



 **HILINE**

Pre-insulated  
pipe systems for  
district heating and  
cooling networks

# BONDED PRE-INSULATED PIPE SYSTEMS



## Introduction

The result of many decades of research and development, CPV's Hiline range of bonded pre-insulated pipe systems offers a safe, secure and efficient means of conveying temperature-dependent fluids – for heating and cooling applications. Proven at countless sites throughout the world, each system has been carefully designed and manufactured to deliver outstanding performance and exceptional levels of reliability.

CPV is a true British success story - having been established in the late 1940s, the company has been one of the pioneers in the development and manufacture of thermoplastic pipe systems and this expertise has been put to great use in the evolution of the company's current Hiline range of pre-insulated pipe systems.

## Environmental Issues

Climate change is here. With the ever-present threat of extreme weather events, flooding and unseasonable weather patterns, few could honestly deny that change is afoot. In the UK, around half of our energy demands come from the need for heat – whether it's domestic, commercial or industrial. Governments are now waking up to the fact that by tackling the carbon emissions from this demand, we can make a sizeable contribution to the reduction of global greenhouse gases.



District heating has been identified as a technology that can play a leading role in helping lower carbon emissions. The Hiline range of pre-insulated pipes has been developed with this application in mind and, as such, offer exceptional performance and reliability when distributing low-carbon heating and hot water.

## Applications

The Hiline range of pre-insulated pipe systems is perfect for all sizes of buried district heating and cooling networks. From large-scale transmission and arterial pipelines down to individual domestic-sized branch connections, the range is complete.

## Efficient Insulation

A key component in the efficiency of the Hiline pipe systems is the CFC-free polyurethane foam which provides excellent levels of insulation – in accordance with the demands of the EN 253 standard. This produces very-low lambda levels – which results in much-reduced energy losses to the media being conveyed by the service pipe.



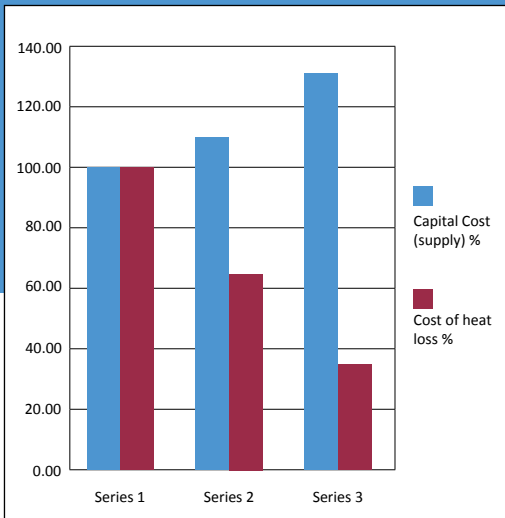


Figure 1

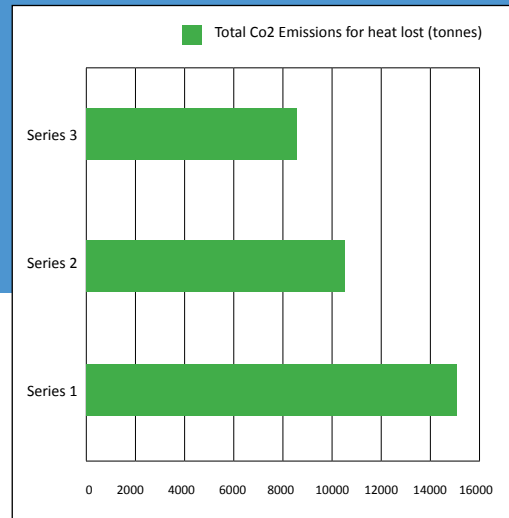


Figure 2

(\*)Basis of Calculations used for example costs:

- Gas supply tariff 3p/ kWh
- Gas costs increase by 2.5% per annum for the 30-year calculation
- Gas boiler efficiency 80%
- Carbon factor for natural gas = 0.1836 kgCO<sub>2</sub>/kWh (source: Ofgem)

The effects of using a more efficient insulation don't appear to be much at face value, but factor in a minimum 30-year life-cycle cost of operating the system and the savings – both financial and environmental – mount up significantly. The Hiline range of pre-insulated pipe systems are available with increased levels of insulation thickness – which for a relatively small additional investment at the time of installation – will yield significant savings during the lifetime of the system.

