

**Economic Commission for Europe**

Inland Transport Committee

**Working Party on the Transport of Dangerous Goods**

17 October 2011

**Ninety-first session**

Geneva, 8–11 November 2011

Item 4 of the provisional agenda

**Work of the RID/ADR/ADN Joint Meeting**

**Outcome of the Joint Meeting RID/ADR/ADN – Transport in  
tanks of UN 0133 – Test reports**

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## Test Report

### Evaluation of the behaviour of ammonium nitrate emulsion in a modified vented pipe test in an aluminium container\*)

Applicant: MSW Chemie GmbH  
Seesener Str. 19  
38685 Langelsheim

Application date: 10<sup>th</sup> November 2004  
Test ref: II.3/5135/04  
Substance to be tested: **Andex LD Explosive**  
Test: Modified Vented Pipe Test in an Aluminium Container\*)  
Test date: 2004-12-02  
Test site: BAM Testing Grounds, Horstwalde  
Attendees: Dr. Breidung, Mr Pissin from MSW Chemie GmbH  
BAM Test Team, Division II.3

\*) The test was conducted in accordance with Australia's proposal in Annex 1 of the UN document UN/SCETDG/21/INF.69 (21<sup>st</sup> Session of the Sub-Committee, July 2002).

The test was not ended until no further reaction was recognisable from the test substance.

The container was filled with 23.3kg of test substance, reaching a height of 450mm.

The temperature was measured with thermo-elements in the container approx. 80mm above the bottom and in the gas flame under the container and was recorded.

#### Deviations from the test regulations with justification:

An aluminium container with an external diameter of 310mm and external height of 600mm was used instead of a steel container. The opening in the lid had a diameter of 75mm. The container had a wall (and lid and bottom) thickness of 5mm. The container was made from an aluminium sheet and had a longitudinal weld joint of the same quality as aluminium transport tanks. The bottom and the lid were welded on with the same quality.

#### Test Results:

| Occurrences/Observations:   | Time in minutes                | Time in seconds      |
|---|--------------------------------|----------------------|
| Ignition of the gas flame   | 00:00                          | 0000                 |
| Smoke begins to emerge from the container's opening   | 13:55                          | 0835                 |
| Flames<br>Ejection of burning substance<br>Ejection of non-burning substance<br>Discharge of non-burning substance<br>Last strong discharge | From 35:45<br><br><br>To 38:45 | 2145<br><br><br>2325 |
| Smoke emerging from substance outside the container   | To 43:15                       | 2595                 |
| Gas off   | 47:00                          | 2820                 |

After the test, it was found that the bottom of the container was torn open and partially melted. There was little solidified substance or ash from burned substance found beside the test set-up.

Conclusions:

The behaviour of the tested explosive and the aluminium tank verifies that Andex LD may be transported in an aluminium tank without quantity limitation.

Berlin, 26<sup>th</sup> January 2005

[Signature]

Dipl.-Ing. Werner Franke  
Working Group "Explosives and Propellants"  
Division II.3 "Explosives".

Enclosures:

Picture documentation  
Temperature progression

## Photographic Documentation of the Tests

Test Ref: II.3/5135/04

1/3

Annex to the test report for the company: **MSW Chemie GmbH**

Tested substance: Explosive An dex LD, 23.3kg in an aluminium container.

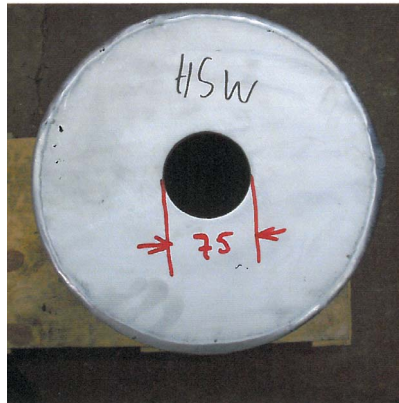
UN Test: Modified Vented Pipe Test in an Aluminium Container

