



SINTEF Building and Infrastructure

Oslo
 Forskningsveien 3b, 0373 Oslo
 P.O.Box 124 Blindern, 0314 Oslo
 Telephone: 22 96 55 55
 Telefax: 22 69 94 38

Trondheim
 Høgskoleingen 7b
 7465 Trondheim
 Telephone: 73 59 33 80
 Telefax: 73 59 33 80

E-mail: byggforsk@sintef.no
 Internet: www.sintef.no/byggforsk
 Enterprise No: NO 948 007 029 MVA

Client LK Systems AB
Client's address Box 9113 SE-200 39 Malmö
Client's contact-person Mats Åström

Project/archive no. 3B0409.32	Date 2012.6.5	Rev. date	No. of pages 7	Appendixes 1	Classification Restricted	Author(s) Bjørn-Roar Krog
Project leader Bjørn-Roar Krog	Sign. BRK	Responsible manager Lars-Erik Fiskum	Sign. LF	Quality assurance Lars-Erik Fiskum	Sign. LF	

Assignment Report

Testing of LK Universal outer protection tube, dimension 20/25 mm. SINTEF Test method no. 1.

Sanitary laboratory

The test results are valid exclusively for the tested objects.

Summary		
SINTEF Building and Infrastructure has on behalf of LK Systems AB carried out testing of LK Universal outer protection tube with dimension 20/25 mm.		
The tests have been carried out in accordance with SINTEF Test Method no. 1:2010 "Outer protection tube for pipe in tube systems"; 4 th edition dated November 9 th 2011.		
Result: Passed		
Address of the building		Built (year)
Method SINTEF Test Method no. 1	Keywords Outer protection tube	Filename 3B040932 LK SINTEF Test no.1

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Test Report

Report ID.	Norner project no	Date	Classification
PD12162	2213055/82706	05.06.2012	Confidential

Customer / Contact/ Reference
Sintef Byggforsk, Oslo / Bjørn-Roar Krog

Title
LK Systems TA 20/25 Grey

Author(s)	Approved by	Norner Customer responsible
Lene Sparre Thunes	Heidi N. Bryntesen	Lene Sparre Thunes

Background
Testing of protection pipe according to SINTEF test method : "Outer protection tube for pipe in tube systems", Test method 01-2010, Date 9th November 2011 – 4th edition
Received date: 18.04.2012
Pipe producer: LK Systems AB
Dimension: 20/25mm
Color: Grey

Conclusions/ Comments/Proposals
Pipe is approved according to requirements in chapter 6.4, 6.5, 6.6 and 6.7 in SINTEF Test method no. 01-2010.

Attachments

1. Samples and Information

Received date: 18.04.2012
 Pipe producer: LK Systems AB
 Dimension: 20/25mm
 Color: Grey

2. Experiment description and results of macroscopic investigation

Method: Macroscopic investigation of the outside surface of the tube is performed by stereo microscopy.
 Requirements: According to test method, chapter 6.4

Results are shown in table 2.1 below

Table 2.1 - Macroscopic investigation results

Surface characteristics	Figure	Method	Results (OK/NOK)
Parting line from tool	NA*	Stereo microscopy	OK
Parting line longitudinal displacement	NA		OK
Corrugated design	NA		OK

NA – not applicable

3. Experiment description and results of microscopic investigation

Method: Microscopic investigation on a cross section of the tube is performed by light microscopy.
 Requirements: According to test method, chapter 6.5

Results are shown in table 3.1 below.

Table 3.1 - Microscopic investigation results

Surface characteristics	Figure	Method	Results (OK/NOK)
Wall thickness distribution, top/bottom curve	NA	Light microscopy	OK
Wall thickness distribution, centring			OK
Curve radius	NA		OK
Smoothness	NA		OK
Distribution of pigments / additives	NA		OK
Dispersion of pigments / additives	NA		OK
Crystal morphology	NA		OK
Plasticisation	NA		OK

4. UV resistance

Method: UV resistance is tested according to NS-EN ISO 4892-2

Requirements: According to test method, chapter 6.6

Results are shown in table 4.1 below.

Table 4.1 – UV resistance results

Test characteristics	Elongation (%)	Decrease (%)	Results (OK/NOK)
Elongation before exposure	120	26	OK
Elongation after exposure	89		

5. Environmental stress crack resistance

Method: Environmental stress crack test is based on ASTM D 1693

Requirements: According to test method, chapter 6.7

Results are shown in table 5.1 below.

Table 5.1 – ESCR results

Test characteristics	Result (hours)	Result (OK/NOK)
Bell test	> 500 hours	OK