



EMERGENCY SERVICES COLLEGE

TEST REPORT 27 Nov 2001

MOLOK DEEP COLLECTION CONTAINER: FIRE TEST

Date 12 Nov 2001

Location Emergency Services College training ground.

OBJECTIVE

The objective was to establish whether waste paper and regular community waste held in a deep collection container catch fire and whether any fire is sustained.

METHODS

A burning cigarette and a propane burner were used as lighting mediums. Temperature changes were monitored using a digital thermometer, with sensors installed at two different levels within the smaller container and at the mouth of the cover lid of the bigger container. The chronology of events was recorded using a stopwatch.

PREPARATIONS

Two deep collection containers (1.3 m³ and 3 m³) were installed underground as in any normal application. The smaller container was filled with waste paper, the bigger one with community waste.

The measurements were conducted by Timo Vaisiinen and Pertti Miettinen from the Emergency Services College; the test report was compiled by the latter. The other people present were as follows:

Mr Keijo Pulli	Molok Oy
Mr Matti Koponen	Molok Oy
Mr Juhani Savolainen	SVK
Mr Kalevi MarjQkangas	Tapiola
Mr Jukka Vartiainen	EngelOy
Mr Sami Ronkainen	Engel Oy

Weather Air temperature 10C
Air pressure 980 hPa
Relative humidity 84 %
Wind direction 2700 (west)
Wind velocity 4m/s

(Information supplied by the Meteorological Institute, Rissala)

TEST 1

TEST DESCRIPTION

Test 1 was conducted with the 1.3 m³ deep collection container. For the purposes of the test the container was filled with newspapers and advertising paper. The paper had been freshly collected from the outdoor storage facility of the local paper collection centre and it was dry. None of the papers were torn, the newspapers were whole and intact, the other papers smooth.

A burning cigarette was dropped through the container's drop-hole opening onto the paper. The container was a model designed for parkland use and had no closable lid. Heat Sensors were placed at the surface level of the wastepaper and at the level of the drop-hole opening. The side of the container was exposed to a wind blowing at four metres per second; other weather details are listed on the front page of the report.

The purpose of the test was to establish whether a burning cigarette can ignite the solid mass of waste paper and whether any fire is sustained.

TEST RESULT

The burning cigarette did not light the waste paper in the container. This is clearly evident in Figure I below, which shows that the temperature at the surface level of the waste paper rose by no more than 3.1°C in eight minutes and then began to drop. The slight increase in temperature was due to the heat generated by the burning cigarette itself. The temperature at the mouth of the container declined by 3.8°C, probably on account of the cold wind affecting the side of the container.

