Certificate no: **DTM 0712264/2**
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# Lloyd's Register Inspection Certificate

Project: ---

Client: **Klinger Fluid Control GmbH**
**Gumpoldskirchen / Austria**

Office: **Dortmund**

Clients Order Number: ---

Date: **17 January 2008**

Order Status: **incomplete**

Inspection Dates

First: **06 December 2007**

Final: **21 December 2007**

This certificate is issued to **the above client to certify that a surveyor to Lloyd's Register did, at their request, attend the testing laboratory of Dr.-Ing. T. Bäumer – Ingenieurbüro -, Herford / Germany for the purpose of inspecting the product listed below.**

| | | |
|---|---|---|
| **Description:** | **Flame resistant test of -1- Ball Valve** | |
| **Type:** | **KHE-FK** | |
| **Nominal bore:** | **DN 65** | |
| **Pressure rating:** | **PN 16** | |
| **Manufacturer's drawing:** | **wH8161.0-0000** | |
| **Materials:** | **Body/flange end piece material:** | **1.0619** |
| | **Operating stem material:** | **1.4104** |
| | **Ball material:** | **1.4408** |
| | **Sealing elements:** | **KFC-25** |
| | **Stem seal material:** | **Graphite / K-Flon** |
| **Test requirements:** | **DIN EN ISO 10497, 2004 and API 607, 5th edition** | |
| **Qualified pressure ratings:** | **Class 150** | |

**The flame resistance tests have been carried out at the independent laboratories of Dr.-Ing. Bäumer.**

**Conclusion:** **All test results, witnessed by the Lloyd's Register Surveyor, were found to be satisfactory and fulfil the requirements of DIN EN ISO 10497, 2004 in every respect.**
**For details please refer to the attached signed and stamped test reports (4 pages).**

**Remarks:** **Ball valve DN 65 pressure rating PN 16 also covers DN 65 and below, DN 80, DN 100 and DN 125.**

For G. Milke: K. Allermann
Surveyor to Lloyd's Register EMEA

**E&T/PRu**

A member of the Lloyd's Register Group

**Dr.-Ing. T. Bäumer**
Messlabor - Ingenieurbüro - Prüfstände

**Messung - Dauerprüfung**
**Entwicklung - Berechnung**
**Auslegung - Projektierung**

# TEST Report

## Flame - resistance tests according to DIN EN ISO 10497
**Report Hc-416**

This report confirms the successful testing of a representative valve in compliance with the DIN EN ISO 10497, 2004.

| | |
|---|---|
| **Manufacturer** | Klinger Fluid Control GmbH<br>Am Kanal 8 - 10<br>A – 2352 Gumpoldskirchen |
| **Test Valve** | Ball -Valve, KHE - FK,<br>flange end connections, Lever opened<br>Nominal bore: DN 65<br>Pressure rating: PN 16<br>Weight: 15,1 kg<br>Bore: Full bore<br>Body/flanged end piece material: 1.0619<br>Operating stem material: 1.4104<br>Ball material: 1.4408<br>Sealing elements: KFC-25<br>Stem seal material: Graphite / K - Flon<br>Drawing number: wH8161.0-0000<br>Operation device: Lever 317 mm length |
| **Date of Testing** | 06 December 2007 |
| **Test Report** | 5 pages |
| **Qualified sizes** | DN 65, DN 80, DN 100, DN 125 |
| **Qualified pressure ratings** | Class 150<br>PN 16, PN 25 |
| **Testing location** | Laboratory of consultant engineer Dr.-Ing. T. Bäumer,<br>Altensenner Weg 75, D - 32052 Herford |
| **Test requirements** | The tests were carried out strictly in accordance with<br>DIN EN ISO 10497, 2004, and with API 607, 5th edition |
| **Participants** | Mr. G. Milke Lloyds Register, EMEA<br>Mr. Dr. T. Bäumer Ingenieurbüro Dr.-Ing. T. Bäumer |

## Test examination

The water filled ball valve was subjected to fire for 30 minutes at a temperature between 750 °C and 1000 °C and a pressure of e.g. 2,0 barg. After the burn period the through-seat-leakage was determined and after a cool down period the external leakage was measured. Then the ball valve was opened, and the external leakage was determined.

## Instrumentation

Temperature: 4 Thermocouples, Ni Cr Ni, accuracy 1 K.
Pressure: Pressure transmitter, accuracy 0,5 %.
PC-system: AD converter board, software for measuring, Personal Computer

The measuring devices are controlled by an accredited calibration service.

