



WATER DISTRIBUTION
SYSTEMS

MONDIAL

A close-up photograph of the end of a white plastic pipe, showing the internal structure and the flange-like edge. The pipe is set against a dark, blurred background.

**The Solution for Open Trench
Pressure Pipe Installation**

Radius- The smart choice for plastic pipe solutions

Established in the UK since 1969, Radius has over the years become the world's most renowned innovator in plastic pipe systems for utility companies. Our products are to be found almost anywhere plastic pipework is required in gas, water and waste water pipe systems.

The Radius operates in 3 manufacturing plants in UK and Ireland and supplies pipes and fittings to more than 100 countries through a network of sales and service operations. We are therefore a natural partner to utility companies operating in a wide variety of global and local markets, developing innovative and cost effective solutions for all piping requirements.

Our quality standards are key to our success and all our products are manufactured under ISO 9001 conditions which, with

many third party certifications, enable us to meet most international standards for pipe and fittings in their different markets.

Extensive and innovative research and development is at the heart of our products and systems and the achievement of BS EN ISO 14001 and BS EN ISO 18001 accreditations demonstrate that we take our health & safety and environmental responsibilities seriously.

We strive to improve industry practices with good health and safety policies at the forefront of our philosophy of 'getting it right first time'. As well as on-site

technical support and specialist installation service from trained engineers and technicians, we also offer expert training in the safe and effective installation and maintenance of plastic pipe systems for all installers through our Uplus business.

Our continuous customer inspired research and development, combined with successful customer partnerships represent our total dedication to the plastic piping industry.

MONdial® PVC-O for Buried Pressure Pipe Systems – WIS 4-31-08

Reducing weight and eliminating corrosion

The first installation of MONdial® pipes was completed in 1974 for the York Waterworks Company. No deterioration of performance was detected after 25 years service and the pipe is expected to continue to perform well into the twenty first century. Many years of experience has lead to confidence in the MONdial® system and seen thousands of kilometres of pipe installed in the UK and many countries around the world.

Through molecular engineering, MONdial® has the best weight versus performance characteristics. MONdial® pipes are the strongest (unreinforced) thermoplastic pipes available in the market today. The introduction of Molecular Orientation raises the toughness of this pipe which no other form of PVC based pipe can match. This combined with

the unique design of the Forsheda 576 Anger-Lock™ ring seal ensures superior joint and system performance.

Standards and specifications

Pipe, spigot and socket

- WIS 4-31-08 - Issue 2 – January 2001
- Approved for use in public water supplies

Sealing rings

- BS EN 681-1 type WA

All Uponor products are manufactured to the requirements of BS EN ISO 9001, ensuring the highest quality standards are maintained from manufacture to delivery on site.

Benefits

Increased System Confidence

- Excellent resistance to surge events
- In transient surge conditions, will withstand:
 - up to twice rated working pressure
 - full negative pressure

Low Maintenance

- No internal or external corrosion.

More Site tolerant

- Superior notch resistance due to the laminated structure of the pipe
- No under pressure tapping failures since introduction in 1974

Ease & Speed of Installation

- Light weight
- Low assembly force
- Easy handling and jointing

Increased Flow

- No reduction in hydraulic properties over time



Applications

Mondial® Blue

- Buried cold potable water systems



Mondial® Black

- Grey water systems
- Sewer pumping mains
- Irrigation pipelines



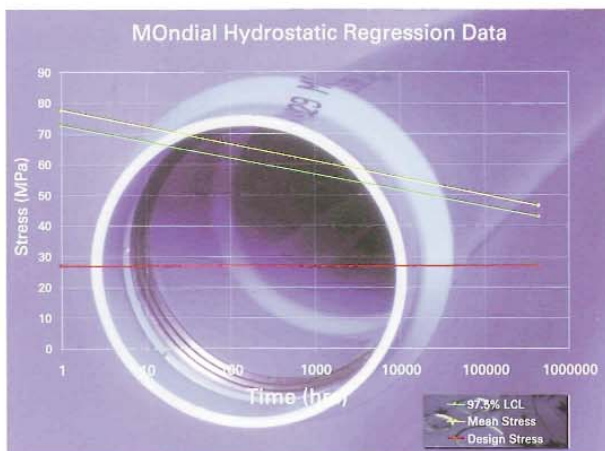
Forsheda 576 Anger-Lock™ Jointing System (non end load bearing)



- Factory fitted ring seal
- Low insertion force
- One-piece seal, incorporating unique retaining ring, minimising ring seal displacement during jointing
- Increased joint integrity
- Concrete thrust block (anchors) required at all relevant points

Comparison Testing

Why choose Mondial®?



