. The high longitudinal movement of the parts to be welded is to ensure for example through adjustable dollies or swinging hangings.

| Pipe Outside Diameter | Die Gap Width |
|-----------------------|---------------|
| ≤ 355 | 0.5 |
| 400 ... < 630 | 1.0 |
| 630 ... < 800 | 1.3 |
| 800 ... ≤ 1000 | 1.5 |
| > 1000 | 2.0 |

Together with the control of the gap width also the misalignment should be checked. The misalignment of the joining areas to one another should not overstep the permissible degree of 0.1 x wall thickness on the pipe outside or on the table respectively.

Not worked welding areas shouldn't be dirty or touched by hands otherwise a renewed treatment is necessary. Shavings which are fallen in the pipe should be removed.

Общие свойства ПЭ

В результате непрерывных разработок полиэтиленовых литевых материалов, значительно повысилась эффективность полиэтиленовых труб и крепёжных деталей. Данный факт был принят во внимание и отразился в новых международных стандартах (ISO9080, EN1555, EN12201), что привело к более высоким допустимым рабочим давлениям.

Полиэтилен (ПЭ) больше не классифицируется по своей плотности (например, ПЭ-НП, ПЭ-СП, ПЭ-ВП), а распределяется по классам прочности МДП.

В сравнении с другими термопластическими материалами Полиэтилен обладает высоким диффузионным сопротивлением, благодаря которому вот уже много лет он применяется для безопасной транспортировки газов.

Другими существенными преимуществами данного материала являются стойкость к ультрафиолетовому облучению (если он окрашен в чёрный цвет) и эластичность литевых материалов ("система гибких трубопроводов").

Физиологические нетоксичные свойства

Полиэтилен по своему составу отвечает соответствующим нормам продуктов питания (согласно ÖNORM B5014, Часть 1, руководствам BGA и KTW).

Полиэтиленовые трубы и фитинги утверждены и зарегистрированы в соответствии с пригодностью для питьевой воды согласно нормам DVGW W270.

Поведение при радиационном напряжённости

Трубы, изготовленные из полиэтилена, могут применяться в районах излучения высокой энергии. Изготовленные из ПЭ трубы хорошо подходят для дренажа радиоактивных сточных вод из лабораторий, а также для промышленности ядерной энергии в качестве водопроводов системы охлаждения. Обычные радиоактивные сточные воды содержат бета и гамма лучи. Системы полиэтиленовых трубопроводов не становятся радиоактивными даже после долгих лет их

использования.

Также, находясь в среде высокой радиоактивности, трубы, изготовленные из полиэтилена, не повреждаются, если они за полный эксплуатационный период не подвергаются больше, чем обычно распространяемой дозе излучения в <104 Грей.

Преимущества ПЭ

- Устойчивость к УФ
- Гибкость
- Низкий специфический вес 0,95 г/см³
- Удобная транспортировка (к примеру, рулоны)
- Очень хорошая устойчивость к химическим воздействиям
- Устойчивость к атмосферным воздействиям
- Устойчивость к радиации
- Хорошая свариваемость
- Износоустойчивость
- Никакие налёты и наросты не возможны, благодаря малому сопротивлению трения и низкого давления
- Потери в сравнении с металлами
- Морозоустойчивость
- Устойчивость к воздействию грызунов
- Устойчивость ко всем видам микробной коррозии

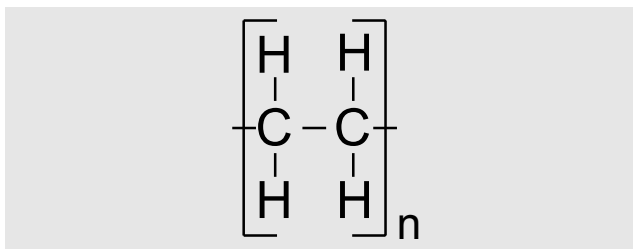
Вид Полиэтилена ПЭ 100

Такие материалы также могут быть описаны как виды полиэтилена третьего поколения (ПЭ-3), соответствующие также материалам МДП 10. Это дальнейшее развитие ПЭ материалов показывает распространение изменённой молекулярной массы путём модификации процесса полимеризации. Поэтому 100 видов ПЭ имеют более высокую плотность и, благодаря таким усовершенствованным механическим свойствам, появились повышенная жёсткость и твёрдость. Также увеличилось деформационное давление и устойчивость к быстрому развитию трещин.