Date: 2004-12-02

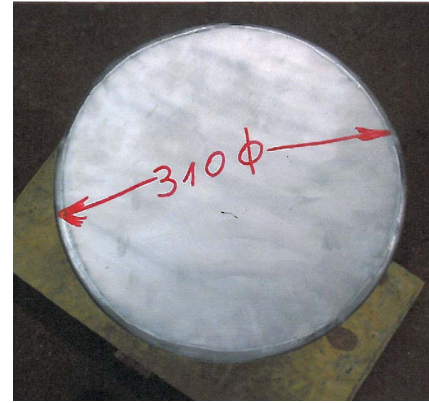
Location: Horstwalde



III. 1  
Aluminium container



III. 2  
Lid



III. 3  
Bottom



III. 4  
Test set-up



III. 5  
Thermo-element for measuring the inside temperature



III. 6  
Initial flames



III. 7  
Ejection of burning substance



III. 8  
Ejection of non-burning substance



III. 9  
Discharge of non-burning substance



III. 9  
Last strong discharge



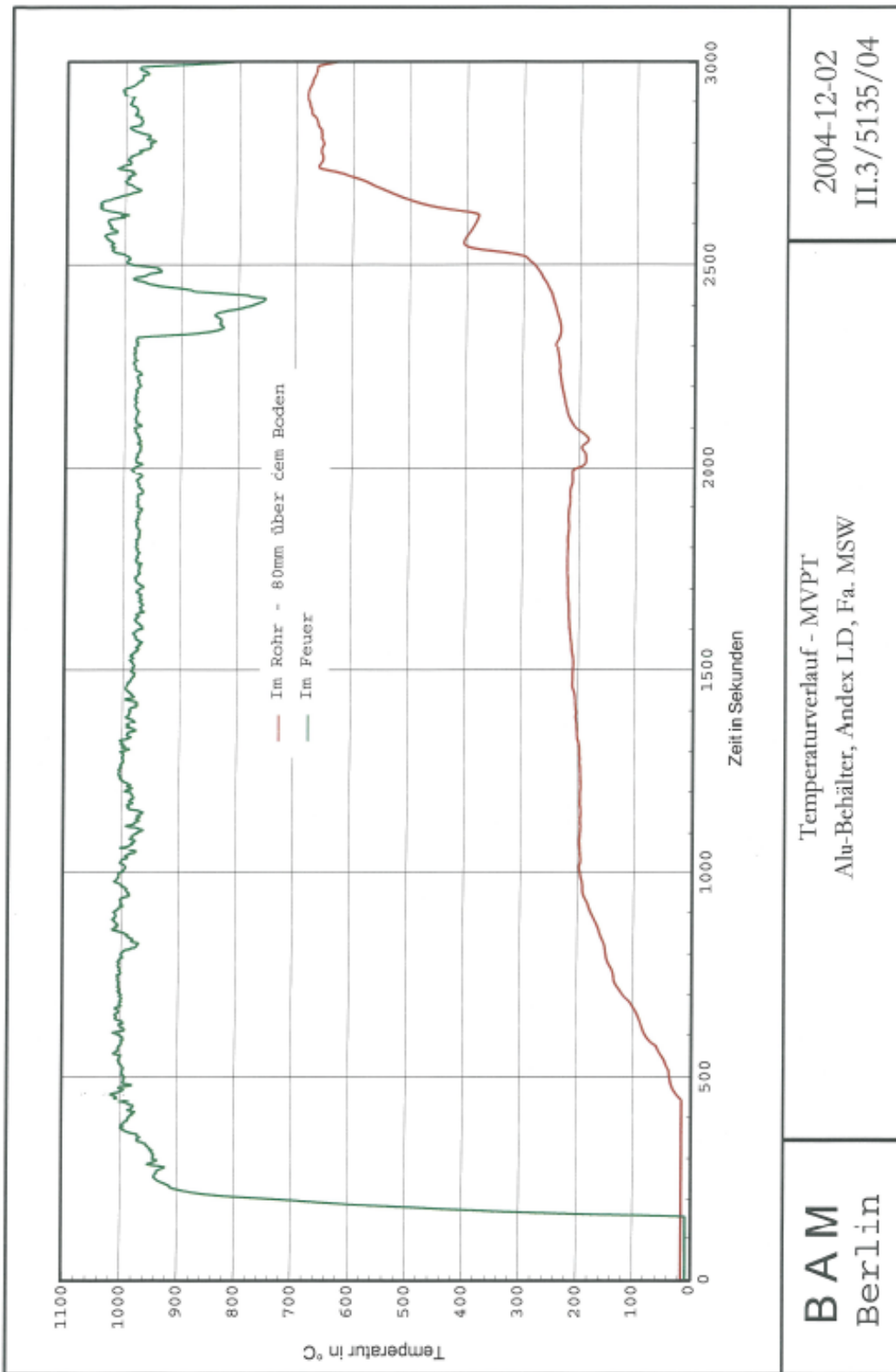
III. 10  
Test set-up after completion of the test



