DANISH TECHNOLOGICAL INSTITUTE

TEST REPORT

Product:
Pre insulated district heating pipe

Carried out for:
Brugg Rohrsystem AG
Industriestrasse 39
CH-5314 Kleindöttingen

in a test project ordered by

Danish District Heating Association
Merkurvej 7
DK-6000 Kolding

Date:
January 12, 2010

Contact person:
Niels Winther

Order No.:
-

Testing was carried out in accordance with:
EN 15632-1:2009 (average temperature calculations)
EN 253:2009 (max lambda)

TEST Reg. No. 300

DANISH TECHNOLOGICAL INSTITUTE

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Test report

Date: January 12, 2009
Order No.: -
Initials: nhwn

Requested by:

Brugg Rohrsystem AG
Industriestrasse 39
CH-5314 Kleindöttingen

Danish District Heating Association
Merkurvej 7
DK-6000 Kolding

On the conditions stated overleaf testing was performed of the following product(s):
Flexible pre insulated district heating pipe, Calpex 2×20/111. The pipe ends were sealed and the pipe was aged at 13 weeks at 70 °C before testing according to the project under Danish District Heating Association "F&U 2007-02".

in compliance with the test specifications:
EN 15632-1:2009 Pre-insulated flexible pipe systems – Part 1: Classification, general requirements and test methods
EN 253:2009 District heating pipes – Pre-insulated bonded pipe systems for directly buried hot water networks

with the following results:
Thermal conductivity λ_{50}: 26.2 mW/(m K)

The result is calculated from a regression line based on 3 tests each calculated by an FEM simulation and the according average temperatures calculated by the formula given in EN 15632-1:2009 (A.2).

Conditions: Testing was carried out on the conditions stated overleaf in compliance with the guidelines laid down for the Laboratory by DANAK (Danish Laboratory Accreditation Scheme) and in compliance with the Danish Technological Institute's General Terms and Conditions regarding Commissioned Work Accepted by the Danish Technological Institute, August 1999.

The test results apply to the tested products only.

This test report may be reproduced in extract only if the report is officially available or if the Laboratory has approved the extract in writing.

Division/centre: Energy and Climate
Installation and Calibration

Signature: Niels Winther
M.Sc.

DANAK (Danish Accreditation)

DANAK was established in 1991 in pursuance of the Danish Act No. 394 of 13 June 1990 on the promotion of Trade and Industry.

The requirements to be met by accredited laboratories are laid down in the Danish Agency for Trade and Industry (Erhvervsfremme Styrelsens) Statutory Order on accreditation of laboratories to perform testing etc. and GLP inspection. The Statutory Order refers to other documents in which the criteria for accreditation are specified further.

The standards DS/EN ISO/IEC 17025 "General requirements concerning the competence of testing and calibration laboratories" and DS/EN 45002 "General criteria for the assessment of testing laboratories" describe fundamental criteria for accreditation. DANAK uses guidance documents to clarify the requirements in the standards, where this is considered to be necessary. They will mainly be drawn up by the "European co-operation for Accreditation (EA)" or the "International Laboratory Accreditation Co-operation (ILAC)" with a view to obtaining uniform criteria for accreditation worldwide. In addition, DANAK draws up Technical Regulations concerning specific demands on accreditation that are not included in the standards.

In order to obtain accreditation it is i.a. required:

- that the laboratory and its personnel are not subject to any commercial, financial or other types of pressure which might influence their technical judgement,

- that the laboratory operates a documented quality control system,

- that the laboratory has technical equipment, facilities and premises of a certain standard at its disposal in order to carry out the service it is accredited to perform,

- that the laboratory management and personnel have technical competence and practical experience in the performance of the service the laboratory is accredited to perform,

- that the laboratory has established guidelines for traceability and uncertainty calculations,

- that accredited testing or calibration is performed in accordance with fully validated and documented methods,

- that the laboratory keeps records which contain sufficient information to permit the repetition of the accredited test or calibration,

- that the laboratory is subject to supervision carried out by DANAK on a regular basis,

- that the laboratory shall take out an insurance, which covers liability in connection with the performance of accredited services.

Reports carrying DANAK's logo are used when reporting accredited services and show that they have been performed in accordance with the rules concerning accreditation.

Unofficial translation for

DANAK, Technical guidelines
No. RL 4 of 20 June 2001
q:\kvalitet & akkreditering\danak-engelsk.doc

Requested by:	Brugg Rohrsystem AG	**Place of sampling/ inspection:**	DTI		
Contact person:	Stefan Lickel	**Samples taken/ inspected by:**	DTI		
Tel.:	+41 (0)56 268 78 30	**Date of sampling/ inspection:**	15/9-3/10 2009		
Fax:	+41 (0)56 268 78 15	**Date of simulation:**	November 2009		
Product:	Flexible pre insulated district heating twin pipe	**Date of reply:**	December 2009		
Place of testing:	DTI	**E-mail:**	lickel.stefan@brugg.com		
Certification body:		**Single pipe test**		**Audit test :**	
Certification No.:	200-T-20115	**Twin pipe test**	X	**Instructive testing:**	
Marking of samples:		**Type test:**		**Retesting:**	
Specific marking appears from the enclosed appendices		**Project test**	X		

Test outline: **In accordance with:**	**Place of testing**	**Appen-dix**	**Requirements met**		**Accredited**		**Subcontractor Accreditation No.**
			Yes	**No**	**Yes**	**No**	
EN 15632-1:2009	DTI	-	-	-	X	-	300
EN 253:2009	DTI	-	X	-	X	-	300