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REPORT ON THE FIRE RESISTANCE OF A 500mm x 700mm INTUSAYF CABLE PENETRAION SEALING SYSTEM





Building Products & Services Programme

**REPORT ON THE FIRE RESISTANCE OF A
500mm x 700mm INTUSAYF CABLE PENETRAION
SEALING SYSTEM**

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REPORT ON THE FIRE RESISTANCE OF A 500mm X 700 mm INTUSAYF CABLE PENETRATION SEALING SYSTEM

1. SPONSOR

Micon Coatings cc
350 Brighton Road
BRAMLEY VIEW

P O Box 307
LONEHILL
2062

2. USE OF THIS REPORT

The use of this report is subject to the attached *General Contract Conditions*.

3. PURPOSE OF THE INVESTIGATION

The purpose of this test was to evaluate the Fire Resistance Rating performance of a service penetration sealing system, used to prevent smoke, fire and heat from spreading between floors through service apertures, through which electrical cables secured to a steel cable tray pass.

4. SYSTEM DESCRIPTION

The cable penetration seal was installed in a 500mm x 700mm horizontal opening in movable concrete slabs, placed over a furnace. The seal was supported on two sides by 50mm x 25mm x 0.08mm galvanised angle iron, which was secured to the concrete aperture face with rawl bolts.

The seal consisted of two 50mm layers of Mineral Wool Board, (Density: 160Kg/m³) coated with **Micon Intusayf** to a dry film thickness of 250 micron on both sides of the exposed board. A mild galvanised steel cable tray with three, 20mm wire reinforced, PVC insulated, electrical cables penetrated the middle of the seal, the cables and tray mounted vertically passing through the seal. The cable tray was supported either side on the seal on angle iron. Both the cable tray and the cables were coated for a distance of 500mm, either side of the seal, with **Micon Intusayf** to a dry film thickness of 250 microns (Figure 3).

All surfaces coated with **Micon Intusayf** were sealed with a single coat, (approximately 75 microns) of **Micon Vinyl Top Coat**.

5. TEST PROCEDURE

The installation was tested simultaneously with some other types of penetration seals in the CSIR's large scale horizontal furnace. The system was tested in a horizontal configuration and was installed into a movable concrete slab with precast rectangular holes. The cable trays were supported either side of the seal, simulating the typical securing configuration of cables in a service duct. This would prevent the tray adding any load to the seal other than any torsional forces as which occur when steel is subjected to heating. It would also prevent the tray from falling through the seal and down the hole after softening of the steel below the slab as a result of heat exposure.

Although no pressure difference was measured across the slab, it can be assumed that the furnace was operated under neutral pressure, the flue gasses being taken out from the bottom of the furnace.

Four steel-sleeved K-type thermocouples were used to measure the temperature within the furnace environment. Their readings were used to ensure that the temperature inside the furnace was adjusted to follow the Standard Temperature-Time (ISO) Curve. The compliance with this temperature criterion is a requirement of the SABS 0177 Part 2 (1991) test procedure as well as the BS 476 Part 20 (1987) test protocol. This particular furnace configuration used four air-aspirated diesel burners as heat sources.

Three K-type thermocouples were fitted to the installation. One was fitted in the centre of the seal, adjacent to the cables, the second on the surface of the seal and the third 50mm up the cables above the seal. The thermocouple points were covered by insulative tape to minimise thermal loss from the air exposed side. This temperature was largely used as a guideline to determine whether the seal fulfilled the insulation requirements.

6. TEST CRITERIA

As with any fire resistance evaluation, there are three criteria that would need to be met. These are:

- No burn through to the unexposed side is allowed during the test period (integrity criterion)
- There should be no structural failure of the seal, which is not allowed to fall out of position within the test period (stability criterion)
- The temperature on the outer surface is not allowed to exceed 140 °C (plus ambient) during the exposure time (installation criterion). Ambient temperature on the day of the test was taken at 26 °C.

The installation was tested to determine whether it would fulfil the requirements of a 2 hour Fire Resistance Rating (FRR).

7. RESULTS

The temperatures recorded inside the furnace are shown in Figure 1. It can be seen that the furnace temperature followed the ISO curve within acceptable limits.

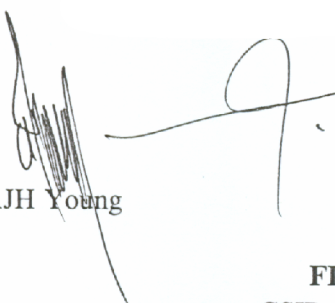
The temperatures recorded on the seal system are shown in Figure 2.

The seal installation remained stable throughout the 2 hour test period. No burn-through to the unexposed side occurred.

8. DISCUSSION AND CONCLUSION

There was no sign of burning through the penetration of the seal therefore the integrity criterion was met. The temperatures at a position of 50mm above the seal and on the unexposed surface were found to be well below the required values after 120 minutes, therefore insulation is not perceived to have been a problem. The cable tray and cables were both still in position after the test period with neither having collapsed or separated from their fixture, hence the stability criterion has been met.

