Fire Technology & Consulting Services
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TITLE	:	Report on the fire properties of PVC-Ling ceiling system as determined by the SANS 10177 Part 5 and10 test protocols
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1 Introduction

The purpose of this investigation was to assess the fire properties of PVC-Ling ceiling system. The combustibility of the material at 750 ℃ was evaluated in accordance with SANS 10177 Part 5 while the horizontal flame spread properties were determined in the inverted channel facility in accordance with the SANS 10177 Part 10 test protocol.

2 Description of system

The system evaluated during this investigation was a polyvinylchloride (PVC) ceiling system constructed from 250 mm wide fluted panels (approximately 7 mm thick) with tongue-and-groove jointing detail on the long edges. The material had a white appearance and an overall density of approximately 1.7 kg/m^3.

3 Test methods

3.1 SANS 10177 Part 5

For this evaluation, a number of 40 mm x 40 mm x 50 mm samples were prepared by stacking small portions of the material. Each sample is then placed on a sample holder and lowered into the standard SANS 10177 Part 5 electrically-heated furnace, which has been pre-set to have a furnace enclosure temperature of 750 ℃. The standard test duration is 10 minutes.

The test criteria for non-combustibility are that the specimen should neither increase the furnace enclosure temperature by more that 50 ºC nor support flaming for more than 5 seconds during the exposure period. Should either of these criteria not be met, the specimen will be regarded as combustible at 750 ℃.

3.2 SANS 10177 Part 10

The test specimen for this evaluation was prepared by screw fixing three joined panels to a timber brandering plank at intervals of 450 mm. The resultant ceiling was then installed in the inverted channel tunnel facility (Figure 3.2.1).

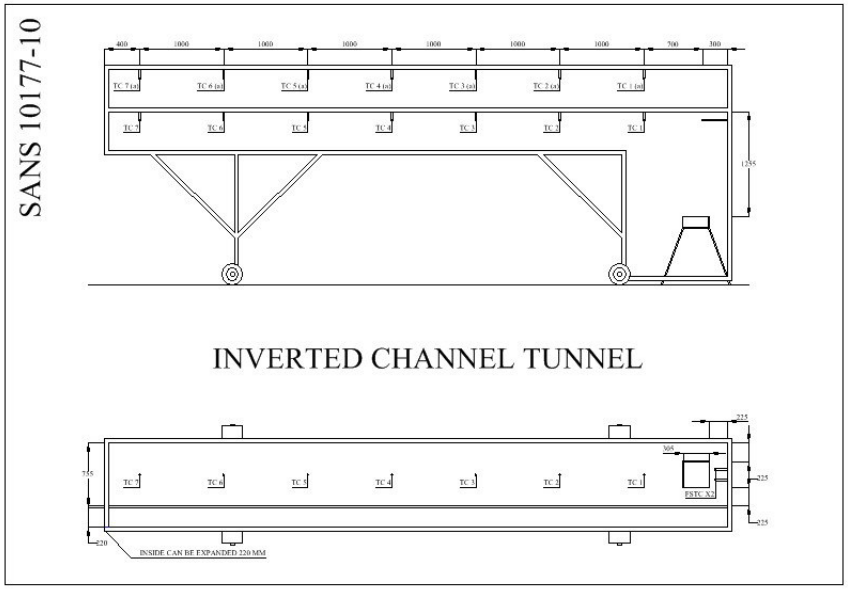

Figure 3.2.1: Diagram of SANS 10177 Part 10 inverted channel testing facility

Temperatures were measured during the investigation with thermocouples located at various positions along the length of the installation. The test installation was exposed to the thermal output of three litres of n-hexane, which was placed in the fire source tray. Temperatures were continuously recorded and observations were noted of the behaviour of the material. The installation prior to the ignition of the fire source is shown in Figure 3.2.2.

