

Test Report

No. 12 0003171-2

Customer: General Fittings
Via Golgi 73/75
I – 25064 Gussago (BS)
Italy

Order date: 11.09.2008

Order: Design test on press connector system "ALPI PRESS";
series 5S00, in combination with multi-layer composite pipes of dimensions
16 mm x 2 mm, 20 mm x 2 mm, 26 x 3 mm and 32 x 3 mm in accordance
with the DVGW Worksheet W 534 May 2004.

DVGW file no.: 06-0234-W

Samples: Connectors of the above-specified dimensions (see attachments) in
connection with multilayer composite pipes (white)

Markings:
GENERAL FITTINGS 16x2.0 Tipo A PEX-AL-PEX Tap Water – Central
and radiant floor heating 95°C 10 bar UNI 10954-1 CL1 34.5<S<42.8
MADE IN ITALY

GENERAL FITTINGS 20x2.0 Tipo A PEX-AL-PEX Tap Water – Central
and radiant floor heating 95°C 10 bar UNI 10954-1 CL1 34.5<S<42.8
MADE IN ITALY

GENERAL FITTINGS 26x3.0 Tipo A PEX-AL-PEX Tap Water – Central
and radiant floor heating 95°C 10 bar UNI 10954-1 CL1 34.5<S<42.8
MADE IN ITALY

GENERAL FITTINGS 32x3.0 Tipo A PEX-AL-PEX Tap Water – Central
and radiant floor heating 95°C 10 bar UNI 10954-1 CL1 S_≤26 MADE IN
ITALY

Date of test: June 2008 to February 2009

Die Ergebnisse der Prüfungen beziehen sich ausschließlich auf die (den) oben bezeichnete(n) Proben/Prüfgegenstand. Prüfberichte dürfen ohne Zustimmung des MPA NRW nur nach Form und Inhalt unverändert veröffentlicht oder vervielfältigt werden. Die gekürzte Wiedergabe eines Prüfberichtes ist nur mit Zustimmung des MPA NRW zulässig.

Tests carried out

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|------|--------------------------------------|---------------------|
| 1.) | System description | |
| 2.) | Handling on building site | W 534 Section 7 |
| 3.) | Assembly – Installation instructions | W 534 Section 8 |
| 4.) | Materials | W 534 Section 10.1 |
| 5.) | Elastomers | W 534 Section 10.3 |
| 6.) | Dimensions | W 534 Section 12.1 |
| 7.) | Surface properties | W 534 Section 12.2 |
| 8.) | Vacuum test in accordance with | W 534 Section 12.4 |
| 9.) | Blast test in accordance with | W 534 Section 12.5 |
| 10.) | Temperature change test | W 534 Section 12.6 |
| 11.) | Flexural type test | W 534 Section 12.9 |
| 12.) | Long-term burst test | W 534 Section 12.10 |
| 13.) | Tensile test | W 534 Section 12.11 |

1.) System description

The connector system type "ALPI-PRESS" consists of connectors of various designs. Compression is achieved with pressing equipment from the company REMS: Akku-Press, type 571, pressing contour: H, U and TH.

2.) Handling on building site in accordance with W 534 Section 7

The production of the pipe connection is possible under normal building site conditions.

3.) Assembly – Installation instructions in accordance with W 534 Section 8

The assembly and installation instructions received by this office are understandable, descriptive and contain all necessary details.

4.) Materials in accordance with W 534 Section 10

The materials for the fittings fulfil the requirements of DIN 50930-6.

5.) Elastomers in accordance with W 534 Section 10.3

Seals/Gaskets type 01/U70 EP from the manufacturers LAV.EL.GOMMA are used as sealing elements.

A valid DVGW design certificate no. DW-5253BQ0577 has been provided.

6.) Dimensions in accordance with W 534 Section 12.1

Dimensional tests of pipe connectors by sampling did not show any deviations from the dimensional drawing documents received by this office.