To illustrate this point, take an example scenario in which a 5,000-metre long network (flow and return) consisting of DN150mm steel pre-insulated pipes circulating hot water at a flow temperature of 100°C. If fuelled by a natural-gas-fired boiler, constantly operating all-year-round, the system with standard insulation – over its nominal 30-year life – will lose heat to the equivalent of around £3.65 million's-worth of gas(\*) and emit 15,250 tonnes of CO<sub>2</sub>. By making a small additional investment – equivalent to around 10 percent of the material cost at the time of installation – in order to upgrade the Hiline pipe system's insulation thickness to Series Two, the cost of the heat lost would be reduced by some £1.2million – also saving 5,091 tonnes of CO<sub>2</sub> from being emitted. The graphs shown above (figures 1 and 2) demonstrate the effects that this can have.

### Quality Assured

Hiline systems are manufactured in modern, EN ISO 9001-approved production facilities, using quality-assured materials that comply with all relevant industry standards for district heating and cooling – including EN 253, as well as customers' bespoke specifications. CPV also works to the requirements of the requirements of the ISO 14001 Environmental Management System.

### Research and Development

CPV has been at the forefront of the design and development of specialist pipe systems and its Hiline range is no exception. Not content with merely accepting current industry best practice, the company is constantly looking into ways in which it can improve a system's performance, life expectancy and capital cost – including innovation in developing the next generation of materials for its composite systems.



## World-class support

CPV prides itself by the way in which it supports its clients - from initial contact, through the design and installation stages and then in offering lifelong operational and maintenance support services for the pre-insulated pipe network. As manufacturer, it is important to ensure that CPV's systems deliver exceptional performance throughout their working life. Therefore, the company has established an array of world-class support services that help its clients every step of the way.



## Design and Stress Analysis

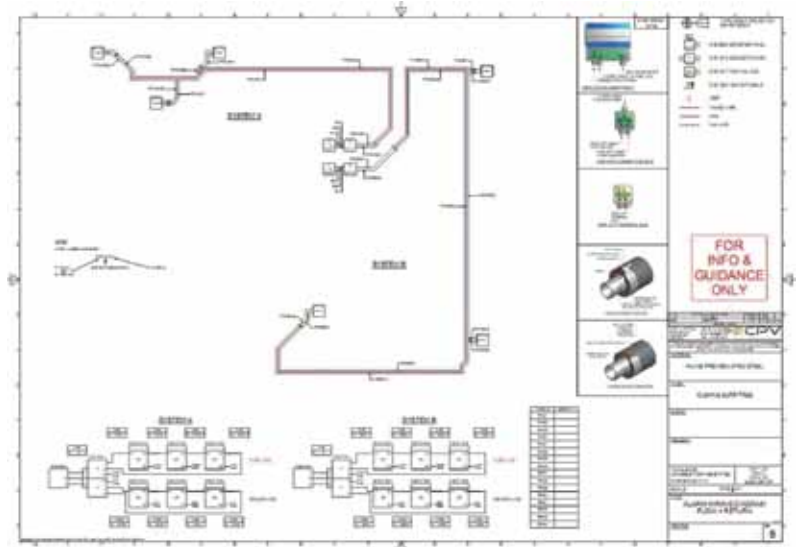
There are many factors that will affect the long-term integrity of a pre-insulated pipe system. Correctly identifying and dealing with the potential for thermal expansion of the pipe system is a critical element of the design process and CPV is a licenced operator of the state-of-the-art sisKMR specialist stress analysis software.

This package enables the configuration of pipe routes to keep thermal expansion within safe limits and conform to the requirements of the EN 13941 standard for Design and installation of pre-insulated bonded pipe systems for district heating.