Tougher

More resilient

Stronger

MONdial® PVC-O for Buried Pressure Pipe Systems – WIS 4-31-08

Design considerations

Narrow Trenching

MONdial® pipes in diameters 110 and 160mm may be jointed above ground and lowered into a narrow trench. It is important to allow adequate clearance on each side of the pipe to permit pipe bedding and surround material to be placed and compacted correctly and to ensure that the joint is fully inserted prior to backfill.

Design for Surge and Fatigue

MONdial® offers superior performance to both the surge and fatigue effects associated with PVC based pipelines used within the Water Industry. MONdial® is the class leader under fatigue, with improved performance over PVC-U and PVC-A based on stress to cause pipe failure after 100,000 pressure cycles.

Toughness

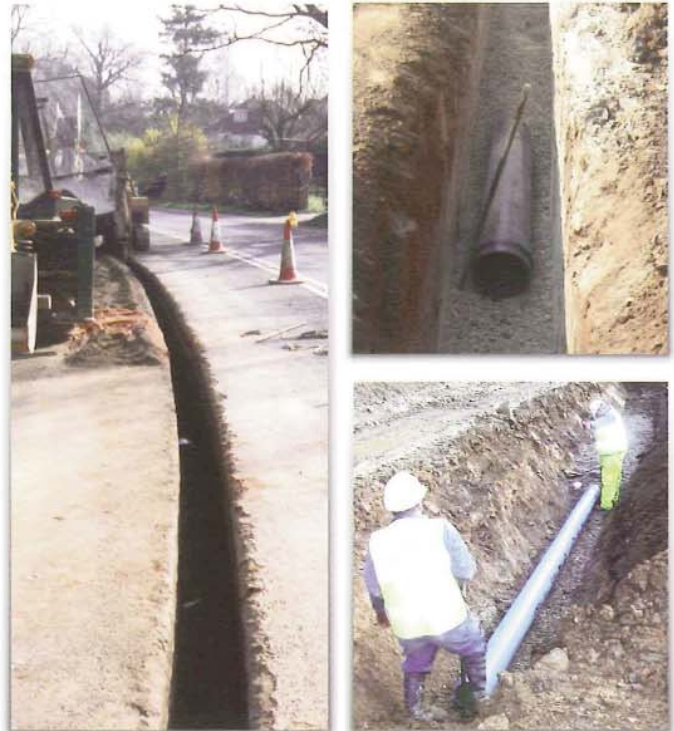
As a function of the Molecular re-engineering produced as part of the manufacturing process, MONdial® pipes offer superior toughness to that found in conventional PVC-U pipes.

Jointing

MONdial® is a simple push fit piping system. The integral sealing ring is 'non end load bearing' and therefore require the use of conventional concrete thrust blocks at relevant locations. MONdial® pipes must not be jointed by the solvent cement method.

Joint misalignment

It is recommended that the maximum allowable angle for joint misalignment for the MONdial® pipe joint should not exceed 1°. However, where there is a requirement the MONdial® pipe joint will tolerate misalignment of up to 3°. Where MONdial® pipes are to be connected to metallic fittings, then it is recommended that they should be jointed and remain true to one another.



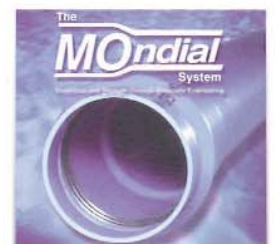
Industry Guidance documents

Guidance on the selection of pipe bedding and surround materials may be found in the following publications:

- UK Water Industry Information & Guidance Note 4-08-01, February 1994 'Bedding & Sidefill Materials for Buried Pipelines'
- UK Water Industry Specification 4-08-02, February 1994, 'Specification for Bedding Materials for Buried Pipelines'

Guidance on the design of thermoplastic pipes for surge and fatigue conditions may be found in the following publications:

- UK Water Industry, Information & Guidance Note 4-37-02, March 1991 'Design Against Surge & Fatigue Conditions for Thermoplastic Pipes'



Industry Guidance documents

Guidance on the use, scope of use and the manufacturing tests association with the production of MOnDial® may be found in the following publication:

- UK Water Industry Specification 4-31-08, January 2001, 'Oriented Polyvinyl Chloride (PVC-O) Pressure Pipes for Underground Use'

World coverage

Uponor MOnDial® pipes are rapidly becoming the preferred pipeline material for water distribution systems in countries where manufactured, which includes the USA, Australia, Japan, South Africa, Portugal and the UK.