III. 11  
Lid with thermo-element



III. 12  
Bottom torn open



**BAM**  
Berlin

Temperaturverlauf - MVPT  
Alu-Behälter, Andex LD, Fa. MSW

2004-12-02  
II.3/5135/04

Details on graph:

- |                                   |   |   |
|-----------------------------------|---|---|
| “Im Rohr - 80mm über dem Boden”   | > | In the pipe - 80mm above the container bottom |
| “Im Feuer”                        | > | In the fire                                   |
| “Zeit in Sekunden”                | > | Time in seconds                               |
| “Temperaturverlauf - MVPT”        | > | Temperature progression - MVPT                |
| “Alu-Behälter, Andex LD, Fa. MSW” | > | Aluminium container, Andex LD, Company: MSW   |

## Test Report

### Evaluation of the behaviour of Andex LD in a modified vented pipe test with a steel pipe \*)

Applicant: MSW Chemie GmbH  
Seesener Str. 19  
38685 Langelshelm

Application date: 11<sup>th</sup> July 2005  
Test ref: II.3/2595/05  
Substance to be tested: **Andex LD Explosive**  
Test: Modified Vented Pipe Test with Steel Pipe\*)  
Test date: 2005-10-19  
Test site: BAM Testing Grounds, Horstwalde  
Attendees: Mr Pissin from MSW Chemie GmbH  
BAM Test Team, Division II.3

\*) The test was conducted in accordance with Australia's proposal in Annex 1 of the UN document UN/SCETDG/21/INF.69 (21<sup>st</sup> Session of the Sub-Committee, July 2002).

The steel pipe was 580mm high and had a wall thickness of 5mm. The bottom and the lid were made of 6mm-thick steel sheet and were welded on using a fillet weld.

The pipe was filled with 17.8kg of test substance, reaching a height of 440mm.

The temperature was measured with a thermo-element in the pipe approx. 80mm above the bottom of the pipe and was recorded.

#### Deviations from the test regulations with justification:

The steel pipe had an external diameter of 265mm. The deviation when compared to an inner diameter of 265mm (not available in Germany) is not very much.

The opening in the lid had a diameter of 75mm. The 87mm figure, which is given in the above-mentioned proposal in square brackets, is replaced by the figure for the US vented pipe test, which is currently given in the UN handbook. The lower figure gives additional certainty.

The test was not ended until no further reaction was recognisable from the test substance.