To illustrate the importance of stress analysis, a 200-metre length of buried DN250mm pre-insulated steel pipe, heated to an operating temperature of 120°C will expand by around 150mm – exerting stress of some 171MPa – the equivalent of 52 tonnes. CPV's design team can provide full advice and support to ensure a system operates within acceptable operational parameters and provide a long working life.

## Drawings

CPV's design team can provide district heating pipe network drawings for



every stage of a project – from initial conceptual design through to the as-installed drawings that accurately record pipe routes and the details of electronic surveillance systems.

## Training

Training installers, supervisors and maintenance operatives, CPV's brand new training centre allows for not only the theory, but hands-on practical experience in the correct method for installing the Hiline pipe systems.

In addition to this, certified training courses are offered in the installation, commissioning and maintenance of electronic surveillance systems – including the use of a purpose-built buried Hiline pipe network, on which moisture faults can be simulated as part of the practical training.

## Tool sales and hire

CPV offers both the sale and short-term hire of all the specialist tools required to install the Hiline pipe system.

## Electronic surveillance systems support

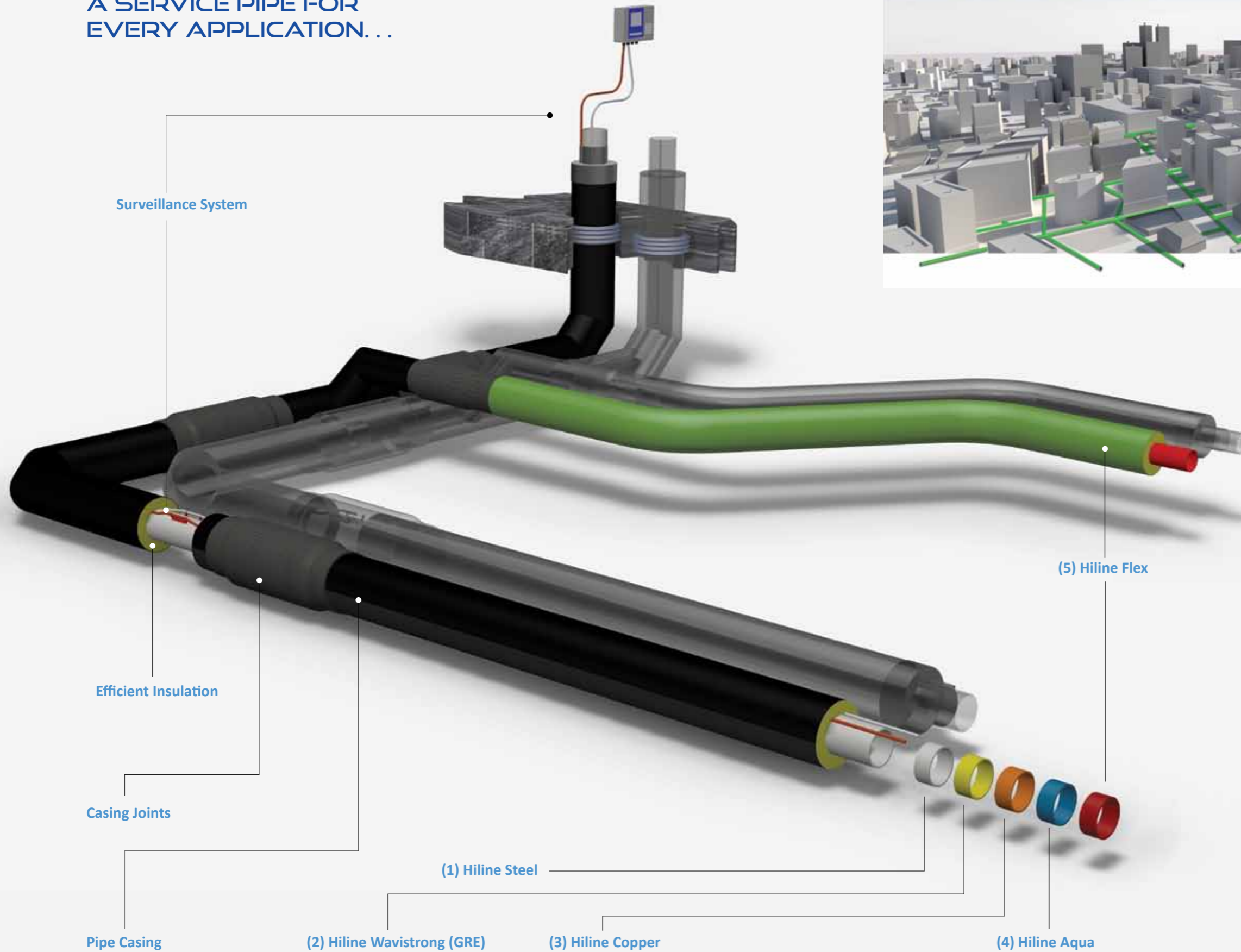
When installing Hiline Steel systems, it is recommended that an electronic surveillance system is included in order to constantly monitor the insulation for the ingress of moisture. This provides peace of mind that should the outer casing be damaged by future street works, the presence of groundwater in the insulation can be picked up, located and repaired before any damage is caused to the service pipe. CPV offers full support for the main types of surveillance technologies, including Nordic, Brandes and customer- specified systems.

