



polyethylene gas distribution pipe

WEHOGAS[®]

General and Technical Information



KWH
PIPE



Introduction

KWH Pipe is a global polyethylene pipe producer with manufacturing sites located in various countries worldwide including Canada and the United States. Our North American operations have been manufacturing PE pipe products since 1967.

KWH Pipe has been supplying polyethylene pipe to the natural gas distribution industry since the late 1960's when the evolution to PE pipe from steel and PVC materials began. Throughout its history, KWH Pipe has established and maintained an enviable record of cost effective performance, reliability and customer satisfaction. KWH Pipe utilizes the latest advances in raw materials and manufacturing techniques to sustain this on-going achievement and commitment to the quality of our WEHOGAS® polyethylene natural gas distribution piping products.

WEHOGAS® gas pipe is manufactured in sizes from 1/2" up to 12" in diameter with larger pipe sizes available upon request. Product can be manufactured from either PE2406 or PE3408 materials.

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The accuracy or applicability of all information contained herein is intended as a guide and is not guaranteed. Hence, KWH Pipe assumes no obligation or liability for this information. All tables and statements may be considered as recommendations but not as warranty. Users of our products should perform their own tests to determine the suitability of each such product for their particular purposes. KWH Pipe's liability for defective products is limited to the replacement, without charge, of any product found to be defective. Under no circumstances shall it be responsible for any damages beyond the price of the products, and in no event shall it be liable for consequential damages.

Performance and Reliability

WEHOGAS® gas pipe is made from premium engineered polyethylene resins with proven long term performance capabilities confirmed by its PE2406 or PE3408 designation. Inherent properties include ductility, flexibility, toughness, high impact strength, weatherability, abrasion resistance and chemical resistance. A primary long term characteristic of all WEHOGAS® gas pipes is its resistance to slow crack growth. Slow crack growth is the typical long term failure mode of a PE pipe when it is subjected to constant pressure or stress over a long period of time. In addition to working with high performance base materials, KWH Pipe maintains total manufacturing control which includes detailed attention to process control, inspection and audit, and final quality testing and verification. This quality process ensures the expected long-term performance that WEHOGAS® gas pipe has demonstrated since the late 1960's.

Quality Assurance

KWH Pipe is widely recognized as an industry leader in terms of commitment to quality. KWH Pipe was the first North American polyethylene pipe manufacturer to demonstrate that its Quality Management System was in compliance with ISO 9002, after an assessment performed by an independent auditor. Registration under this internationally recognized standard assists in providing assurance to you, our customer, that our products will continually meet or exceed the requirements of the relevant product standards and will perform as expected in the field. Throughout 10 years of commitment to this quality management program, KWH Pipe has demonstrated a thorough understanding that continual improvement and awareness of product quality is a vitally important aspect of our day-to-day business.

WEHOGAS® gas pipe is produced in accordance with the strictest manufacturing specifications from quality engineered polyethylene resins that are tested and qualified by the Plastic Pipe Institute (PPI). KWH Pipe maintains complete quality control from the raw material to the finished product by establishing strict manufacturing specifications that meet or exceed industry standards. Verifying our actions daily and using precise dimensional controls and accelerated long term hydrostatic testing verifies the expected performance of our WEHOGAS® gas pipe products.



Wehogas[®] General Dimensions

(ALL DIMENSIONS IN INCHES)

Nominal Size	SDR	Average Outside Diameter	Minimum Wall Thickness	Average Inside Diameter	Nominal Weight (lb per meter)
3/4" NPS	8.8	1.051	0.119	0.798	0.490
1" NPS	8.8	1.315	0.150	0.998	0.770
1-1/4" NPS	8.8	1.660	0.189	1.260	1.230
1-1/2" NPS	8.8	1.900	0.216	1.440	1.620
2" NPS	8.8	2.375	0.270	1.804	2.520
3" NPS	8.8	3.500	0.398	2.656	5.480
4" NPS	8.8	4.500	0.511	3.416	9.060
6" NPS	8.8	6.636	0.754	5.037	19.690
8" NPS	8.8	8.624	0.980	6.546	33.280
1/2" NTS	7	0.626	0.090	0.438	0.210
3/4" NPS	11	1.051	0.095	0.849	0.400
1" NPS	11	1.315	0.119	1.063	0.630
1-1/4" NPS	10	1.660	0.166	1.300	1.120
1-1/2" NPS	11	1.900	0.173	1.533	1.330
2" NPS	11	2.375	0.216	1.918	2.080
3" NPS	11	3.500	0.318	2.826	4.500
4" NPS	11	4.500	0.409	3.633	7.440
6" NPS	11	6.636	0.602	5.360	16.150
8" NPS	11	8.624	0.785	6.960	27.370
1" NPS	13.5	1.315	0.097	1.109	0.530
2" NPS	13.5	2.375	0.176	2.003	1.720
3" NPS	13.5	3.500	0.259	2.951	3.740
4" NPS	13.5	4.500	0.333	3.794	6.180
6" NPS	13.5	6.636	0.491	5.595	13.430
8" NPS	13.5	8.624	0.639	7.269	22.730

