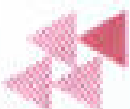




DIVISION OF
BUILDING
TECHNOLOGY

CSIR



Building
Technology

CSIR

Report on the fire properties of Micon “Flamsayf” cable penetration sealing system.





Building Products & Services Programme

Report on the fire properties of Micon “Flamsayf” cable penetration sealing system.

Contract No:

BF 501/040 5600 5664

July 1997

Division of Building Technology, CSIR
PO Box 395 Pretoria 0001
Republic of South Africa

Telephone: (012) 841-3871

Telefax: (012) 841-4680

REPORT ON THE PROPERTIES OF MICON “FLAMSAYF” CABLE PENETRATION SEALING SYSTEM

1. SPONSOR

Micon Coatings cc
P O Box 307
LONEHILL
2062

2. USE OF THIS REPORT

The use of this report is subject to the attached *General Contract Conditions* which forms an integral part of this report.

3. PURPOSE OF THE INVESTIGATION

The purpose of the investigation was to determine the Fire Resistance Rating (FRR) of a cable penetration seal system consisting of two 50 mm layers of mineral wool (density of 160 kg/m³) coated with “Flamsayf 325” (1.6 mm dry thickness) on both the exposed and unexposed sides.

Furthermore, a surface fire index was obtained for the material by performing a SABS 0177 Part III test on it.

4. TEST PROCEDURE

The test specimen was built into a horizontal furnace with internal dimensions of about 2.0 m x 2.0 m x 1.3 m as is shown in Figures 2 and 3. The furnace was fired by two diesel fuelled compressed air aspirated burners, adjusted so that the average temperature within the furnace followed the Standard Time-Temperature Curve. The temperature on the outside of the seal was measured at four different positions as shown in Figure 4. These positions are referred to on the graph (Figure 1). The thermocouples at the double and single cables were positioned approximately halfway through the seal. The installation was subjected to these conditions for a period 2 hours.

For the SABS 0177 Part III test, “Flamsayf 325” was applied to a fibre cement board to a dry thickness of approximately 1.6mm. the sample was tested according to the prescribed test procedure in order to ascertain its flame spread, heat contribution and smoke evolution properties. Based on these a surface fire index was calculated and a classification awarded.

5. RESULTS AND DISCUSSION

The temperatures recorded during the test are depicted graphically in Figure 1. Figures 5 and 6 shows the diesel burners in operation while Figure 7 shows the outside of the seal prior to completion of the 2 hours.

The graph shows that the temperature on the outer surface of the seal was approximately 100 °C throughout the second hour of the test but that the temperature halfway through the seal (i.e. between the two mineral wool layers) top went up to about 400 °C, rapidly rising during the last 40 minutes. This, however, had no impact on the integrity of the fire seal. The failing criterion is that the temperature on the outer surface of the seal should not exceed 140 °C plus the ambient temperature (i.e. ± 160 °C). This sealing system therefore passed this aspect.

The temperatures measured in the two sets of cables bundle (also measure in the middle of the seal) exceeded 200 ° C at about 40minutes. These temperatures are considered to determine the heat transfer effect of the cables through the seal. The integrity of the seal at those particular points was not affected by the heat flow.

Another aspect to be considered is the smoke sealing characteristics of the system. The test criteria states that no smoke leakage through the seal is allowed. No leakage was observed during this test and therefore this specification is met.

The results of the SABS 0177 Part III test are as follows:

- Spread of Flame Index : 0
- Heat Contributed Index : 0
- Smoke Emitted Index : 0.95

Therefore the Surface Fire Index of the material is $0.95/3 = 0.32$.

The table with the maximum allowable values of the various indices for the different classifications are given below:

Class	Spread of Flame Index	Heat Contributed Index	Smoke Emission Index	Surface Fire Index
1	0.1	0.1	0.2	0.1
2	0.7	0.8	1.0	0.6
3	1.5	1.7	2.0	1.2
4	3.5	3.8	4.0	2.9
5	5.5	5.8	6.0	4.5

From the table it can therefore be seen that “Flamsayf 325” is classified as a Class 2 material.

6. CONCLUSION

The cable penetration seal constructed with two layers of 50 mm thick mineral wool (density of 160 kg/m³) coated on both sides with “Flamsayf 325” (1.6mm dry thickness) will have a Fire Resistance Rating (FRR) of at least 2 hours.