Figure 3.3.2: Test installation prior to ignition of fire source

4 Test results

4.1 SANS 10177 Part 5

The material increased the furnace temperature by approximately 60 ℃ with flaming combustion being supported for a period in excess of 30 seconds from the moment the material was introduced into the furnace. The material would therefore be regarded as combustible at 750 ℃.

4.2 SANS 10177 Part 10

At no stage during this evaluation was any ignition of ceiling installation observed. The material softened and systematically drooped and fell out of the hot zone without igniting. Figure 4.2.1 shows the installation after 5 minutes with the front portion of material having already drooped out of the hot zone.

Figure 4.2.1: Front portion of ceiling dropped out after 5 minutes

Figure 4.2.2 shows the installation subsequent to the completion of the test. Most of the installation had drooped out and softened but no ignition or flame propagation was observed at any time during the test.

Figure 4.2.2: Test specimen subsequent to completion of the test

The temperatures recorded in the furnace are depicted graphically in Figure 4.2.3. This plot confirms that no ignition had occurred as no secondary temperature peaks were noted at positions further along the length of the tunnel.

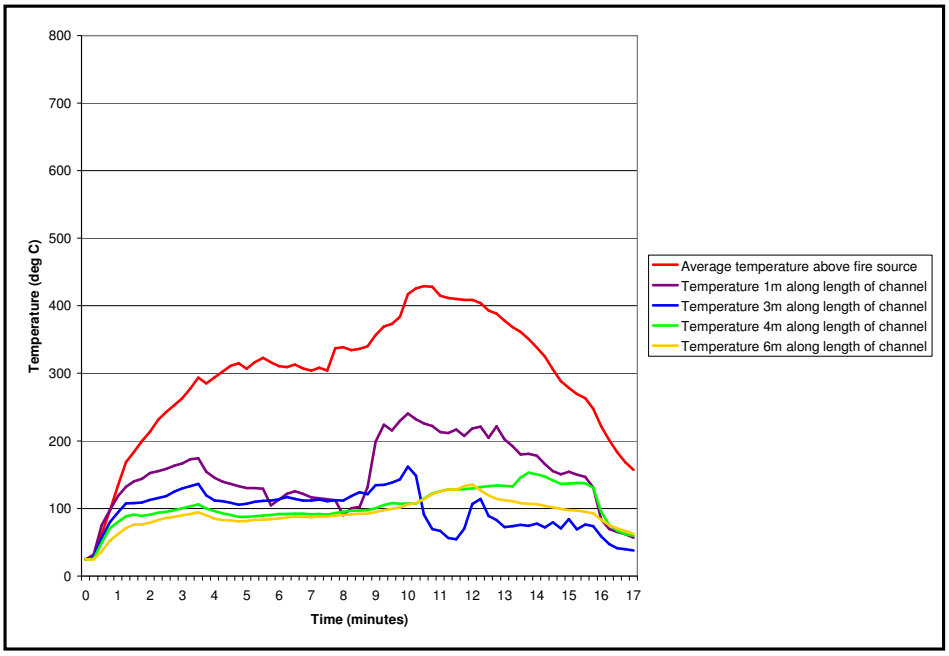

Figure 4.2.3: Temperatures recorded during the test on PVC-Ling ceiling system

5 Discussion of results

While the PVC-Ling ceiling material is classified as combustible based on the results of the SANS 10177 Part 5 test, the results from the SANS 10177 Part 10 test confirm that the material does not have a propensity to support flame spread. No ignition of the material and any resultant fire propagation were observed at any time during the test.

6 Conclusions

The PVC-Ling ceiling system as tested is suitable for use from a fire safety point of view in all applications except where a non-combustible ceiling system is required. The overall classification of B/B1/2 is applicable to this product in terms of the SANS 428 specification.

These tests evaluated the fire propagation properties of the system and not its fire resistance. Fire resistance requires that a system maintain integrity and stability during exposure to fire and the fact that the system softens and fall out would compromise its fire resistance. In instances where a fire resistant ceiling installation is required (eg. a 30-minute fire resistant ceiling), this system would therefore not be suitable.