

DIN EN 253:2015-12 (E)

District heating pipes - Preinsulated bonded pipe systems for directly buried hot water networks - Pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene (includes Amendment A2:2015)

Contents

	Page
European foreword	5
Introduction	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Requirements	10
4.1 General	10
4.2 Steel service pipe	11
4.2.1 Specification	11
4.2.2 Diameter	11
4.2.3 Wall thickness	12
4.2.4 Surface condition	13
4.3 Casing	14
4.3.1 Material properties	14
4.3.2 Casing properties	14
4.4 Polyurethane rigid foam insulation (PUR)	16
4.4.1 Composition	16
4.4.2 Cell structure	16
4.4.3 Compressive strength	16
4.4.4 Foam density	16
4.4.5 Water absorption at elevated temperature	16
4.5 Pipe assembly	17
4.5.1 General	17
4.5.2 Pipe ends	17
4.5.3 Diameter and wall thickness of the casing	17
4.5.4 Centre line deviation	18
4.5.5 Expected thermal life and long term temperature resistance	18
4.5.6 Thermal conductivity in unaged condition	18
4.5.7 Thermal conductivity at artificially aged condition	19
4.5.8 Impact resistance	19
4.5.9 Long term creep resistance and modulus	19
4.5.10 Surface conditions at delivery	19
4.5.11 Measuring wires for surveillance systems	19
5 Test methods	19
5.1 General conditions and test specimens	19
5.1.1 General conditions	19
5.1.2 Test specimens	19
5.2 Casing	20
5.2.1 Appearance and surface finish	20
5.2.2 Elongation at break	20
5.2.3 Carbon black dispersion, homogeneity	21
5.2.4 Stress crack resistance test	21
5.3 Polyurethane rigid foam insulation (PUR)	22

5.3.1	Composition	22
5.3.2	Cell structure	22
5.3.3	Compressive strength	22
5.3.4	5.3.4 Foam density	23
5.3.5	5.3.5 Water absorption	23
5.4	Pipe assembly	23
5.4.1	Axial shear strength	23
5.4.2	Tangential shear strength	25
5.4.3	Shear strength of the pipe assembly after ageing	27
5.4.4	Thermal conductivity in unaged condition	27
5.4.5	Thermal conductivity at artificially aged condition	27
5.4.6	Impact resistance	27
5.4.7	Long term creep resistance and modulus at 140 °C	27
6	Marking	30
6.1	General	30
6.2	Steel service pipe	30
6.3	Casing	30
6.4	Pipe assembly	31
Annex A (informative) Relation between actual continuous operating conditions and accelerated ageing test conditions		32
Annex B (informative) Calculation of the minimum expected thermal life with operation at various temperatures with respect to PUR foam performance		34
Annex C (normative) !Calculated Continuous Operating Temperature (CCOT)"		35
C.1	General	35
C.2	Principle	35
C.3	Symbols	35
C.4	Ageing and shear strength determinations	36
C.5	Calculations	36
C.5.1	Determination of the thermal life at different ageing temperatures	36
C.5.2	Adoption to the Arrhenius relation	36
C.5.3	Calculated continuous operating temperature, CCOT	37
Annex D (informative) Guidelines for inspection and testing		38
D.1	General	38
D.2	Manufacturer's type test	38
D.3	Manufacturer's quality control	38
D.4	External inspection	38
D.5	Manufacturer's responsibility	38
Annex E (informative) Radial creep behaviour of the polyurethane foam (PUR)		42
Annex F (normative) Thermal conductivity of pre-insulated pipes - Test procedure		43
F.1	Scope	43
F.2	Requirements (EN ISO 8497:1996, Clause 5)	43
F.2.1	Test specimen (EN ISO 8497:1996, 5.1)	43
F.2.2	Operating temperature (EN ISO 8497:1996, 5.2)	43
F.2.3	Types of apparatus (EN ISO 8497:1996, 5.5)	43
F.3	Apparatus (EN ISO 8497:1996, Clause 7)	43
F.3.1	Guarded end apparatus	43
F.3.2	Calibrated end apparatus	43
F.3.3	Dimensions (EN ISO 8497:1996, 7.2)	44
F.3.4	Heater pipe surface temperature	44
F.4	Test specimens (EN ISO 8497:1996, Clause 8)	44
F.4.1	Conditioning (EN ISO 8497:1996, 8.4)	44
F.4.2	Dimension measurement (EN ISO 8497:1996, 8.5)	44

F.4.3	Surface temperature measurement	44
F.4.4	Location of temperature sensors (EN ISO 8497:1996, 8.6)	44
F.5	Procedure (EN ISO 8497:1996, Clause 9)	44
F.5.1	Test length (EN ISO 8497:1996, 9.1.1)	44
F.5.2	Diameter (EN ISO 8497:1996, 8.5)	44
F.5.3	Thickness of casing	44
F.5.4	Ambient requirements (EN ISO 8497:1996, 9.2)	45
F.5.5	Test pipe temperature (EN ISO 8497:1996, 9.3)	45
F.5.6	Power supply (EN ISO 8497:1996, 7.9)	45
F.5.7	#Axial heat loss\$	45
F.5.8	Test period and stability (EN ISO 8497:1996, 9.5.3)	45
F.6	Calculations (EN ISO 8497:1996, Clause 11)	45
F.6.1	Thermal conductivity (EN ISO 8497:1996, 3.5)	45
F.7	Symbols and units (EN ISO 8497:1996 Clause 4)	46
Annex G (informative) National A-deviations		48
G.1	Swedish national legislative deviations on steel service pipes	48
Annex I (informative) Waste treatment and recycling		52
Bibliography		53