When a sample with a dry thickness of 1.6 mm is considered, “Flamsayf 325” is classified as a Class 2 material and can be used in appropriate applications.



K van Dyk
FIRE AND EXPLOSIONS GROUP
on behalf of the Division of Building Technology - CSIR

Figure 1 : Temperatures Recorded

Flamsayf cable seal system - 95:12:07

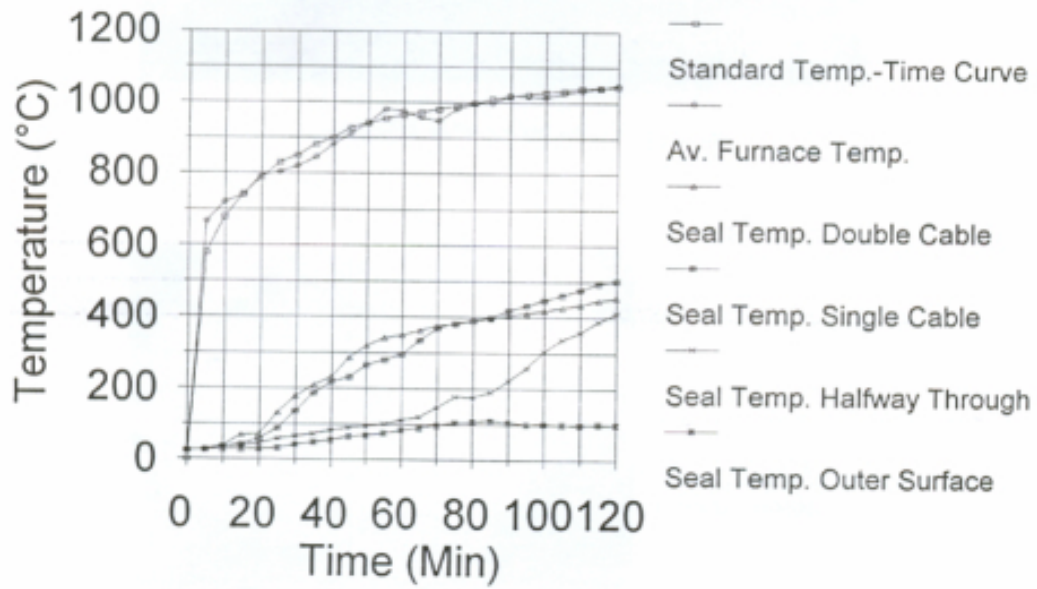


Figure 2: Installation prior to test as seen from outside



Figure 3: Installation prior to test as seen from the inside



Figure 4: Thermocouple positioning



Figure 5: Diesel burner on lefthand side in operation



Figure 6: Diesel burner on righthand side in operation



Figure 7: Outer surface of seal just prior to completion of test



GENERAL CONTRACT CONDITIONS

- 1. PURPOSE**

The purpose of the investigation must be fully disclosed to the CSIR. The client will use the results of the investigation only for the purpose disclosed to the CSIR, unless otherwise agreed.
- 2. RISK RELATING TO MATERIALS, APPARTUS, OR EQUIPMENT**

Materials, apparatus or equipment delivered by or on behalf of the client to the CSIR pursuant to the contract, shall be accepted, retained and used at the owner's risk.
- 3. PUBLICATION OF REPORTS**
 - (a) The contents of any interim reports issued are confidential and may not be published by the CSIR or the client, and the results of any discussions with CSIR personnel relating to this investigation may not be communicated to the press or technical journals or be given publicity in any other manner until the final report has been issued.
 - (b) The final report will be the property of the client and may be published by him provided that:
 - (i) the CSIR be acknowledged in the publication;
 - (ii) it is published in full, or where only extracts or a summary of an abridgment are published, the CSIR's written approval of the extracts, summary or abridged report be obtained prior to publication; and
 - (iii) the CSIR be indemnified against any claim for damages which may result from publication.
- 4. CONFIDENTIALITY**

The CSIR will not publish any results without the client's consent. The CSIR is, however, entitled to use technical information obtained from the investigation, but undertakes in doing so not to identify the sponsor or the subject of this investigation.
- 5. ADVERTISING**

No reference may be made to CSIR or any of its strategic units or employees in advertisements or for sale or publicity purposes without the CSIR's prior written consent.
- 6. OWNERSHIP OF INTELLECTUAL PROPERTY**