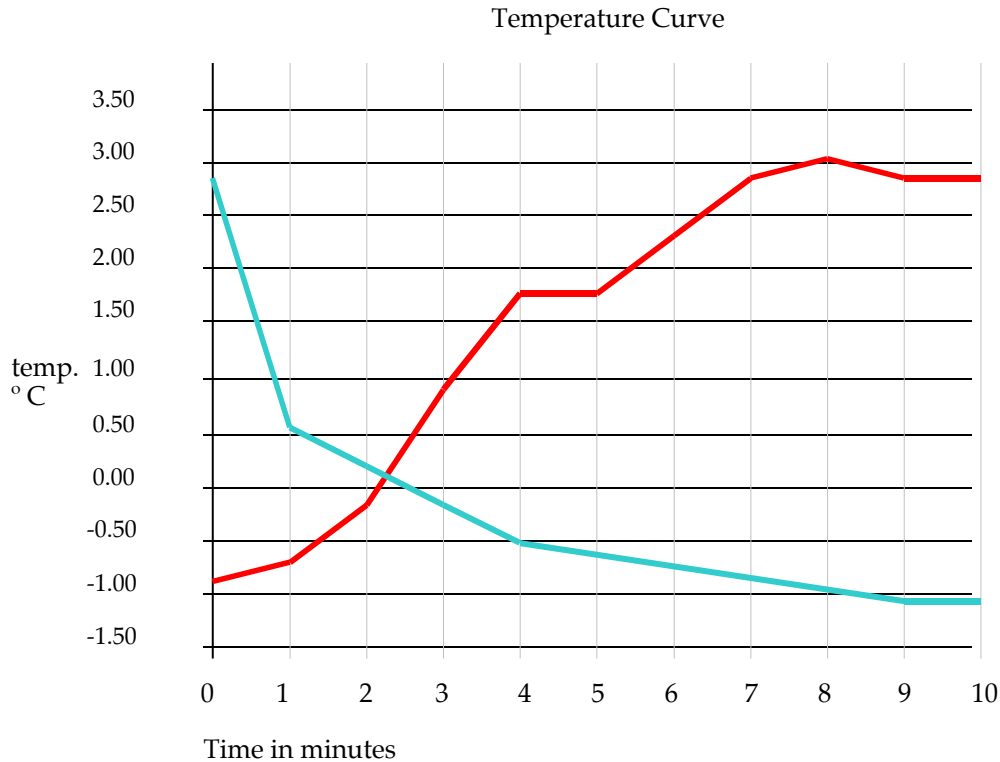


FIGURE 1

TEST 2

TEST DESCRIPTION

Test 2 was conducted with the 13m³ deep collection container. For the purposes of this test the container was filled in the same way as in Test 1, with the exception that the top layers of the wastepaper were torn into small pieces, covering the whole surface of the paper mass. A burning cigarette was dropped through the container's drop-hole opening onto the paper. The container was a model designed for parkland use and had no closable lid.

Heat sensors were placed at the surface level of the wastepaper and at the level of the drop-hole opening. The side of the container was exposed to a wind blowing at four metres per second; other weather details are listed on the front page of the report.

The purpose of the test was to establish whether a burning cigarette can ignite the torn wastepaper and whether any fire is sustained.

TEST RESULT

The burning cigarette ignited a smouldering fire in the container. At the surface level of the wastepaper there was no significant rise in temperature (Figure 2). The smouldering fire was extinguished by itself three minutes after it was ignited; by this time the cigarette had also extinguished.

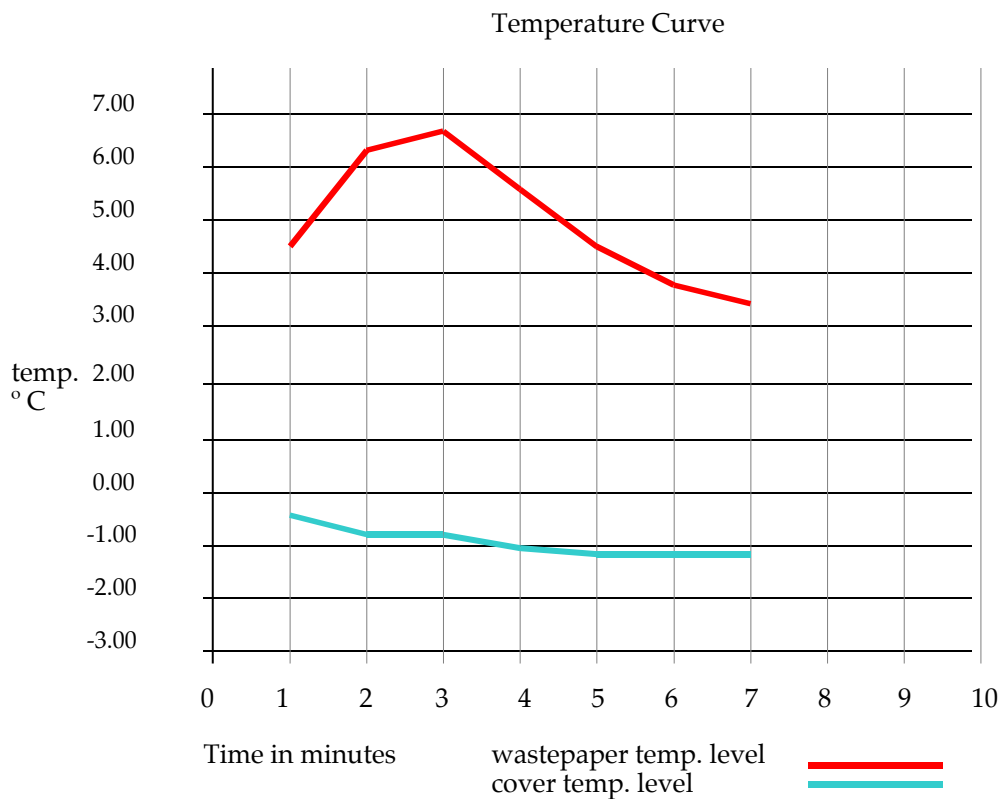


FIGURE 2

TEST 3

TEST DESCRIPTION

Test 3 was conducted with the 13m³ deep collection container. For the purposes of this test the container was filled with newspaper and advertising paper. The top layers of the paper were torn into small pieces, covering the whole surface of the paper mass. A propane burner was used as a lighting medium. The container was fitted with a normal lid that was closed as soon as the wastepaper had been ignited.