Следовательно, этот материал подходит для производства труб высокого давления с большим диаметром. В сравнении с обычными трубами высокого давления из ПЭ с меньшей толщиной стены, будет достигнуто соответствующее номинальное давление.

Модифицированный полиэтилен ПЭ 80-эл (Полиэтилен, электропроводник)

Благодаря электропроводности, ПЭ80-эл часто используется для транспортировки легко воспламеняемых веществ (например, топлива), либо для передачи пыли, так как для таких систем трубопроводов может быть установлен контакт с землёй.



Химическая структура Полиэтилена

Общие химические свойства ПЭ и ПП

В сравнении с металлами, где взаимодействие с химикатами приводит к необратимым химическим изменениям, для полимерных материалов это всего лишь физический процесс, который снижает коэффициент их полезности. Такими физическими изменениями могут быть, к примеру, процессы вздутия и растворения, при которых состав полимерных материалов может измениться таким образом, что это повлияет на их механические свойства. Для таких случаев, при разработке оборудования и деталей, необходимо учитывать редуцирующие факторы.

ПЭ и ПП устойчивы к слабым растворам солей, кислот и щелочных металлов, если только они не являются сильными окисляющими веществами. У них также присутствует хорошая устойчивость ко многим растворителям, таким как спирты, сложные эфиры и кетоны.

При контакте с растворителями, такими как алифатические и ароматические соединения, хлористый углеводород, вам придётся полагаться на сильное вздутие, особенно при повышенных температурах. Но разрушение начинается лишь изредка.

Устойчивость может быть сильно ослаблена коррозионным растрескиванием от напряжения из-за амфолитных веществ (хромовая кислота, концентрированная серная кислота).

Щелочные растворы

Щелочные металлы

Слабые растворы щелочных металлов (к примеру, едкий щёлк) даже при повышенных температурах и с высокой концентрацией не вступают в реакцию с полипропиленом и полиэтиленом, поэтому их можно применять без проблем, в отличие от ПВДФ или других фторопластов.

Белильные растворы

Так как подобные растворы содержат активный хлор, только условное сопротивление придаётся при комнатной температуре.

При повышенных температурах и концентрации активного хлора, ПП и ПЭ скорее подходят только для системы трубопроводов и ёмкостей с отсутствием давления.

Углеводороды

ПП только условно устойчив к углеводородам (бензину также как и другим видам топлива) уже при окружающей температуре (вздутие более 3%).

ПЭ, однако, может быть использован для транспортировки при температурах до 40 °С и для хранения таких материалов при температуре до 60 °С.

Только при температуре выше 60 °С ПЭ обладает условным сопротивлением, так как вздутие составит более 3%.

Кислоты

Серная кислота

Концентрации, достигшие приблизительно 70%, изменяют свойства ПП и ПЭ, только слегка. Концентрации выше 80% уже при комнатной температуре вызывают окисление. При более высоких температурах, такое окисление может

даже привести к обугливанию поверхности полипропиленовых заготовок.

Соляная кислота, фтороводородная кислота

ПП и ПЭ химически устойчивы к концентрированным соляной и фтороводородной кислотам. Но в таких случаях начинается рассеивание HCl (концентрации более 20%) и HF (концентрации более 40%) на ПП, что не повреждает материал, но вызывает вторичные повреждения на окружающих металлических конструкциях.

Для таких случаев утверждены системы трубопроводов с двойной защитной оболочкой.

Азотная кислота

Высококонцентрированная азотная кислота оказывает на материал окислительный эффект. Свойства механической прочности снижаются при высокой концентрации.

Фосфорная кислота

Против такого раствора, ПП и ПЭ также устойчивы при высокой концентрации и повышенных температурах.