- NOTE:**
- All WEHOGAS[®] gas pipe is manufactured in strict accordance to CSA B137.4, Polyethylene Piping Systems for Gas Services.
 - Other pipe diameters, and SDR ratings are available upon request.

Wehogas[®] General Packaging Information

REELED Pipe

Nominal Pipe Size	Reel Length (Meters)	Reel Size	Reel Width
3/4" NPS	1,900	2" x 6" x 8'	35"
	2,600	2" x 6" x 9'	35"
1" NPS	1,300	2" x 6" x 8'	35"
	3,000	2" x 6" x 9'	35"
1 1/4" NPS	1,000	2" x 6" x 9'	35"
1 1/2" NPS	800	2" x 6" x 9'	35"
	1,400	2" x 6" x 9'	35"
2" NPS	600	2" x 6" x 9'	35"
	900	2" x 6" x 9'	35"
3" NPS	500	2" x 6" x 9'	42"
4" NPS	270	2" x 6" x 9'	42"

COILED Pipe and Tubing

Nominal Size	Coil Length (meters)	Coil Dimensions ID x OD x W (inches)	Number of Coils per Pallet	Number of Pallets per Truck		Total Meters per Truckload	
				Truck Deck Length		Truck Deck Length	
				48	53	48	53
1/2" NTS	300	28 x 42 x 8	10	24	26	72,000	78,000
3/4" NPS	150	28 x 47 x 9	7	24	26	25,200	27,300
1" NPS	150	28 x 47 x 12	7	24	26	25,200	27,300
1-1/4" NPS	150	48 x 75 x 7-1/2	10	7	8	10,500	12,000
2" NPS	150	50 x 75 x 13-1/2	7	7	8	7,350	8,400
3" NPS	150	82-1/2 x 86 x 26-1/2	3	5	6	2,250	2,700
4" NPS	150	82-1/2 x 108 x 32-1/2	20	5	6	1,500	1,800

NOTE: 1. Other coiling dimensions and packaging arrangements are available upon request. All coil pallets are shrink wrapped for additional UV light stability and shipping protection. All straight length pipe is shipped with a dust cap installed on each pipe end.

STRAIGHT Pipe - Standard 12 meter length

Nominal Size	Number of Pieces per Crate	Number of Crates Per Truck	Total Number of Lengths per Truck	Total Meters per Truckload
3"	63	10	630	7,560
4"	38	10	380	4,560
6"	20	10	200	2,400
8"	14	8	112	1,344
10"	11	6	66	792
12"	N/A	N/A	56	672

Typical Resin Products

WEHOGAS® gas pipe can be manufactured from a yellow PE2406 compound or black PE3408 compound which are qualified and listed by PPI and CSA (where required). The table below lists the physical properties of these base materials. These nominal properties represent values measured from plaque moulded test specimens made from the base resin used to produce the pipe.

Property	ASTM Test	PE2406 Nominal Value	PE3408 Nominal Value
Density - Compounded - Natural	D1505	0.941 g/cc 0.940 g/cc	0.944 g/cc 0.955 g/cc
Melt Flow	D1238	0.20 g/10 min. Cond. 190/2.16	10.0 g/10 min. Cond. 190/21.6
Yield Strength	D 638	2,800 psi	3,300 psi
Ultimate Strength	D 638	4,500 psi	4,500 psi
Environmental Stress Crack Resistance	D1693	> 5,000 hours	> 5,000 hours
Elongation at Break	D 638	> 800%	> 800%
Brittleness Temperature	D 746	< -150°F	< -180°F
Cell Classification	D3350	234363E	345464C
Hydrostatic Design Basis (HDB)	D2837	1,250 psi @ 73.4°F 1,000 psi @ 140°F	1,600 psi @ 73.4°F 800 psi @ 140°F
PPI Listing	PPI	PE2406	PE3408

Note: The HDB and PPI Listings are determined from actual pipe hydrostatic tests in accordance with ASTM D2837.