Heat sensors were placed at the surface level of the wastepaper and at the level of the drop-hole opening, The side of the container was exposed to a wind blowing at four metres per second; other weather details are listed on the front page of this report.

The purpose of the test was to establish what reaction is caused in the container if the lid is closed upon igniting the fire, as well as to establish the impact of opening the lid while the fire is still burning. In addition, the purpose was to find out how long the container lasts when the fire is left burning with the lid closed, or whether the fire is extinguished by itself.

TEST RESULT

The flame of the propane burner ignited the wastepaper in the container. The temperature at the surface level of the wastepaper increased rapidly (see Figure 3). Twenty minutes after the fire had been started, the lid of the container began to melt and became glued to the cover. At this point the temperature at the mouth of the opening was 144.1°C, at the surface level of the wastepaper 79.8°C.

The test was then continued by fully opening the lid 20 minutes after the fire had been ignited, allowing oxygen to flow freely into the burning container. The temperature at the surface level of the wastepaper mass increased sharply, peaking at 463.3°C; at the mouth of the opening the temperature peaked at 141.5°C 28 minutes after the fire had been started.

Temperature levels began to drop half an hour after the fire had been started as the torn wastepaper on the surface of the paper mass was exhausted. One hour after the fire had been started, the lid was closed and the paper mass remaining in the container was left to smoulder.

Three hours after the fire had been started, it had burned a hole measuring around 20 x 20 cm in the side of the container, at its collar; this was on the side protected from the wind.

The rest of the container now started burning and its contents and structures were completely burned out.

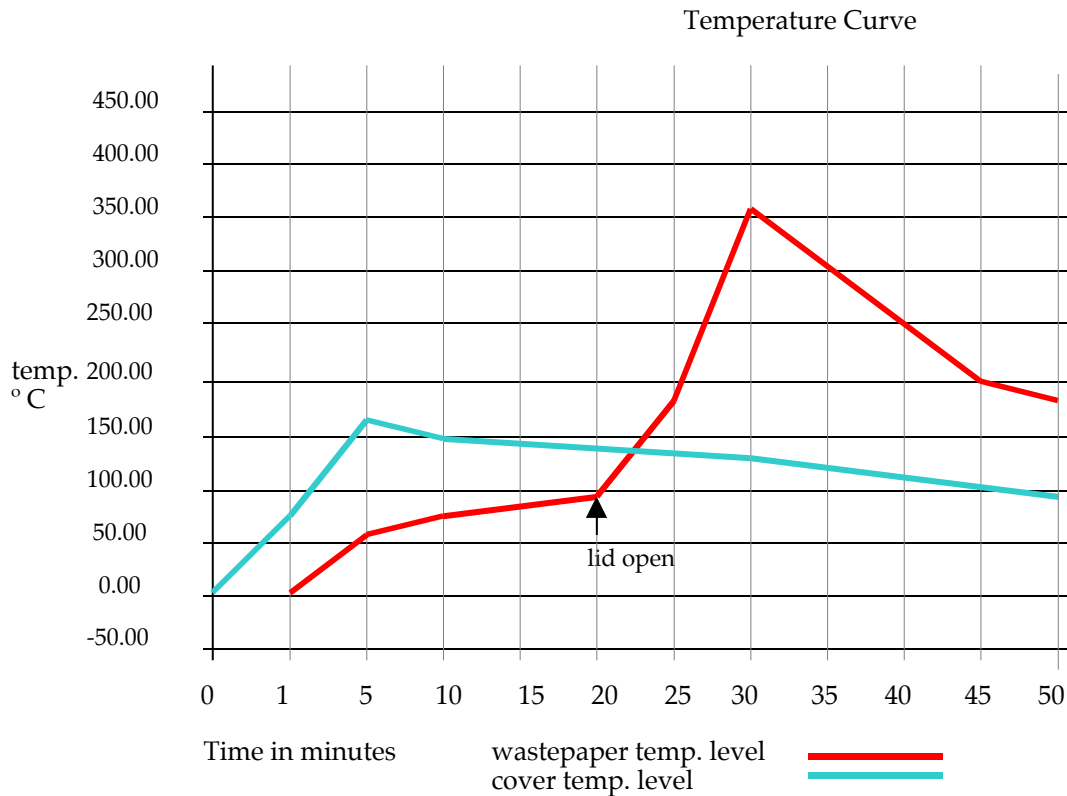


FIGURE 3

TEST 4

TEST DESCRIPTION

Test 4 was conducted with the 3m³ deep collection container. For the purposes of this test the container was filled with regular community waste. The top layers of the waste were packed in plastic bags. The surface of the community waste reached to 70 cm below the cover level. The waste was set alight using a propane burner. The container was fitted with a regular lid that was wedged open immediately after the fire had been started.