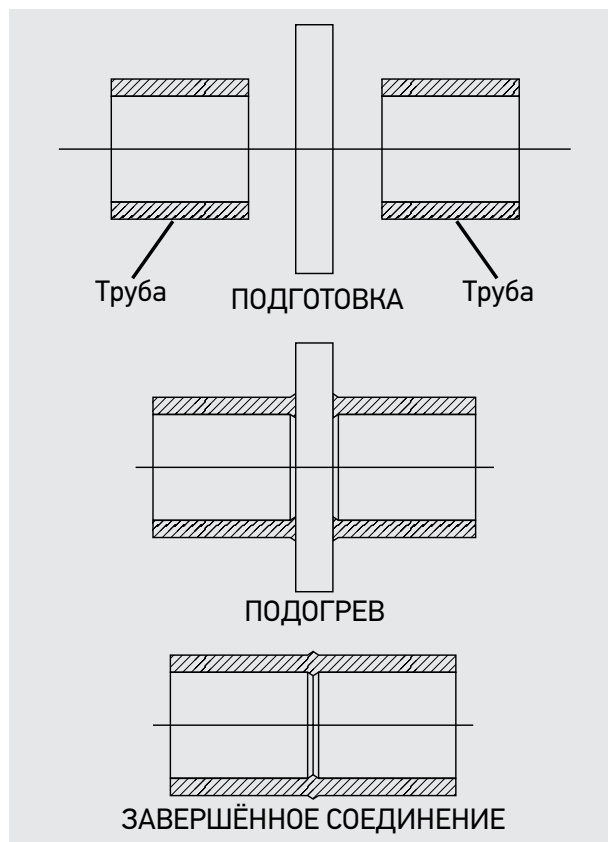
Для более подробной информации о химической устойчивости нашей продукции в любое время в вашем распоряжении будет наш отдел инженерных разработок.

Нагревательные элементы стыковых швов

(следуя DVS2207, часть 1 для ПЭ-ВП и части 11 для ПП)

Описание метода сварки

Лицевые стороны швов частей, которые должны быть соединены, сближают под давлением на нагревательном приборе (совмещение). Затем части нагреваются до температуры сварки под редуцированным давлением (подогрев) и соединяются под давлением после того, как был убран нагревательный прибор (соединение).



Принцип нагревательного элемента стыковых швов проиллюстрирован на примере трубы.

Все сварки должны осуществляться машинами и инструментами, которые соответствуют руководству DVS 2208 часть 1.

Подготовка перед сваркой

Контролируйте необходимую температуру нагревательного прибора перед каждым сварочным процессом. Так происходит, например, с высокоскоростным термометром для измерения поверхностей. Контроль измерений должен происходить в пределах области нагревательного прибора, которая соответствует заготовкам. Подобный термический баланс может быть достигнут, если нагревательный прибор использовать не позднее чем через 10 минут после достижения согласованной температуры.

Для оптимальной сварки протирайте нагревательный прибор чистой, неворсистой бумагой перед каждым сварочным процессом. Антипригарное покрытие нагревательного

прибора не должно быть повреждено в его рабочей области.

Для бывших в употреблении машин должно использоваться обычное соединительное давление и соединительная энергия. Они могут ссылаться на конструкционную информацию, подсчитанные или измеренные значения. В дополнение, во время процесса сварки трубы, медленным движением рабочих деталей появляется колебательное давление и колебательная энергия, которую можно увидеть на индикаторе сварочного аппарата и необходимо добавить к первой обозначенной соединительной энергии и соединительному давлению.

Номинальная толщина стенки частей, которые будут сварены, должна соответствовать прилегающей области.

До фиксирования трубы и фитингов в сварочном аппарате, их необходимо упорядочить соосно, продольное перемещение частей, подготовленных к сварке, обеспечивается, например, через передвижные валики или качающиеся подвески.