Performance Characteristics

The Long Term Strength of a pipe is determined by the test method defined under ASTM D2837. A series of hydrostatic pipe tests are performed to mathematically categorize the Hydrostatic Design Basis (HDB) for each standard temperature tested. For WEHOGAS® gas pipe made from PE2406 and PE3408 grade resins, the following HDB values apply:

Temperature °F	PE2406 HDB in psi	PE3408 HDB in psi
73	1,250	1,600
140	1,000	800

The Design Pressure (P) for a WEHOGAS® gas pipe system can be calculated using the HDB and appropriate service factor. The following formula is used to determine the pressure capability:

$$P = \frac{2 \times \text{HDB} \times F}{(\text{SDR}-1)}$$

where:

- P = design pressure, psi
- HDB = hydrostatic design basis, psi
- F = Design Service Factor 0.40 (CSA Z662-99)
- SDR = Standard Dimension Ratio

The resultant design working pressure for common pipe ratings is as follows:

SDR	PE2406 (in psi)		PE3408 (in psi)	
	73°F	140°F	73°F	140°F
8.8	128 **	103 **	164 **	82
11	100	80	128 **	64
13.5	80	64	102	51

** Where the pipe is rated higher than 102, a check should be made to determine if these pressures apply under the local codes governing the specific application.

Performance Characteristics

The suitability of polyethylene pipe for gas service is complimented by the pipes Chemical Resistant nature. Typical compounds (predominantly methane) found in a natural gas distribution system do not have a detrimental effect to the long term performance of WEHOGAS® gas pipe. Specific chemical exposure tests outlined in CSA B137.4 confirm the stability of WEHOGAS® gas pipe in the presence of odorants, antifreezes and other compounds that may be present in this type of system.

Allowable Operating Temperatures of WEHOGAS® gas pipe are between -20°F up to 140°F. However, for systems operating above 100°F, the owner should verify that fittings and appurtenances working in conjunction with the pipe be tested and verified to operate safely at the proposed maximum operating temperature and pressure.

Joining Considerations

DOT regulations state that joining procedures and technical personnel performing the fusion procedure must be qualified and/or trained to perform the work. KWH Pipe's butt, socket, and saddle fusion procedures are qualified using industry accepted procedures allowing the installer to maintain their current procedure(s). When procedures differ, KWH Pipe can assist in assuring the proper qualification testing is performed.

In addition, the fusion of WEHOGAS® gas pipe to other PE2406 or PE3408 pipe and fittings is an acceptable practice as demonstrated by laboratory and Plastic Pipe Institute (PPI) evaluation and utility experience. In most cases, the PE2406 or PE3408 compounds are characterized with similar cell classifications (i.e. 234363E or 345464C). In these cases, they are considered **like** materials from a joining perspective, therefore, no special alterations to standard fusion procedures are required.

Please refer to KWH Pipe's Heat Fusion Qualification Guide for detailed procedures.

Environmental Considerations

When performing fusion work below 55°F, fusion heating time and heater plate temperature must be carefully observed. Adjustment to dwell times during heating and regular monitoring of the heater plate temperature are critical. In addition, where noticeable wind conditions exist, the fusion operation should be shielded from the wind. In extreme cold environments with environment conditions less than 32°F, the fusion equipment and technician performing the fusion should ideally work in an enclosed, heated shelter thereby ensuring that proper equipment operation and reasonable working conditions are achieved.

Other temperature considerations relate to the behavior of a polyethylene pipe as temperatures differ during installation and operation. **Thermal expansion and contraction** should be considered when selecting and installing mechanical fittings and coupling systems. The effects of thermal stresses in polyethylene pipe are typically not a consideration in pipe design. For the most part, buried polyethylene systems are confined and restrained by soil friction around the pipe once installed.

Squeeze-Off Considerations

WEHOGAS® gas pipe is suitable for squeeze-off providing the following recommendations are followed:

- Use proper tool design which incorporates radiused squeeze bars and a positive squeeze stop.
- Use proper squeeze tool and squeeze stops for size of pipe being squeezed.
- Squeeze pipe slowly or use momentary pauses in the squeeze operation.
- Minimize amount of squeeze-off to a maximum of 30% compression based on maximum pipe wall thickness.
- Time of squeeze should be limited to complete necessary work only.
- Initial release step must be performed as slow as is prudent and safe - ideally, the squeeze tool should be designed to have immediate control at time of release - not abrupt release.





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