Test Results:

| Occurrences/Observations:   | Time in minutes                   | Time in seconds          |
|---|-----------------------------------|--------------------------|
| Ignition of the gas flame   | 00                                | 0000                     |
| Smoke begins to emerge from the lid's opening   | 14                                | 0840                     |
| Emission of melted substance<br>Combustion of the melted substance running down<br>Extinguishment of the flames (melted substance)<br>Discharge of melted substance and gas-based decomposition products (smoke)<br>Last strong smoke discharge | From 33.5<br><br><br><br>To 38:75 | 2110<br><br><br><br>2325 |
| Smoke emerging from the pipe and from substance outside   | To 45:50                          | 2730                     |

The pipe was empty after the test. The pipe, with its bottom and lid, was undamaged. Ash from burned substance and solidified melted substance were to be found beside the test set-up.

Conclusions:

The behaviour of the tested explosive in the steel container verifies that Andex LD is suitable for transport in a steel tank.

Berlin, 23<sup>rd</sup> November 2005

[Signature]

Dipl.-Ing. Werner Franke  
Working Group "Explosives and Propellants"  
Division II.3 "Explosives".

Enclosures:  
Picture documentation  
Temperature progression



## Photographic Documentation of the Tests

Test Ref: II.3/2595/05

1/3

Annex to the test report for the company: **MSW Chemie GmbH**

Tested substance: Explosive An dex LD, 17.8kg in a steel pipe.