Области, подготовленные для сварки, необходимо очистить!

| Внешний диаметр трубы | Ширина щели головки |
|-----------------------|---------------------|
| ≤ 355 | 0.5 |
| 400 ... < 630 | 1.0 |
| 630 ... < 800 | 1.3 |
| 800 ... ≤ 1000 | 1.5 |
| > 1000 | 2.0 |

Наряду с контролем ширины проёма, необходимо также проверить правильность положения. Нарушение соосности соединяющихся областей по отношению друг к другу не должно превышать допустимое значение в 0,1 умноженное на толщину стенки трубы снаружи либо на площадке соответственно.

Не отработанные области для сварки нельзя трогать руками или загрязнять, в противном случае потребуются проведение новой обработки. Стружка, которая попадает внутрь трубы, должна быть извлечена.

Properties of Polyethylene

| Property | Standard | Unit | PE 80 (HD) | PE 100 |
|---------------------------|---------------|-------------------|--------------|-----------|
| Specific density at 23° C | ISO 1183 | g/cm ³ | 0.95 | 0.95 |
| Melt flow index | ISO 1133 | g/10 min | 0.50 | 0.3 |
| MFR 190/5 | | | | <0.1 |
| MFR 190/2, 16 | | | | |
| MFR 230/5 | | | | |
| MFI range | ISO 1872/1873 | | T006 | T003 |
| Tensile stress at yield | ISO 6259-3 | MPa | 22 | 25 |
| Elongation at yield | ISO 6259-3 | % | 9 | 9 |
| Elongation at break | ISO 6259-3 | % | >600 | >600 |
| Carbon black dispersion | ISO 18553 | - | <3 | <3 |
| Carbon black content | ISO 6964 | % | 2.25±0.25 | 2.25±0.25 |

| Change in length by internal pressure load | | Calculation of the change in length by temperature change | | Calculation of the minimum straight length | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------|---|------------|--|------------|--|-----|------|------|------|------|--------------------------|--|--|--|--|--|----|----|----|----|----|---|----|----|----|----|----|----|--------------------------------|--|--|--|--|--|----|----|----|----|----|---|----|----|----|----|----|----|
| $\Delta L_p = \frac{0.1 \cdot p \cdot (1 - 2\mu)}{E_c \cdot \left(\frac{da^2}{di^2} - 1\right)} \cdot L$ | | $\Delta L_T = \alpha \cdot L \cdot \Delta T$ | | $L_s = k \cdot \sqrt{\Delta L \cdot da}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lines Path Length (mm) | L | Expansion coefficient | α | Minimum straight length (mm) | L_s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Internal Pressure | p | Lines path length (mm) | L | Length changes | ΔL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Contraction Coefficient | μ | Temperature changes | ΔT | Outside diameter (mm) | da | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gradual Deformation Coefficient according to Standard | E_c | | | Specific average coefficient according to material | k | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Outside diameter (mm) | da | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Internal diameter (mm) | d_i | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th></th> <th>0°C</th> <th>10°C</th> <th>30°C</th> <th>40°C</th> <th>60°C</th> </tr> </thead> <tbody> <tr> <td colspan="6">At change in temperature</td> </tr> <tr> <td>PE</td> <td>16</td> <td>17</td> <td>23</td> <td>28</td> <td>-</td> </tr> <tr> <td>PP</td> <td>23</td> <td>25</td> <td>29</td> <td>31</td> <td>40</td> </tr> <tr> <td colspan="6">One time change in temperature</td> </tr> <tr> <td>PE</td> <td>12</td> <td>12</td> <td>16</td> <td>17</td> <td>-</td> </tr> <tr> <td>PP</td> <td>18</td> <td>18</td> <td>20</td> <td>20</td> <td>24</td> </tr> </tbody> </table> | | | | | | | 0°C | 10°C | 30°C | 40°C | 60°C | At change in temperature | | | | | | PE | 16 | 17 | 23 | 28 | - | PP | 23 | 25 | 29 | 31 | 40 | One time change in temperature | | | | | | PE | 12 | 12 | 16 | 17 | - | PP | 18 | 18 | 20 | 20 | 24 |
| | 0°C | 10°C | 30°C | 40°C | 60°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| At change in temperature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PE | 16 | 17 | 23 | 28 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PP | 23 | 25 | 29 | 31 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| One time change in temperature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PE | 12 | 12 | 16 | 17 | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PP | 18 | 18 | 20 | 20 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Material | PE | PP | PVDF |
|-------------|-------|-------|--------|
| Temperature | >45°C | >60°C | >100°C |