Body cavity set relief pressure and setting: 24 barg

## Test results

**Time of test start (ignition of burners): 01.45 p.m.**

**Temperatures and pressure during burn period**

| Time | p | $T_{Fire1}$ | $T_{Fire2}$ | $T_{Cal1}$ | $T_{Cal2}$ | $T_{Body}$ | $T_{Bonnet}$ |
|---|---|---|---|---|---|---|---|
| [s] | [barg] | [°C] | [°C] | [°C] | [°C] | [°C] | [°C] |
| .00 | 2.03 | 713.4 | 609.3 | 49.4 | 31.4 | 16.3 | 13.4 |
| 30.00 | 2.03 | 783.3 | 712.7 | 49.4 | 31.4 | 16.3 | 13.4 |
| 60.00 | 2.03 | 874.9 | 713.4 | 52.4 | 65.9 | 183.2 | 377.4 |
| 90.00 | 2.03 | 890.9 | 785.7 | 104.9 | 134.9 | 894.7 | 482.9 |
| 120.00 | 2.03 | 968.9 | 814.4 | 169.4 | 184.4 | 897.9 | 574.4 |
| 150.00 | 2.03 | 963.4 | 816.3 | 232.4 | 248.9 | 884.3 | 578.9 |
| 180.00 | 2.03 | 952.4 | 817.7 | 283.4 | 308.9 | 829.4 | 593.9 |
| 210.00 | 2.03 | 947.9 | 819.8 | 332.9 | 362.9 | 566.0 | 621.9 |
| 240.00 | 2.10 | 973.4 | 842.4 | 379.4 | 412.4 | 533.3 | 658.4 |
| 270.00 | 2.10 | 992.9 | 836.9 | 418.4 | 458.9 | 533.3 | 672.4 |
| 300.00 | 2.18 | 953.9 | 819.1 | 458.9 | 500.9 | 520.2 | 686.4 |
| 330.00 | 2.03 | 992.9 | 846.6 | 494.9 | 538.4 | 531.6 | 674.4 |
| 360.00 | 2.03 | 969.4 | 867.2 | 529.4 | 569.9 | 543.1 | 703.4 |
| 390.00 | 2.03 | 977.9 | 864.4 | 557.9 | 598.4 | 556.7 | 713.9 |
| 420.00 | 2.03 | 961.9 | 828.7 | 586.4 | 622.4 | 586.6 | 757.4 |
| 450.00 | 2.03 | 998.9 | 817.1 | 608.9 | 643.4 | 574.5 | 775.9 |
| 480.00 | 2.03 | 977.4 | 818.6 | 632.9 | 662.9 | 584.3 | 786.4 |
| 510.00 | 2.03 | 994.9 | 812.3 | 653.9 | 677.9 | 582.2 | 780.4 |
| 540.00 | 2.03 | 962.9 | 817.1 | 673.4 | 692.9 | 592.0 | 786.4 |
| 570.00 | 2.03 | 975.9 | 785.6 | 691.4 | 704.9 | 601.7 | 789.4 |
| 600.00 | 2.10 | 965.4 | 790.1 | 706.4 | 715.4 | 611.0 | 789.4 |
| 630.00 | 2.03 | 975.9 | 787.9 | 719.9 | 725.9 | 620.1 | 799.9 |
| 660.00 | 2.03 | 998.9 | 772.8 | 727.4 | 734.9 | 627.8 | 798.4 |
| 690.00 | 2.10 | 985.9 | 764.4 | 734.9 | 742.4 | 650.8 | 772.9 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 720.00 | 2.03 | 966.4 | 765.8 | 743.9 | 748.4 | 6553. | 777.4 |
| 750.00 | 2.03 | 973.4 | 782.1 | 748.4 | 754.4 | 665.4 | 792.4 |
| 780.00 | 2.10 | 969.4 | 778.9 | 749.9 | 758.9 | 677.9 | 792.4 |
| 810.00 | 2.03 | 992.9 | 798.9 | 754.4 | 763.4 | 694.8 | 783.4 |
| 840.00 | 2.03 | 976.9 | 761.7 | 758.9 | 769.4 | 686.1 | 789.4 |
| 870.00 | 2.03 | 967.9 | 767.2 | 763.4 | 773.9 | 681.2 | 777.4 |
| 900.00 | 2.03 | 982.9 | 786.4 | 769.4 | 778.4 | 694.3 | 792.4 |
| 930.00 | 2.03 | 984.4 | 779.6 | 773.9 | 782.9 | 697.6 | 759.4 |
| 960.00 | 2.03 | 978.4 | 772.7 | 778.4 | 787.4 | 681.2 | 779.9 |
| 990.00 | 2.03 | 985.4 | 776.8 | 784.4 | 790.4 | 681.2 | 791.9 |
| 1020.00 | 2.03 | 973.4 | 771.3 | 787.4 | 791.9 | 679.6 | 763.4 |