## On-site support services

Whether it's on-site training, site supervision or specialist advice, support and maintenance – CPV's engineers are at hand to provide customer support as and when required.



# A SERVICE PIPE FOR EVERY APPLICATION...



**(1) Hiline Steel** - A range of bonded pre-insulated pipe systems with steel service pipes that conform to European and International specifications – suitable for district heating and cooling applications.

**(2) Hiline Wavistrong (GRE)** - A bonded pre-insulated glass-reinforced epoxy (GRE) service pipe that's suitable for district heating and cooling networks.

**(3) Hiline Copper** - A bonded pre-insulated copper pipe system for district heating and cooling along with hot and cold water applications.

**(4) Hiline Aqua** - A bonded rigid-polypropylene pre-insulated pipe system for use in district heating and cooling along with hot and cold water applications.

**(5) Hiline Flex** - A flexible, pre-insulated PE-Xa pipe system for use in district heating and cooling applications.

#### Surveillance System

- Compatible with a range of surveillance systems for use with both metallic and polymer service pipes.
- Nordic pulse, Brandes resistance or customer-specified systems catered for.

#### Efficient insulation

- High-efficiency CFC-free, rigid polyurethane foam insulation
- Different thicknesses available (Series 1, 2 and 3)
- Low global warming potential: <0.6
- Ozone depletion: Zero

#### Outer Casing

- High Density Polyethylene (HDPE) casing on standard systems
- Foil vapour barrier available on certain systems
- Barrier-pipe casing available for use in contaminated ground
- UV-stable and fire-resistant HDPE above-ground options available
- Metallic spiral-wound casings also available

#### Casing Joints

- Range of secure joints and fittings available
- HDPE electro-fusion and heat-shrinkable case jointing options
- Two-part, snap-fit shell sleeve system for Hiline Flex system