UN Test: Modified Vented Pipe Test in Steel Pipe

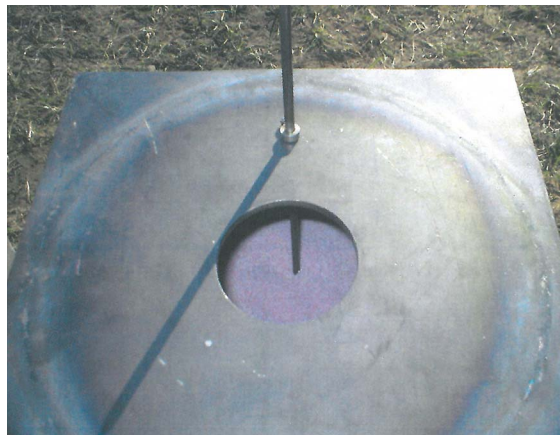
Date: 2005-10-19

Location: Horstwalde



III. 1

Test set-up



III. 2

Lid of the filled pipe



III. 3

First melted substance runs over



III. 4

Burning melted substance at the top and bottom



III. 5

Ejected melted substance, burning



III. 6

Ejected melted substance, decomposition products



III. 7  
Ejected melted substance, decomposing



III. 8  
Ejected melted substance, decomposing



III. 9  
Discharge of nitrous gases



III. 10  
Last strong smoke discharge



III. 11  
Test set-up after the test



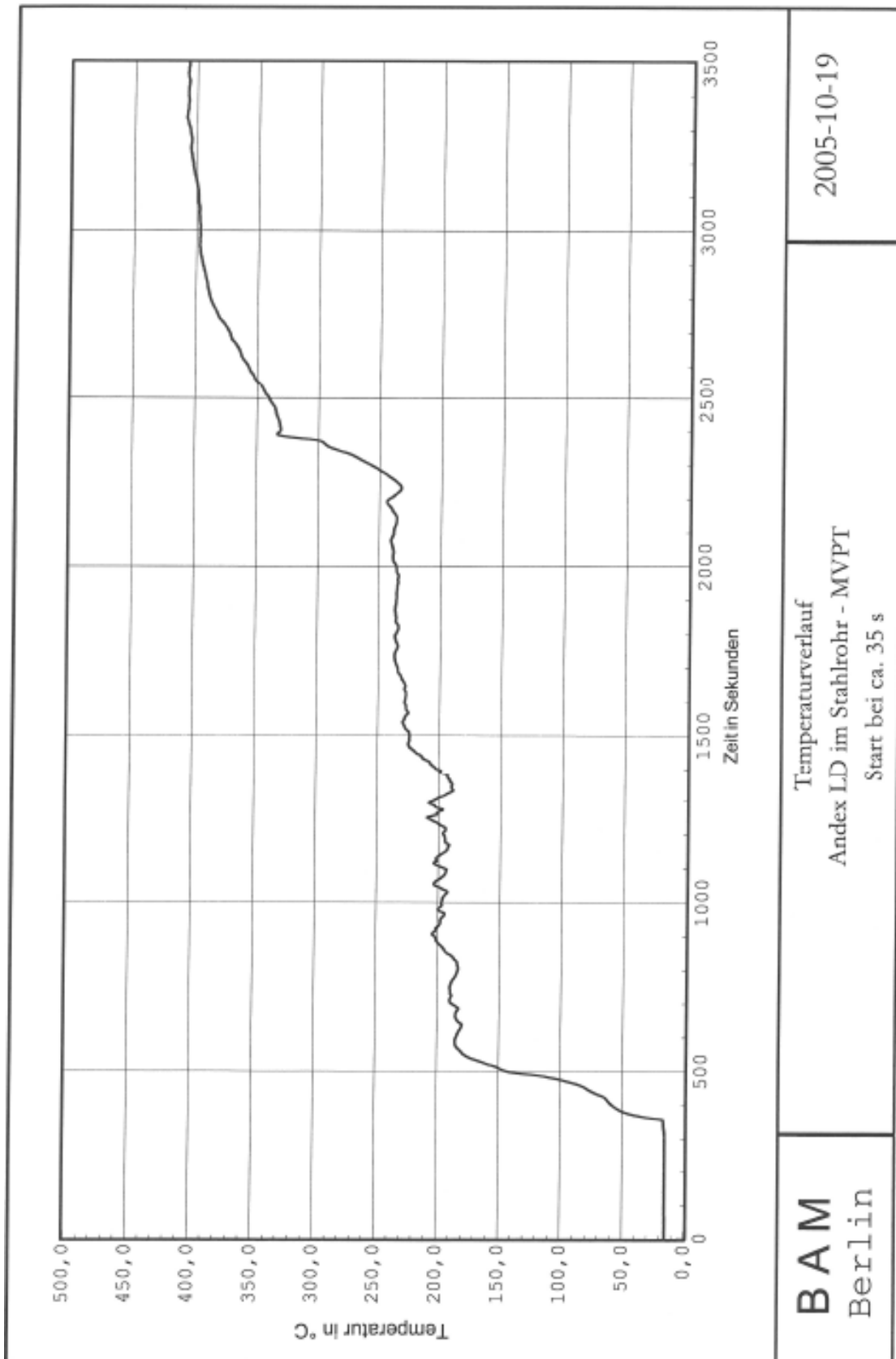
III. 12  
Lid



III. 13  
Lid and wind guard with left-over substance at  
the bottom of the test set-up



III. 14  
Cinders (combustion product)



**BAM**  
Berlin

Temperaturverlauf  
Andex LD im Stahlrohr - MVPT  
Start bei ca. 35 s

2005-10-19

Details on graph:

- "Zeit in Sekunden" > Time in seconds
- "Andex LD im Stahlrohr - MVPT" > Andex LD in a steel pipe - MVPT
- "Start bei ca. 35s" > Start at approx. 35 seconds.

## Test Report

### Evaluation of the behaviour of Andex LD in a modified vented pipe test in an aluminium container\*)

Substance to be tested: **Andex LD Explosive**  
Test: Modified Vented Pipe Test in an Aluminium Container\*)  
Test date: 15<sup>th</sup> November 2007  
Test site: BAM Testing Grounds, Horstwalde  
Attendees: Representatives of K+S AG, MSW Chemie GmbH and DeuCon  
and the BAM Test Team, Division II.3

\*) The test was conducted in accordance with Australia's proposal in Annex 1 of the UN document UN/SCETDG/21/INF.69 (21<sup>st</sup> Session of the Sub-Committee, July 2002).

The test was not ended until no further reaction was recognisable from the test substance.

The pipe was filled with a total of 22.2kg of test substance, reaching a height of 450mm.