The cable penetration seal of the size parameters tested therefore meets the requirements for a 2 hour FRR.



AJH Young



JS Strydom

FIRE ENGINEERING SCIENCES
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Figure 1 : Large scale FRR - 17:02:2000 - Furnace temperatures

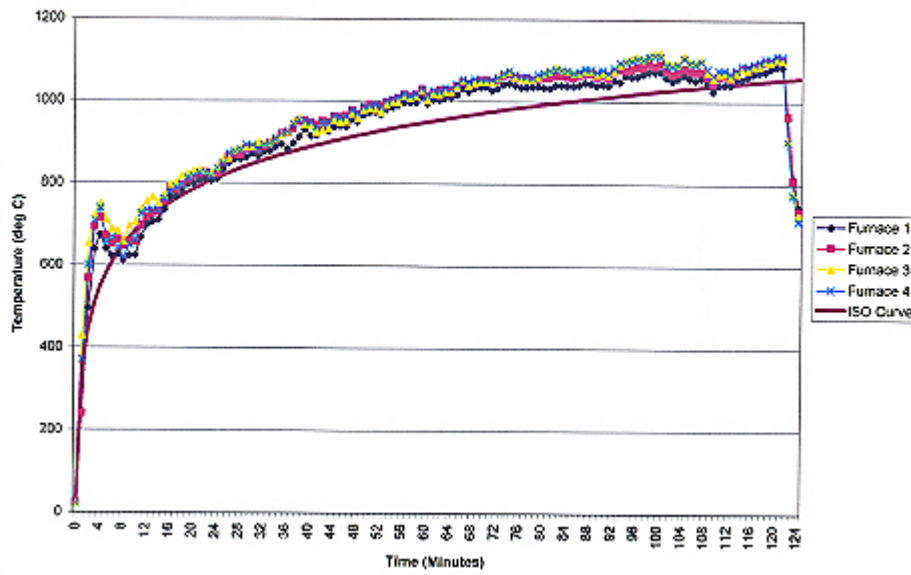


FIGURE 1:

Time / temperature curve of temperatures recorded in the furnace during the test.

Figure 2 : Large scale FRR - 17:02:2000 -
Temperatures recorded on 500mm x 700 mm seal

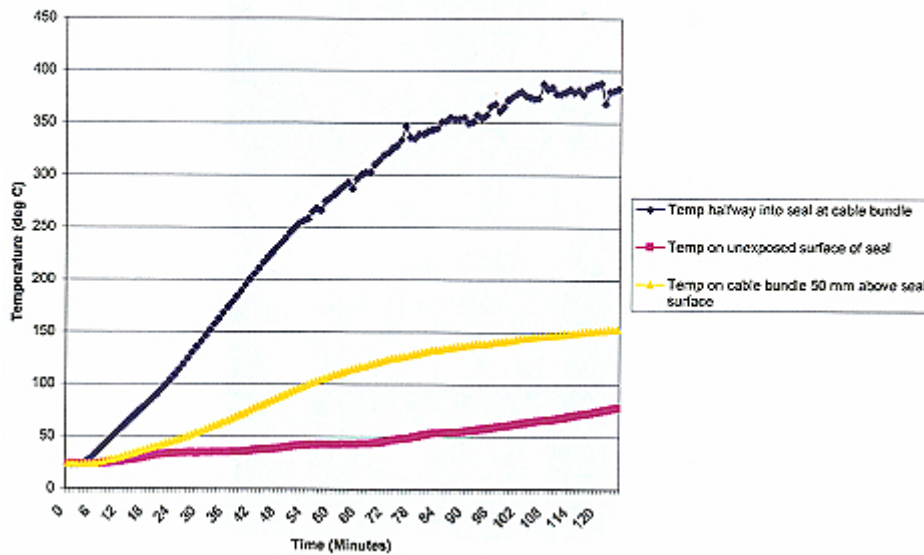


FIGURE 2:

Time / temperature curve of temperatures recorded on the seal during the test.

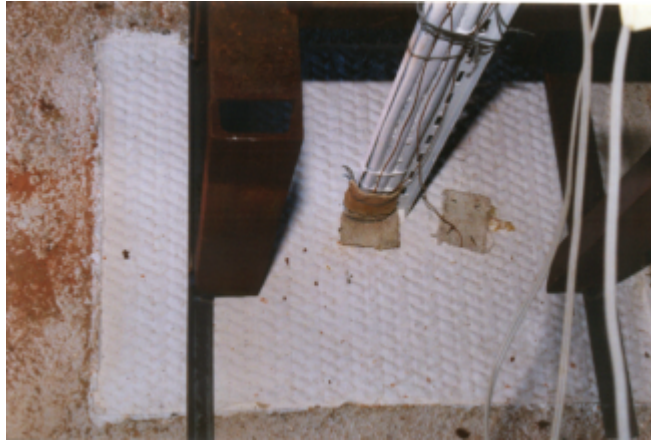


FIGURE 3:

Photograph of seal and cable penetration at commencement of test.



FIGURE 4:

Photograph of the seal and cable penetration at end 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, APPARATUS, 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 contract 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.