| 1050.00 | 2.03 | 986.9 | 752.1 | 785.9 | 793.4 | 688.0 | 710.9 |
| 1080.00 | 2.10 | 977.9 | 767.2 | 785.9 | 794.9 | 681.8 | 700.4 |
| 1110.00 | 2.03 | 984.4 | 782.3 | 790.4 | 796.4 | 694.3 | 710.9 |
| 1140.00 | 2.10 | 969.4 | 780.9 | 794.9 | 796.4 | 681.2 | 794.4 |
| 1170.00 | 2.10 | 992.9 | 760.3 | 793.4 | 797.9 | 679.2 | 765.4 |
| 1200.00 | 2.03 | 970.4 | 778.2 | 791.9 | 797.9 | 693.4 | 757.4 |
| 1230.00 | 2.10 | 971.4 | 787.8 | 796.4 | 797.9 | 690.7 | 756.9 |
| 1260.00 | 2.03 | 996.4 | 778.2 | 802.4 | 797.9 | 682.8 | 763.9 |
| 1290.00 | 2.10 | 993.4 | 775.4 | 800.9 | 797.9 | 683.4 | 757.9 |
| 1320.00 | 2.03 | 961.4 | 790.6 | 803.9 | 797.9 | 679.0 | 791.4 |
| 1350.00 | 2.10 | 983.4 | 774.1 | 809.9 | 799.4 | 689.4 | 776.4 |
| 1380.00 | 2.03 | 985.4 | 783.7 | 812.9 | 799.4 | 675.7 | 768.4 |
| 1410.00 | 2.10 | 983.9 | 790.6 | 818.9 | 799.4 | 681.7 | 757.9 |
| 1440.00 | 2.03 | 996.4 | 775.4 | 820.4 | 799.4 | 693.2 | 766.9 |
| 1470.00 | 2.10 | 963.9 | 778.2 | 815.9 | 797.9 | 683.4 | 766.9 |
| 1500.00 | 2.10 | 981.9 | 779.6 | 814.4 | 796.4 | 698.1 | 763.9 |
| 1530.00 | 2.10 | 989.9 | 796.1 | 818.9 | 797.9 | 678.5 | 715.9 |
| 1560.00 | 2.10 | 980.4 | 778.2 | 821.9 | 799.4 | 684.5 | 777.9 |
| 1590.00 | 2.03 | 995.4 | 789.2 | 829.4 | 799.4 | 670.3 | 756.9 |
| 1620.00 | 2.10 | 994.4 | 796.1 | 838.4 | 799.4 | 691.5 | 757.4 |
| 1650.00 | 2.03 | 987.4 | 783.7 | 841.4 | 797.9 | 674.6 | 750.9 |
| 1680.00 | 2.10 | 976.4 | 785.6 | 838.4 | 793.4 | 686.7 | 750.9 |
| 1710.00 | 2.03 | 985.9 | 792.8 | 833.9 | 787.4 | 680.1 | 757.4 |
| 1740.00 | 2.03 | 970.4 | 787.3 | 830.9 | 781.4 | 670.7 | 754.4 |
| 1770.00 | 2.03 | 964.4 | 791.8 | 827.9 | 775.4 | 673.0 | 760.9 |
| 1800.00 | 2.03 | 971.4 | 787.8 | 804.3 | 791.2 | 672.6 | 755.7 |

**Time required for valve to cool down to 100 °C:** 7 min

**Test valve unseated:** Yes

**Test valve moved to the fully open position:** Yes

| | Leakage [ml/DN/min] | Allowable leakage [ml/DN/min] |
|---|---|---|
| **Through-seat-leakage in burning phase:** | 0,5 | 4,0 |
| **External leakage in burning and cooling phase:** | 0,0 | 1,0 |
| **Through-seat-leakage at low pressure:** | 0,3 | 1,6 |
| **External leakage in the open position:** | 0,0 | 1,0 |

## Comments on the results

The test valve is an asymmetric ball valve. Because it is intended for one-directional installation, the tests were carried out only for one flow direction.

## Conclusion

The test valve fulfilled the test requirements according to DIN EN ISO 10497, 2004. Only allowable through-seat-leakages and external leakages were observed during the test.

Herford, 06 December 2007

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ATTACHMENT TO LLOYD'S REGISTER CERT. NO. DTM 0712264/2