# PRODUCT SELECTOR TABLE

	Hiline Steel Metric	Hiline Steel Galvanised	Hiline Steel Flex	Hiline Steel Imperial	Hiline Steam	Hiline Wavistrong GRE	Hiline Copper	Hiline Aqua PP-R	Hiline Flex PE-Xa
Size Range	DN20-DN1200	DN20-DN450	DN16-DN25	3/4" - 8" (NB)	DN20-DN500	DN32-DN350	15-159 (OD)	20-315 (OD)	25-160 (OD)
System Standards	EN 253, EN 448, EN 488, EN 489, EN 13941 & EN 14419		EN 15632-4	Generally manufactured in accordance with EN 253 as no current standards exist for pre-insulated service pipes of these material types					EN 15632-1/2
Service Pipe Standards	Seamless EN 10216-2 Welded EN 10217-2 & 5	Welded EN 10217-2 & 5 EN 10240, EN 1179 EN ISO 1461	Seamless EN 10305 -1 Welded EN 10305-2/3	Seamless EN10216 1/2 Welded EN 10255 & EN 10217-1	EN 10210-1/2 & EN 10216 2	ISO 14692-1/2/3/4 ASTM D2310 ASTM D2996	EN 1057	DIN 8077 DIN 8078	EN 12318-2 DIN 16892 DIN 16893
Service Pipe Material & Grade	STEEL St 37.0 Seamless R-35, P235 GH Welded P235 GH, P235 TR1 & TR2	STEEL St 37.0 Welded P235 GH, P235 TR1 & TR2	STEEL St 34.2	STEEL St 37.0 Seamless P235 TR2 Welded P265 TR1	STEEL St 37.0 Seamless R-35, P235 GH	GRE ASTM D2310-11FX1 & ASTM D2996	COPPER Cu-DHP, R250 & R290	PP-R & PP-RCT Multi-layer composite fibre reinforced	PE-Xa with EVOH Barrier
Casing Pipe Material	*HDPE & METALLIC SPIRAL	*HDPE & METALLIC SPIRAL	*MDPE	HDPE	*HDPE & METALLIC SPIRAL	HDPE	HDPE & MDPE BARRIER	HDPE & MDPE BARRIER	CORRUGATED LDPE
Max Operating Pressure (bar)	25	25	25	25	25	10	10	10	6
Max Cont Operating Temp (°C)	140	140	120	120	180	100	120	80	80
Max Peak Operating Temp (°C)	152	152	140	140	N/A	120	130	95	95
Insulation Material	PUR	PUR	PUR	PUR	PUR/ MINERAL WOOL	PUR	PUR	PUR	PUR
Insulation Series	1,2 & 3	1 & 2	1 & 2	1,2 & 3	1 & 2	1 & 2	1 & 2	1 & 2	1
Insulation Value (w/mK)	0.0244	0.0244	0.023	0.024-0.029	0.0244 (PUR) 0.034 (WOOL)	0.024-0.029	0.024-0.029	0.024-0.029	0.0216-0.026
Delivered Lengths	6m & 12m	6m & 12m	Up to 400m (coil)	6.5m & 6m	6m & 12m	6m & 10m	6m	6m & 12m	Up to 1000m (coil)
Electronic Surveillance	NORDIC, BRANDES & CUSTOM	NORDIC, BRANDES & CUSTOM	NORDIC	NORDIC, BRANDES & CUSTOM	NORDIC	NORDIC	NORDIC, BRANDES & CUSTOM	NORDIC & CUSTOM	N/A
<b>APPLICATIONS</b>									
*HDPE & *MDPE Casings can be supplied with oxygen diffusion barrier for diameters d75 - d400 (on request)									
District Heating	●	●	●	●	●	●	●	●	●
District Cooling	●	●	●	●	○	●	●	●	●
Potable Water Services	○	○	○	○	○	○	●	●	○

## Project References

The Hiline system has been used on projects worldwide for a variety of applications. The list continues to grow, so please contact CPV for up-to-date project references. The list below illustrates a small selection of project types:

- City-wide district heating networks
- Hospitals
- Hotels
- Manufacturing facilities
- Ministry of Defence
- Public buildings
- Research Facilities
- Residential (social and private)
- Schools

- Sports and leisure
- UK overseas embassies
- Universities



## About CPV Ltd

CPV operates in a wide array of sectors, with products satisfying many applications, most of which concern engineering pipe solutions for aggressive, corrosive, hot, chilled and potable liquids.

Its state-of-the-art production facility - based at the site of CPV's headquarters near Romsey in Hampshire - is backed by a comprehensive selection of research, design, engineering, testing, quality, training and support services; ensuring the perfect marriage between its products and the applications in which they serve.

The details of the full range of products can be found on CPV's website: [www.cpv.co.uk](http://www.cpv.co.uk)

## Product Solutions

Since the company's inception in 1948, it has regularly led the way in the research and development of pipe systems, tanks and vessels. The current range encompasses:

- Pre-insulated pipe systems
- Chemical and hazardous drainage systems
- Pressure pipe systems
- Tanks and vessels
- Custom extrusions and fabrications
- Heat exchanger solar panels

CPV is a member of the following organisations:



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