In terms of Act No. 46 of 1988 all intellectual property developed by CSIR during the course of the investigation vests in the CSIR unless otherwise agreed in writing.
- 7. DOMICILIUM CITANDI ET EXECUTANDI**

The parties hereto respectively choose as their *domiciliuim citandi et exectutandi* for all purposes of, and in connection with, this contract, the addresses stated in the letter of proposal.
- 8. WAIVER**

Failure of either party hereto at any time to demand performance of any provision of the contract shall not affect that party's rights to require full performance thereof at any time thereafter and a waiver by either party of a breach by the other of any such provision shall not be taken to a waiver of any subsequent or similar breach, or as nullifying by the effectiveness of such provision.
- 9. NOTICES**

Any notice to be given hereunder shall be given in writing and may be given either personally or may be sent by post or telex or telefax and addressed to the relevant party at its *domicilium* or to such other address as shall be notified in writing by any of the parties to the other. Any notice given by post shall be deemed to have been served on the expiry of 7 (seven) working days after the same is posted by registered post by (land or airmail). Any notice delivered personally or sent by telex or telefax shall be deemed to have been served at the time of delivery or sending.

Any notice to be given shall be given to the client at his principal place of business and to the CSIR, Scientia (BOUTEK) at Meiring Naude Road, Pretoria.
- 10. AMENDMENTS**

No amendment to this contract or the proposal shall be of any force or effect unless reduced to writing and signed by both parties.
- 11. VALUE ADDED TAX**

It is hereby expressly recorded that any Value Added Tax (VAR) payable in respect of the services rendered in terms of this contract shall be for the account of the client and shall be included in the final payment payable in terms of this contract.

12. LIMITATION OF LIABILITY

While every care is taken to ensure the accuracy of any work performed by the CSIR under this contract, the CSIR does not warrant the merchantability or commercial viability of the research results. Neither the CSIR nor its employees shall be liable in any way whatsoever to the client or to any other person whatsoever for any negligence, error or omission in carrying out the work or for any erroneous statement, whether in fact or opinion, contained in any report issued pursuant to the work performed.

13. GOVERNING LAW AND JURISDICTION

13.1 The contract between the parties shall be governed by and interpreted in all respects in accordance with the laws of the Republic of South Africa. The parties hereby consent to the jurisdiction of any competent Magistrate's Court for the adjudication of any claim based on this contract.

13.2 Notwithstanding the provision of 13.1, in the event of the parties failing to reach agreement in regard to the interpretation of, or the carrying into effect of, or any of the parties' rights and obligation arising from, or the termination of or arising from the termination of, or the rectification of, this agreement within 14 (fourteen) days of the dispute arising, then either party may, by notice in writing to the party, refer the dispute for determination by arbitration in South Africa under the provision of the Arbitration Act, Act No. 42 of 1965, as amended.

The arbitrator shall be, if the matter in dispute is principally

- a legal matter, a practising attorney of not less than 15 (fifteen) years standing or a practising advocate of not less than 10 (ten) year standing;
- an accounting matter, a practising chartered accountant of not less than 10 (ten) year standing;
- any other matter, any independent person agreed to between parties.

Should the parties fail to agree on an arbitrator within 14 (fourteen) days after the arbitration has been demanded then the arbitrator shall be nominated by the (current) serving President of the Law Society of the Transvaal.

14. PAYMENT OF ACCOUNT

All amounts due in terms of this contact shall be payable on the due date indicated in the proposal or within 30 (thirty) days of the date of issue of an invoice where that is required. Any amount not paid on the due date shall bear interest at a rate of 2% (two per cent) above the prime overdraft rate charged by Volkskas Bank Limited to its preferred corporate clients, calculated and compounded daily as from the due date until date of payment.

15. VALIDITY

All proposals are valid for 30 (thirty) days from date of issue, unless otherwise indicated, and unless accepted within that period, will lapse automatically.

16. TERMINATION

This contract may be terminated forthwith by either party in the event of the other being liquidated or being placed under judicial management.

In the event of any party to this contract being in breach of any of the terms of the contract, the other may by written notice require the party which is in breach to remedy the breach, and if it has not been done so within 7 (seven) days of receipt of such notice, or if the breach is incapable of being remedied, the other party may, in writing, terminate the contract without prejudice to its right to claim damages.