References values for heating element butt welding of PE Pipes and Fittings at Outside Temperatures of about 20°C and Low Air Speed Rates

| Type of material | Wall thickness (mm) | Bead height (mm) | Pre-heating time t_{Aw} (sec) | Adjusting time t_U (sec) | Joining pressure build-up time t_f (sec) | Cooling time t_{AK} (min) |
|------------------------|---------------------|------------------|---------------------------------|----------------------------|--|-----------------------------|
| PE80 PE100 PE-el | ...4.5 | 0.5 | ... 45 | 5 | 5 | 6 |
| | 4.5 ... 7.0 | 1.0 | 45 ... 70 | 5 ... 6 | 5 ... 6 | 6 ... 10 |
| | 7.0 ... 12.0 | 1.5 | 70 ... 120 | 6 ... 8 | 6 ... 8 | 10 ... 16 |
| | 12.0 ... 19.0 | 2.0 | 120 ... 190 | 8 ... 10 | 8 ... 11 | 16 ... 24 |
| | 19.0 ... 26.0 | 2.5 | 190 ... 260 | 10 ... 12 | 11 ... 14 | 24 ... 32 |
| | 26.0 ... 37.0 | 3.0 | 260 ... 370 | 12 ... 16 | 14 ... 19 | 32 ... 45 |
| | 37.0 ... 50.0 | 3.5 | 370 ... 500 | 16 ... 20 | 19 ... 25 | 45 ... 60 |
| | 50.0 ... 70.0 | 4.0 | 500 ... 700 | 20 ... 25 | 25 ... 35 | 60 ... 80 |

Sustainable Pressure Operation in Polyethylene Pipes PE 100 Based on Water Temperature Changes

| Temperature (°C) | Operating Period (years) | Diameter- wall thickness relation SDR | | | | | | |
|---------------------|--------------------------------|--|-----|------|------|------|------|------|
| | | 41 | 33 | 26 | 17 | 11 | 7.4 | 6 |
| | | Pip series S | | | | | | |
| | | 20 | 16 | 12.5 | 8 | 5 | 3.2 | 2.5 |
| | | PN | | | | | | |
| | | 4 | 5 | 6.3 | 10 | 16 | 25 | 32 |
| | | Permissible component operating pressure p_s (bar) | | | | | | |
| 10 | 5 | 5.0 | 6.3 | 7.9 | 12.6 | 20.2 | 31.5 | 40.4 |
| | 10 | 4.9 | 6.2 | 7.8 | 12.4 | 19.8 | 31.0 | 39.7 |
| | 25 | 4.8 | 6.0 | 7.6 | 12.1 | 19.3 | 30.2 | 38.7 |
| | 50 | 4.7 | 5.9 | 7.5 | 11.9 | 19.0 | 29.7 | 38.0 |
| | 100 | 4.6 | 5.8 | 7.3 | 11.6 | 18.7 | 29.2 | 37.4 |
| 20 | 5 | 4.2 | 5.3 | 6.6 | 10.6 | 16.9 | 26.5 | 33.9 |
| | 10 | 4.1 | 5.2 | 6.5 | 10.4 | 16.6 | 26.0 | 33.3 |
| | 25 | 4.0 | 5.0 | 6.4 | 10.1 | 16.2 | 25.4 | 32.5 |
| | 50 | 4.0 | 5.0 | 6.3 | 10.0 | 16.0 | 25.0 | 32.0 |
| | 100 | 3.9 | 4.9 | 6.1 | 9.8 | 15.7 | 24.5 | 31.4 |
| 30 | 5 | 3.6 | 4.5 | 5.6 | 9.0 | 14.4 | 22.5 | 28.8 |
| | 10 | 3.5 | 4.4 | 5.5 | 8.8 | 14.1 | 22.1 | 28.3 |
| | 25 | 3.4 | 4.3 | 5.4 | 8.6 | 13.8 | 21.6 | 27.6 |
| | 50 | 3.3 | 4.2 | 5.3 | 8.4 | 13.5 | 21.2 | 27.1 |
| 40 | 5 | 3.0 | 3.8 | 4.8 | 7.7 | 12.3 | 19.3 | 24.7 |
| | 10 | 3.0 | 3.8 | 4.7 | 7.6 | 12.1 | 19.0 | 24.3 |
| | 25 | 2.9 | 3.7 | 4.6 | 7.4 | 11.8 | 18.5 | 23.7 |
| | 50 | 2.9 | 3.6 | 4.5 | 7.2 | 11.6 | 18.2 | 23.3 |
| 50 | 5 | 2.6 | 3.3 | 4.2 | 6.7 | 10.7 | 16.7 | 24.4 |
| | 10 | 2.6 | 3.2 | 4.0 | 6.5 | 10.4 | 16.2 | 20.3 |
| | 15 | 2.3 | 2.9 | 3.7 | 5.9 | 9.5 | 14.8 | 19.0 |
| 60 | 5 | 1.9 | 2.4 | 3.0 | 4.8 | 7.7 | 12.1 | 15.5 |
| 70 | 2 | 1.5 | 1.9 | 2.4 | 3.9 | 6.2 | 9.8 | 12.5 |