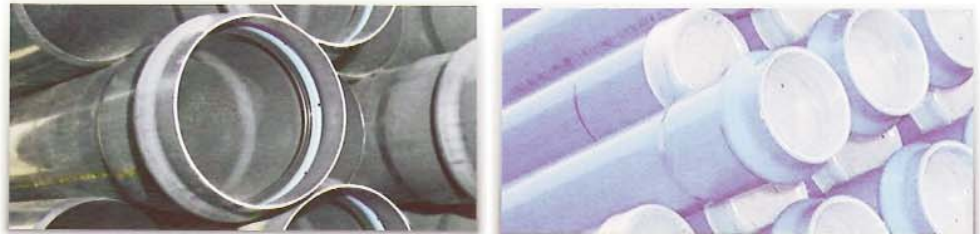
Technical Support

Uponor offer comprehensive advice on MOnDial® design and installation, including site visits where appropriate.

Dimensions

Pipe

Effective length: 6m







| Nom. Pipe Size mm | 12.5 Bar | | | 16 Bar | | |
|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Max Bore mm | Min Wall mm | Weight kg/m | Max Bore mm | Min Wall mm | Weight kg/m |
| 110 | 104.0 | 3.0 | 1.61 | 104 | 3.2 | 1.69 |
| 140 | 129.8 | 5.1 | 3.17 | 129.8 | 5.1 | 3.17 |
| 160 | 152.6 | 3.7 | 3.08 | 150.6 | 4.7 | 3.72 |
| 200 | 190.8 | 4.6 | 4.48 | 188.4 | 5.8 | 5.90 |
| 250 | 238.6 | 5.7 | 7.43 | 235.4 | 7.3 | 9.26 |
| 315 | 300.6 | 7.2 | 10.70 | 296.6 | 9.2 | 14.05 |
| 400 | 381.8 | 9.1 | 18.48 | 376.8 | 11.6 | 22.01 |

MOndial® PVC-O for Buried Pressure Pipe Systems – WIS 4-31-08




Fittings range with Integral Sealing Ring

Epoxy coated D.I bends with double socket joints

| Nom. Pipe Size | 90° | 45° | 22.5° | 11.5° |
|----------------|---|---|--|---|
| 110 |  |  |  |  |
| 160 | | | | |
| 200 | | | | |
| 250 | | | | |
| 315 | | | | |
| 400 | | | | |

| Nom. Pipe Size (mm) | Pressure Rating (Bar) | 90° | | | 45° | | | 22.5° | | | 11.5° | | |
|---------------------|-----------------------|-----|-----|--------|-----|-----|--------|-------|-----|--------|-------|-----|--------|
| | | D | L | Weight | D | L | Weight | D | L | Weight | D | L | Weight |
| 110 | 16 | 90 | 120 | 7.0 | 90 | 65 | 6.0 | 90 | 45 | 8.0 | 90 | 34 | 6.0 |
| 160 | 16 | 100 | 170 | 15.0 | 100 | 85 | 12.0 | 100 | 55 | 12.0 | 100 | 40 | 8.0 |
| 200 | 16 | 126 | 220 | 22.0 | 126 | 110 | 17.0 | 126 | 65 | 19.0 | 126 | 45 | 13.0 |
| 250 | 16 | 190 | 270 | 42.0 | 190 | 130 | 33.0 | 190 | 75 | 27.0 | 190 | 50 | 27.0 |
| 315 | 16 | 204 | 320 | 66.0 | 204 | 150 | 58.0 | 204 | 85 | 38.0 | 204 | 60 | 43.0 |
| 400 | 16 | 204 | 293 | 93.3 | 224 | 175 | 100.0 | 224 | 126 | 76.9 | 224 | 106 | 84.1 |