7.) Surface properties and homogeneity in accordance with W 534 Section 12.2

Visual inspection did not lead to any complaints. The pipe connectors are free of any moulding residue, ridges, bubbles and shrinkage cavities.

8.) Vacuum test in accordance with W 534 Section 12.4

A vacuum test in accordance with DVGW worksheet W 534 section 12.4 was carried out on 3 samples each of all sizes.

Samples:

The connectors were fitted with pipe sections at both ends and closed at the ends.

Test setup:

The samples were connected to a vacuum pump with intermediate shut-off valve.

Requirements:

There must not be any perceptible rise in pressure during the test period of 1 hour respectively.

Test implementation:

Test system: Vacuum pump with shut-off valve and pressure gauge
Test pressure: - 0.8 bar
Test medium: Air
Test period: 1 hour

Test results:

A rise in pressure was not found on any of the samples over the complete test period of 1 hour.

9.) Blast test in accordance with W 534 Section 12.5

A blast test in accordance with DVGW worksheet W 534 section 12.5 was carried out on 3 samples each of all sizes.

Samples:

The connectors were fitted with pipe sections at both ends and closed at the ends.

Test setup:

The samples were filled with water and connected to a high pressure test bench.

Requirements:

There may not be any perceptible leakages in the samples after 10,000 approximately sinusoidal pressure cycles between 1 bar and 25 bar.

Test implementation:

Test system: High-pressure test bench with pressure control and electric
internal pressure sensor
Pressure blast: approx. sinusoidal, p_{\min} 1 bar, p_{\max} 25 bar
Test medium: Water
Test duration: 10,000 pressure cycles
Frequency: 30 pressure cycles per minute

Test results:

No leaks were found in any of the samples during or following completion of the test.

10.) Temperature change test in accordance with W 534 Section 12.6

A temperature change test in accordance with DVGW worksheet W 534 section 12.6 was carried out on connectors of all sizes.

Samples:

A test specimen was set up for each size in accordance with DVGW worksheet W 534.

Test setup:

The samples were installed in a temperature change test bench.

Requirements:

There may not be any perceptible leaks or residue of dissolved matters on the connectors during or immediately after the temperature change test.

Test implementation:

Test system:	Temperature change test bench no. IV
Test pressure:	10 bar
Test medium:	Water
Flow speed:	≥ 0.5 m/s
Test duration:	5000 cycles
Cycle:	15 minutes cold water at 20°C, 15 minutes hot water at 93°C

Test results:

Neither leaks nor residue of dissolved matters were found on any of the connections during or immediately after the temperature change test.

11.) Flexural type test in accordance with W 534 Section 12.9

A flexural type test in accordance with DVGW worksheet W 534 section 12.9 was carried out on a sample each of all sizes.

Samples:

The samples were set up as pipe – fitting – pipe in accordance with DVGW worksheet W 534 and fitted with transition connectors at the ends.

Test setup:

The samples were clamped tight at both ends and fastened in the middle to an oscillating cylinder.

Requirements:

There may not be any perceptible leaks in the samples at the end of 333 cycles.

Test implementation:

Test system: Hydr. oscillating cylinder and high-pressure pump with pressure gauge
Test pressure: 15 bar
Test medium: Water
Excursion: ± 10 mm
Cycle: 300 load changes in 20 seconds (15Hz), 2 minutes rest
Cycles: 333

Test results:

No leaks were discovered on any of the samples during or upon completion of the test.

12.) Long-term burst test in accordance with W 534 Section 12.10

A long-term burst test in accordance with DVGW worksheet W 534 section 12.10 was carried out on samples of all sizes.

Samples:

The samples were set up as pipe – fitting – pipe in accordance with DVGW worksheet W 534 section 12.10 and fitted with transition connectors at the ends.

Test setup:

The samples were subjected to the respective test pressures and stored in an immersion basin at 95°C for the respective test duration.