Polyethylene Pipe Specification DIN 8074, INSO 14427

| SDR | 51 | 41 | 33 | 26 | 22 | 21 | 17.6 | 17 | 13.6 | 11 | 9 | 7.4 | 6 | 5 |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| PE 80 SF 1.25 PN(bar) | 2.5 | 3.2 | 4.0 | 5.0 | 6.0 | 6.4(6.0) | 7.4 | 8.0 | 10.0 | 12.5 | 14.0 | 20.0 | 25.0 | 32.0 |
| PE 80 SF 1.6 PN(bar) | 2.0 | 2.5 | 3.0 | 4.0 | 4.6 | 5.0 | 6.0 | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 |
| PE 80 SF 2 PN(bar) | 1.6 | 2.0 | 2.5 | 3.0 | 3.8 | 4.0 | 4.8 | 5.0 | 6.3 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 |
| PE 100 SF 1.25 PN(bar) | 3.2 | 4.0 | 5.0 | 6.3(6.0) | 7.4 | 8.0 | 9.6 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 32.0 | 40.0 |
| PE 100 SF 1.6 PN(bar) | 2.5 | 3.0 | 4.0 | 5.0 | 6.0 | 6.3 | 7.4 | 8.0 | 10.0 | 12.5 | 16.0 | 20.0 | 25.0 | 31.0 |
| PE 100 SF 2 PN(bar) | 2.0 | 2.5 | 3.0 | 4.0 | 4.8 | 5.0 | 6.0 | 6.3 | 8.0 | 10.0 | 12.5 | 15.5 | 20.0 | 25.0 |
| Diameter (mm) | S | W | S | W | S | W | S | W | S | W | S | W | S | W |
| 20 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 32 | | | | | | | 2.0 | 0.198 | 2.0 | 0.198 | 2.4 | 0.235 | 3 | 0.282 |
| 40 | | | | | | | 1.8 | 0.229 | 1.9 | 0.24 | 2.0 | 0.251 | 2.3 | 0.288 |
| 50 | | | | | | | 1.8 | 0.29 | 2.0 | 0.317 | 2.3 | 0.365 | 2.4 | 0.378 |
| 63 | | | | | | | 1.8 | 0.368 | 2.0 | 0.403 | 2.5 | 0.5 | 2.9 | 0.569 |
| 75 | 1.8 | 0.44 | 2 | 0.462 | 2.3 | 0.557 | 2.9 | 0.683 | 3.5 | 0.816 | 3.6 | 0.836 | 4.3 | 0.987 |
| 90 | 2 | 0.531 | 2.2 | 0.647 | 2.8 | 0.8 | 3.5 | 0.988 | 4.1 | 1.15 | 4.3 | 1.2 | 5.1 | 1.4 |
| 110 | 2.2 | 0.795 | 2.7 | 0.952 | 3.4 | 1.19 | 4.2 | 1.45 | 5.0 | 1.69 | 5.3 | 1.79 | 6.3 | 2.1 |
| 125 | 2.5 | 1.01 | 3.1 | 1.25 | 3.9 | 1.53 | 4.8 | 1.86 | 5.7 | 2.19 | 6.0 | 2.29 | 7.1 | 2.69 |