Epoxy coated Duckfoot Hydrant Bends and Flange Assemblies, drilled to BS 4504 NP 16, complete with sealing gasket

| Nom Pipe Size (mm) | Socket Flange | Spigot Flange | Hydrant Bend | | |
|--------------------|---|---|---|--|--|
| 110 |  |  |  | | |
| 160 | | | | | |
| 200 | | | | | |
| 250 | | | | | |
| 315 | | | | | |
| 400 | | | | | |

| Nom Pipe Size (d) mm | Flange Drilling mm | Pressure Rating (Bar) | Socket Flange | | | Spigot Flange | | | (dii) | Hydrant Bend | | | D | Weight |
|----------------------|--------------------|-----------------------|---------------|----|--------|---------------|-----|--------|-------|--------------|-----|-----|-----|--------|
| | | | L1 | L2 | Weight | L1 | L2 | Weight | | L1 | L2 | L3 | | |
| 110 | 100 | 16 | 130 | 15 | 6.0 | 149 | 117 | 6.0 | x 80 | 300 | 120 | 300 | 135 | 14.0 |
| 160 | 150 | 16 | 150 | 15 | 10.0 | 169 | 137 | 10.0 | x 80 | 340 | 120 | 300 | 125 | 36.0 |
| 200 | 200 | 16 | 192 | 34 | 16.0 | 204 | 172 | 17.0 | - | - | - | - | - | - |
| 250 | 250 | 16 | 220 | 41 | 24.0 | 246 | 215 | 28.0 | - | - | - | - | - | - |
| 315 | 300 | 16 | 240 | 49 | 35.0 | 233 | 190 | 37.0 | - | - | - | - | - | - |
| 400 | 400 | 16 | 295 | 71 | 69.9 | 270 | 228 | 47.6 | - | - | - | - | - | - |

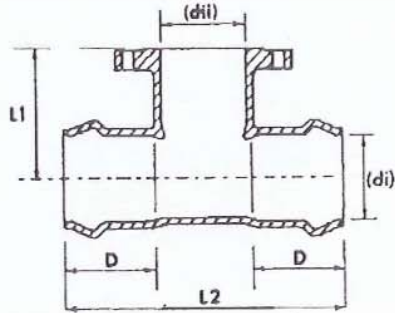
All fittings supplied with integral sealing ring. Sealing rings profile may vary depending on manufacturer. All dimensions in millimetres and weights in kilos. They are approximate and subject to change

Fittings range with Integral Sealing Ring

Epoxy coated D.I Hydrant tees, branch flanged and drilled BS4504 NP 16

Nom. Pipe Size

110
160
200
250
315
400



| Nom Pipe Size (di x dii) | L1 | L2 | D | Weight kg | Nom Pipe Size (di x dii) | L1 | L2 | D | Weight kg |
|--------------------------|-----|-----|-----|-----------|--------------------------|-----|-----|-----|-----------|
| 110 x 80 | 172 | 345 | 120 | 12.0 | 250 x 200 | 275 | 638 | 189 | 56.0 |
| 110 x 100 | 172 | 360 | 118 | 13.0 | 250 x 250 | 295 | 685 | 187 | 60.0 |
| 160 x 80 | 199 | 380 | 132 | 17.0 | 315 x 80 | 305 | 550 | 199 | 62.0 |
| 160 x 100 | 208 | 410 | 137 | 18.0 | 315 x 100 | 309 | 576 | 202 | 64.0 |
| 160 x 150 | 218 | 460 | 137 | 26.0 | 315 x 150 | 309 | 624 | 201 | 67.0 |
| 200 x 80 | 223 | 458 | 165 | 27.0 | 315 x 200 | 292 | 672 | 200 | 77.0 |
| 200 x 100 | 240 | 465 | 157 | 29.0 | 315 x 250 | 305 | 773 | 225 | 95.0 |
| 200 x 150 | 273 | 560 | 208 | 34.0 | 315 x 300 | 309 | 745 | 186 | 90.0 |
| 200 x 200 | 280 | 547 | 153 | 41.0 | 400 x 80 | 316 | 688 | 204 | 84.0 |
| 250 x 80 | 250 | 522 | 191 | 36.0 | 400 x 150 | 335 | 718 | 224 | 91.3 |
| 250 x 100 | 255 | 534 | 187 | 38.0 | 400 x 250 | 365 | 806 | 241 | 107.9 |
| 250 x 150 | 265 | 579 | 184 | 43.0 | | | | | |

A full range of equal tees, reducers and reduced tees is available – please contact our Customer Services Department for more information.

Full details of jointing, installation, testing, handling and storage of MOnDial® pipes are available on request from Uponor.



All fittings supplied with integral sealing ring. Sealing rings profile may vary depending on manufacturer. All dimensions in millimetres and weights in kilos. They are approximate and subject to change.

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