A heat sensor was placed at the mouth of the opening. The side of the container was exposed to a wind blowing at four metres per second; other weather details are listed on the front page of this report.

The purpose of the test was to establish what reaction is caused in the container if the lid remains open once the fire has started.

TEST RESULT

The flame of the propane burner set alight the community waste in the container. The temperature rose rapidly: within 90 seconds of the fire being started, the temperature at the mouth of the opening was 347C (Figure 4).

Four minutes after the fire had been started, the lifting bag melted. Ten minutes after ignition, the lid had melted and softened to such extent that it closed by itself.

The test was then continued by reopening the lid. Thirty-one minutes after the waste had been set alight, the fire burned a hole at the collar of the container. Six minutes later, the whole structure collapsed and the container began to burn throughout. At this point the temperature at the mouth of the opening was 730°C.

Fifty minutes after the fire had been started, the container had completely burned out.

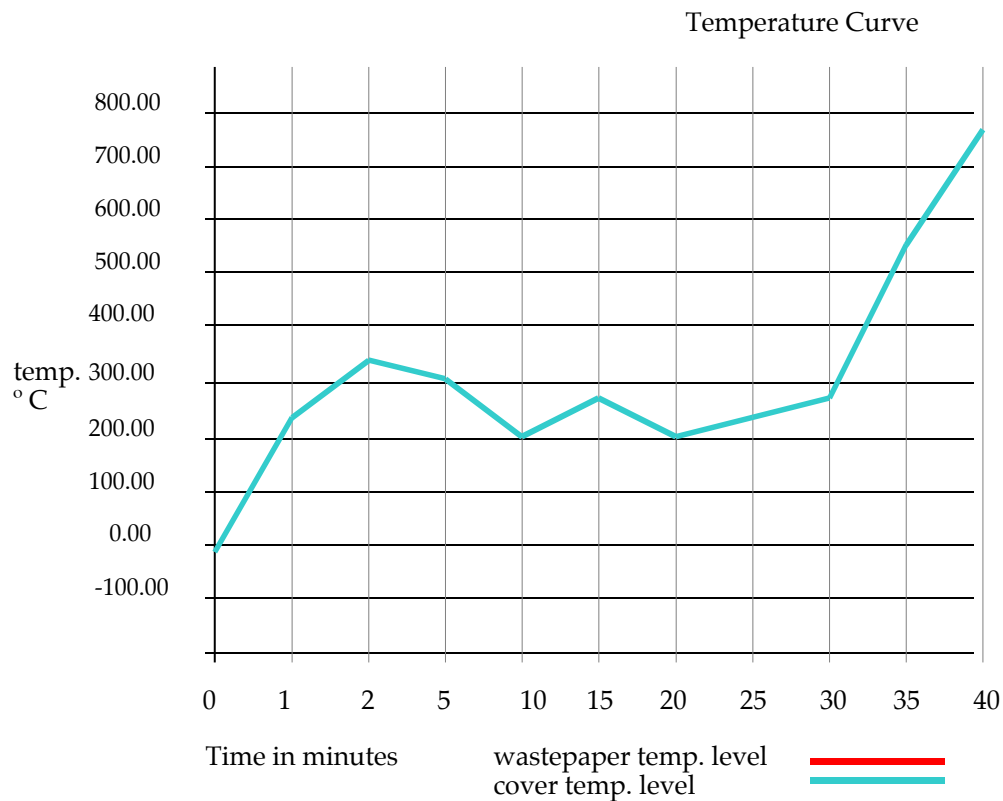


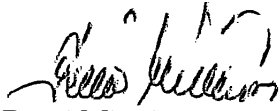
FIGURE 4

(Figure 4)

SUMMARY

A burning cigarette dropped into the deep collection container did not set alight the wastepaper in either of the two tests carried out.

Wastepaper and community waste set alight by means of the flame of a propane burner continued to burn within the container. In both containers the fire developed so slowly that in these cases it would not have spread beyond the container within six minutes, which is the normal response time for fire and rescue services.



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