The temperature was measured with 3 thermo-elements in the container approx. 5, 22 and 51,5cm above the bottom of the container and was recorded.

#### Deviations from the test regulations with justification:

An aluminium container with an external diameter of 310mm and external height of 600mm was used instead of a steel container. The opening in the lid had a diameter of 26.3mm. The container had a wall (and lid and bottom) thickness of 5mm. The container was made from an aluminium sheet and had a longitudinal weld joint of the same quality as in aluminium transport tanks. The bottom and the lid were welded on with the same quality.

#### Test Results:

| Occurrences/Observations:   | Time in minutes | Time in seconds |
|---|-----------------|-----------------|
| Ignition of the gas flame   | 00              | 0000            |
| Smoke begins to emerge from the lid's opening                                     | 15              | 0900            |
| Melted substance runs out of the opening over the edge and is combusted.          | 44              | 2640            |
| Strong smoke emission from the opening together with ejection of melted substance | 47              | 2820            |
| End of smoke discharge  | 52              | 3120            |
| The bottom of the container bulges  | 53              | 3180            |
| The bottom of the container opens   | 53:30           | 3210            |
| End of the reaction   | 62              | 3720            |

The bottom of the container was partially melted after the test. Ash from burned substance and solidified melted substance were to be found beside the test set-up.

Conclusions:

The ratio of the size of the opening in the aluminium tank to the volume of the tested substance corresponds to that of openings in the transport tanks to the volume of the transported explosive.

The behaviour of the tested explosive and of the aluminium container verifies that Andex LD is suitable for transport in an aluminium tank without quantity limitation.

Berlin, 11<sup>th</sup> April 2008

[Signature]

Dipl.-Ing. Werner Franke  
Working Group "Explosives and Propellants"

Enclosures:

Picture documentation

Temperature progression

## Photographic Documentation of the Tests

Annex to the test report for the company: **MSW Chemie GmbH**

Tested substance: Explosive An dex LD, 22.2kg in an aluminium container.