| 140 | 2.8 | 1.26 | 3.5 | 1.56 | 4.3 | 1.9 | 5.4 | 2.35 | 6.4 | 2.75 | 6.7 | 2.86 | 8.0 | 3.37 |
| 160 | 3.2 | 1.65 | 4.0 | 2.02 | 4.9 | 2.45 | 6.2 | 3.08 | 7.3 | 3.58 | 7.7 | 3.75 | 9.1 | 4.4 |
| 180 | 3.6 | 2.07 | 4.4 | 2.51 | 5.5 | 3.1 | 6.9 | 3.83 | 8.2 | 4.52 | 8.6 | 4.71 | 10.2 | 5.54 |
| 200 | 3.9 | 2.48 | 4.9 | 3.08 | 6.2 | 3.88 | 7.7 | 4.74 | 9.1 | 5.57 | 9.6 | 5.84 | 11.4 | 6.86 |
| 225 | 4.4 | 3.16 | 5.5 | 3.9 | 6.9 | 4.82 | 8.6 | 5.96 | 10.3 | 7.07 | 10.8 | 7.37 | 12.8 | 8.64 |
| 250 | 4.9 | 3.88 | 6.2 | 4.88 | 7.7 | 5.98 | 9.6 | 7.38 | 11.4 | 8.68 | 11.9 | 9.02 | 14.2 | 10.7 |
| 280 | 5.5 | 4.88 | 6.9 | 6.04 | 8.6 | 7.47 | 10.7 | 9.2 | 12.8 | 10.9 | 13.4 | 11.4 | 15.9 | 13.3 |
| 315 | 6.2 | 6.18 | 7.7 | 7.59 | 9.7 | 9.47 | 12.1 | 11.7 | 14.4 | 13.8 | 15.0 | 14.3 | 17.9 | 16.9 |
| 355 | 7.0 | 7.81 | 8.7 | 9.65 | 10.9 | 12 | 13.6 | 14.8 | 16.2 | 17.5 | 16.9 | 18.2 | 20.1 | 21.4 |
| 400 | 7.9 | 9.92 | 9.8 | 12.2 | 12.3 | 15.2 | 15.3 | 18.8 | 18.2 | 22.1 | 19.1 | 23.1 | 22.7 | 27.2 |
| 450 | 8.8 | 12.4 | 11.0 | 15.4 | 13.8 | 19.2 | 17.2 | 23.7 | 20.5 | 28 | 21.5 | 29.3 | 25.5 | 34.3 |
| 500 | 9.8 | 15.4 | 12.3 | 19.2 | 15.3 | 23.6 | 19.1 | 29.2 | 22.8 | 34.5 | 23.9 | 36.1 | 28.3 | 42.3 |
| 560 | 11.0 | 19.3 | 13.7 | 23.9 | 17.2 | 29.7 | 21.4 | 36.6 | 28.5 | 43.2 | 26.7 | 45.2 | 31.7 | 53 |
| 630 | 12.3 | 24.3 | 15.4 | 30.2 | 19.3 | 37.5 | 24.1 | 46.4 | 28.7 | 54.7 | 30.0 | 57 | 35.7 | 67.2 |

Data: T = 20° C and 50 years of service life, SDR: Standard Dimensional Ratio, SF: Safety Factor, PN: Nominal Pressure (bar), S: Thickness (mm), W: Weight in kg/m, (INSO 14427)



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