RENOVATION GAS VRC®
RENOVATION VRC® ORANGE

PE100 RC WITH ENHANCED STRESS CRACKING RESISTANCE

Black with orange identification stripes or orange piping systems based on polyethylene resistant to crack PE100 RC (MRS 10), intended for the supply gaseous fuels, fulfilling the requirements of the standards EN 1555 and ISO 4427 and the technical specification PAS 1075 (Type 1) for alternative installation techniques (open trench without sand bedding and no dig).

Supply of gaseous fuels

IDROTHERM 2000

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Characteristics according to PAS 1075*

Test	Method	Conditions	Raw material	Pipe
Notch Pipe Test	ISO 13479	80 °C – 9,2 bar (SDR 11)	>8.760 hours	
Point Loading Test	——	80 °C – sol. 2% Arkopal N-100 4 N/mm^2	>8.760 hours	>8.760 hours
Full Notch Creep Test (FNCT)	ISO 16770	80 °C – sol. 2% Arkopal N-100 4 N/mm^2	>8.760 hours	>3.300 hours

* Verified by an organism accredited according to IEC EN 45011

Maximum operative pressure

The maximum operative pressure (MOP) for a pipeline based on RENOVATION GAS VRC - RENOVATION VRC ORANGE should be selected on the basis of the gas supply system operating requirements provided that it does not exceed 10 bar and the following conditions are satisfied:

a) verification of the overall service coefficient C to be calculated using the equation below and which shall be greater than or equal to 2

$$C = \frac{20 \times MRS}{MOP \times (SDR - 1) \times D_F}$$

D_F is the derating factor which takes into account the influence of the operating temperature according to the following table:

Temperature	D_F
20 °C	1.0
30 °C	1.1
40 °C	1.3

b) verification of the RCP criterion, considering that the ratio of critical rapid crack propagation pressure P_{RCP} to MOP shall be greater than or equal to 1.5 (the critical rapid crack propagation pressure P_{RCP} for RENOVATION GAS VRC - RENOVATION VRC ORANGE is greater than 10 bar at 0 °C).

Design considerations

Gas supply systems are designed to provide a safe and continuous supply of gas, therefore the design of the pipeline must include both technical aspects and procedures with environmental and safety aspects.
The design of a piping network based on RENOVATION GAS VRC - RENOVATION VRC ORANGE should include but not be limited to basic data for the gas supply system to be installed, such as the family of the gas, the anticipated gas flow, the design pressure which is required to be maintained within values that permit correct functioning of pressure regulators and specific user appliances, the layout of the existing gas supply system, the gas velocity in the pipes which should be sufficiently low to limit excessive movement of any impurity and the dynamic variations in gas flow due to special industrial applications.

Installation

Care shall be taken to prevent damage of a piping system based on RENOVATION GAS VRC - RENOVATION VRC ORANGE during the whole process of installation. Changes of direction of a pipeline shall be achieved by means of preformed bends or elbow fittings or by the natural flexibility of the pipe (natural flexing can be used for bend radii greater than or equal to 25 x DN).
Pipes shall not be overstressed by tensile forces during laying. According to EN 12007-2, if the RENOVATION GAS VRC - RENOVATION VRC ORANGE pipes are laid by drag care shall be taken that the force is not greater than the values (in Newton) given by the following formula:

$$F < \frac{14 \times \pi \times DN^2}{3 \times SDR}$$

Material around the pipes shall be compacted so as to avoid excessive pipe ovality and shall be done layer by layer. Backfill materials around the pipe shall be selected to prevent damage to the pipe from contact with sharp edges during and after compaction.

Jointing

A piping system based on RENOVATION GAS VRC - RENOVATION VRC ORANGE can be jointed through butt-fusion welding or electrofusion. The choice of the most adequate jointing technique can affect the reliability and the long term behavior of the pipe network. The range of pipe diameters intended to be assembled with different methods is summarized in the following table.

Jointing method	Range of DN
Butt-fusion	DN≥63 mm
Electrofusion	DN≥20 mm

Mechanical joints shall be used for jointing RENOVATION GAS VRC - RENOVATION VRC ORANGE to other materials such as cast iron or steel often referred to as transition fittings.

Bending

Pipe bars can be bended according to a minimum bending radius in order to avoid the excessive stress on the material. The bending radius R depends on the installation temperature for both SDR 11 and 17,6 according to the following table.

20 °C	10 °C	0 °C
R = 20 x DN	R = 35 x DN	R = 50 x DN

Pressure testing

The pipeline operators shall be responsible for ensuring a suitable pressure testing prior to commissioning. Procedures to prove the integrity of mains and service lines shall be selected from EN 12327 with levels of test pressure appropriate to the pipe size, volume under test and maximum operative pressure.
The strength test and the tightness test can be performed as a combined test with combined test pressure equal to strength test pressure. Considerations shall be given to the need for any special precautions to be taken for protection if air or inert gas is used as the test medium. Records of pressure tests shall be kept detailing the date and the results.
The test pressures selected for a pipeline shall be appropriate to its MOP and shall take into account the following guidance:

$$1{,}5 \times MOP \leq STP \leq \frac{20 \times MRS}{SDR - 1}$$

$$MIP < STP \leq 0.9P_{RCP}$$

(MIP = maximum incidental pressure = maximum pressure which a system can experience during a short time limited by the safety devices and STP = strength test pressure).

The designer of a piping system shall consider and carefully evaluate the implications of the parameters of each specific project with technical or law regulations.

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	SDR 17,6		SDR 17		SDR 11	
DN (mm)	e_n (mm)	DI (mm)	e (mm)	DI (mm)	e (mm)	DI (mm)
20	2.3•	15.4	2.3•	15.4	3.0•	14.0
25	2.3•	20.4	2.3•	20.4	3.0•	19.0
32	2.3•	27.4	2.3•	27.4	3.0	26.0
40	2.3	35.4	2.4	35.2	3.7	32.6
50	2.9	44.2	3.0	44.0	4.6	40.8
63	3.6	55.8	3.8	55.4	5.8	51.4
75	4.3	66.4	4.5	66.0	6.8	61.4
90	5.2	79.6	5.4	79.2	8.2	73.6
110	6.3	97.4	6.6	96.8	10.0	90.0
125	7.1	110.8	7.4	110.2	11.4	102.2
140	8.0	124.0	8.3	123.4	12.7	114.6
160	9.1	141.8	9.5	141.0	14.6	130.8
180	10.3	159.4	10.7	158.6	16.4	147.2
200	11.4	177.2	11.9	176.2	18.2	163.6
225	12.8	199.4	13.4	198.2	20.5	184.0
250	14.2	221.6	14.8	220.4	22.7	204.6
280	15.9	248.2	16.6	246.8	25.4	229.2
315	17.9	279.2	18.7	277.6	28.6	257.8
355	20.2	314.6	21.1	312.8	32.2	290.6
400	22.8	354.4	23.7	352.6	36.3	327.4
450	25.6	398.8	26.7	396.6	40.9	368.2
500	28.4	443.2	29.7	440.6	45.4	409.2
560	31.9	496.2	33.2	493.6	50.8	458.4
630	35.8	558.4	37.4	555.2	57.2	515.6

• The calculated values of e_n have been rounded up to 2.3 for SDR 17.6 and SDR 17 and 3.0 for SDR 11

DN = nominal outside diameter e_n = nominal wall thickness DI = internal diameter

kiwa UNI IT-DT-Ki0410 IIP UNI RINA DIN plus PAS 1075

The range of certified products can be checked on www.idrotherm2000.com and on the websites of the certification bodies

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