UN Test: Modified Vented Pipe Test in an Aluminium Container

Date: 15<sup>th</sup> November 2007

Location: Horstwalde



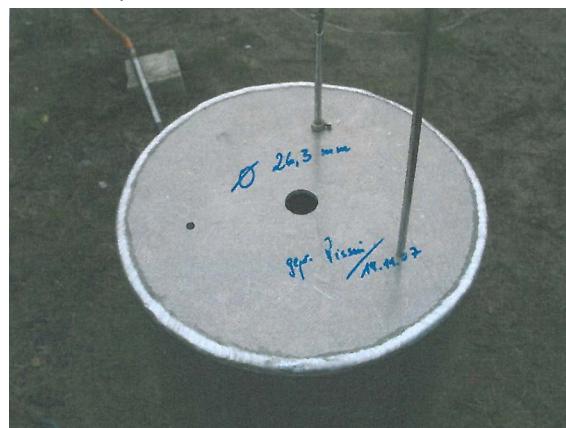
III. 1  
Aluminium container



III. 2  
Test set-up



III. 3  
Insertion of the thermo-elements to  
measure the temperature inside



III. 4  
Lid



III. 5  
Ignition of the gas flame



III. 6  
Propane burner



III. 7  
Overflowing combusted substance



III. 8  
Strong smoke discharge from the opening



III. 9  
The bottom of the container bulges



III. 10  
The bottom of the container bulges



III. 11  
Opened container bottom



III. 12  
Container after the test





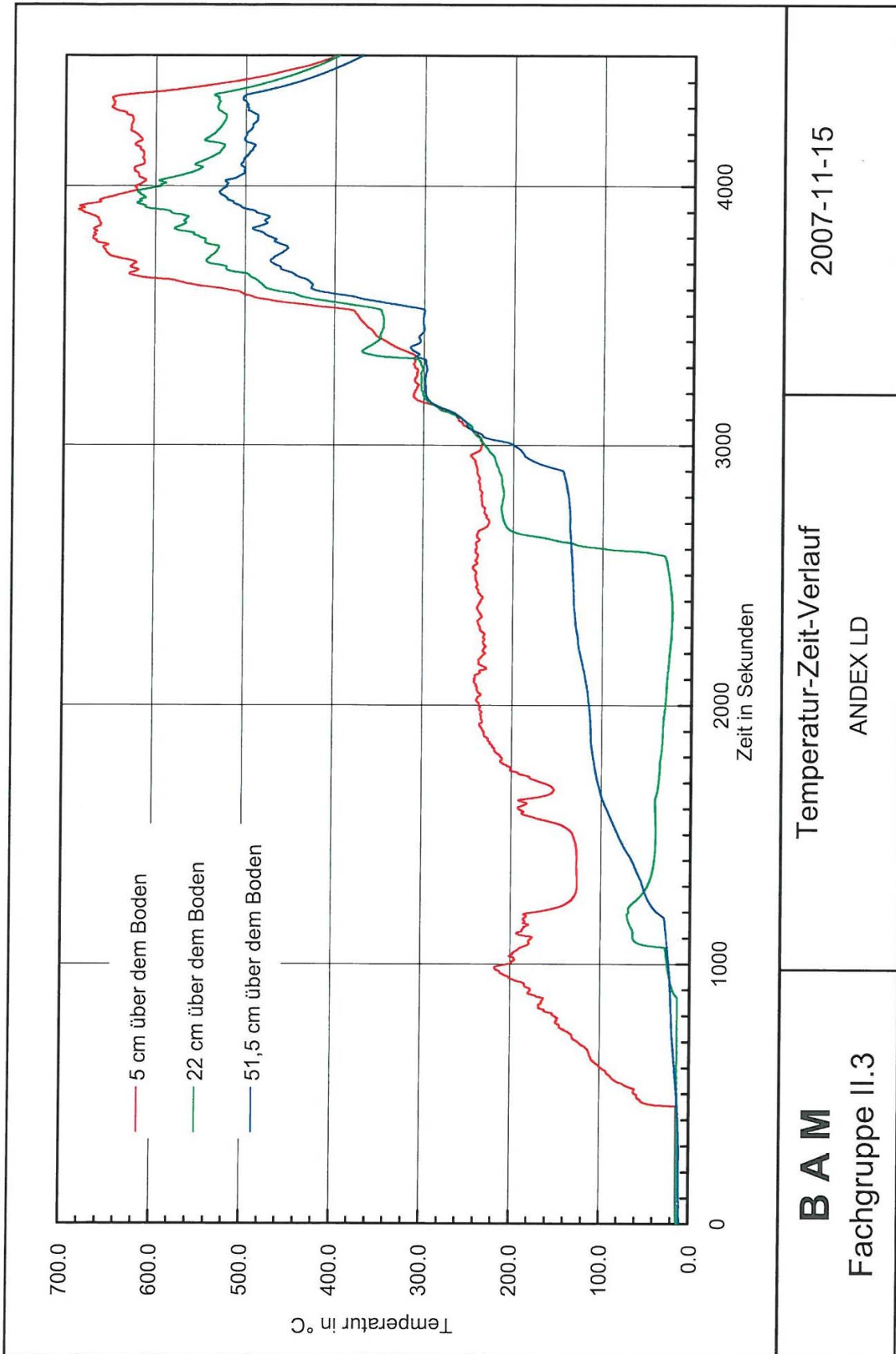
III. 13  
Opened container bottom



III. 14  
Lid following the test



III. 15  
Opened container bottom



**B A M**  
 Fachgruppe II.3

Temperatur-Zeit-Verlauf  
 ANDEX LD

2007-11-15

Details on graph:

- “über dem Boden” > From the bottom of the container
- “Zeit in Sekunden” > Time in seconds
- “Temperatur-Zeit-Verlauf” > Temperature progression over time
- “Fachgruppe II.3” > Division II.3