Requirements:

Neither cracks nor damage may occur on the pipe connections during the test period.

Test implementation:

Test system:	Long-term burst test bench
Test pressure:	In accordance with composite pipe dimensions
Test medium:	Water
Storage medium:	Water
Test temperature:	95°C
Test duration:	22 hours, 165 hours and 1000 hours

Test results:

No cracks or damage to the samples were found during or immediately after the long-term burst tests.

13.) Tensile test in accordance with W 534 Section 12.11

A tensile test in accordance with DVGW worksheet W 534 section 12.11 was carried out on a sample each of all sizes at temperatures of 20°C and 93°C.

Samples:

The samples were set up as pipe – fitting – pipe in accordance with DVGW worksheet W 534 section 12.11 and fitted with transition connectors at both ends.

Test setup:

The samples were clamped at both ends, vertically and without bending, in a tensile testing machine and subjected to axial force.

Requirements:

The pipe must not be pulled out of the pipe connector during a test period of 1 hour and there must not be any occurrence of cracks or breakages in the pipe.

Test implementation:

Test system: Tensile test machine and load cell
 Test temperature: 20°C and 93°C
 Test period: 1 hour

16 mm		Ø 20 mm		Ø 26 mm		Ø 32 mm	
20°C	93°C	20°C	93°C	20°C	93°C	20°C	93°C
0.5 kN	0.26 kN	0.8 kN	0.41 kN	1.25 kN	0.63 kN	2.0 kN	1.00 kN

Test results:

The pipe was not pulled out of the pipe connector during the test period in the case of any of the samples and no cracks or damage to the pipes were found.

Summary:

The requirements stated in the DVGW worksheet W 534 were met in all of the named test points.

The requirements stated in EN ISO 21003-5,

-Multilayer piping systems for hot and cold water installations inside buildings-
 are also fulfilled.

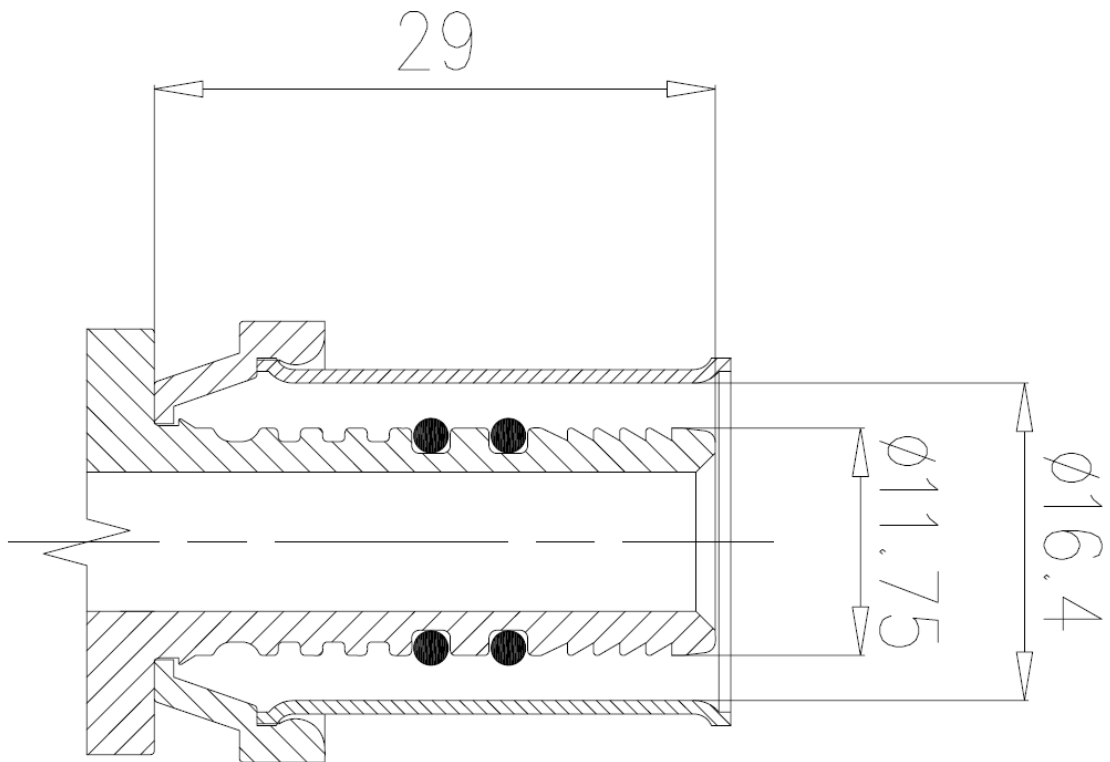
Remark:

In cases of any doubts the German version is valid only.

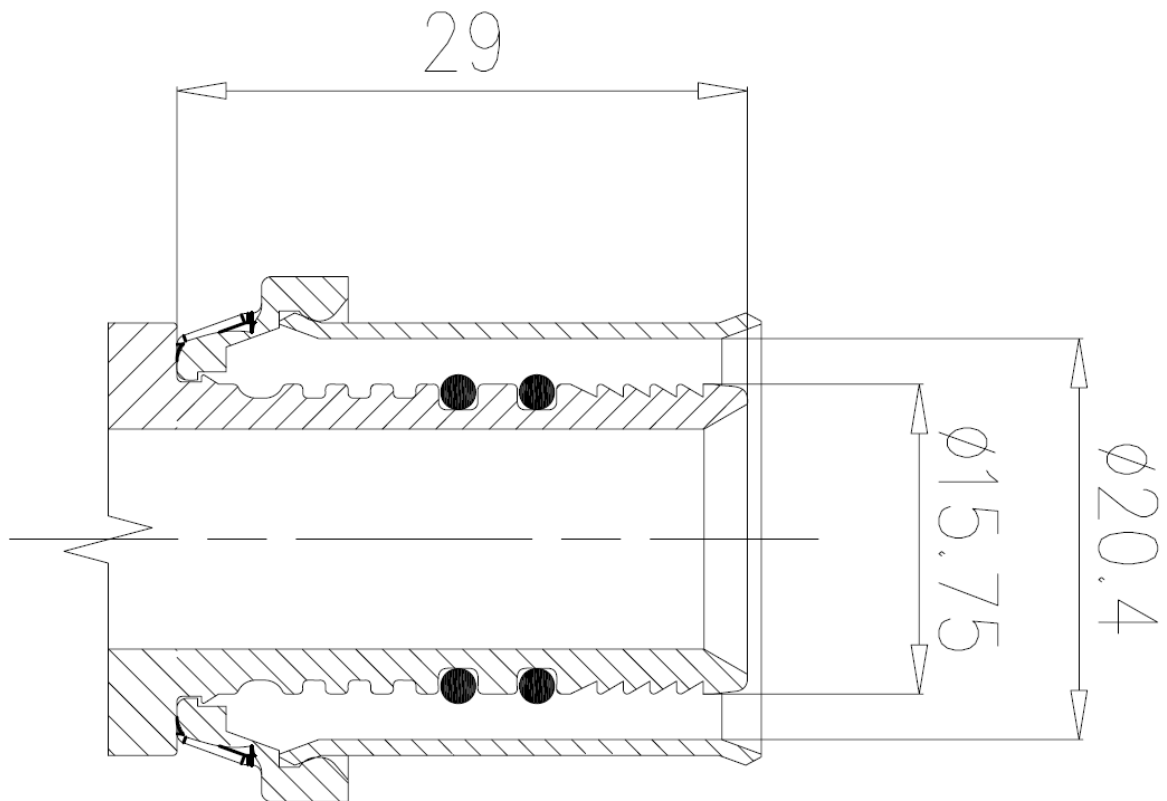
Dortmund, 18.02.2009

By order

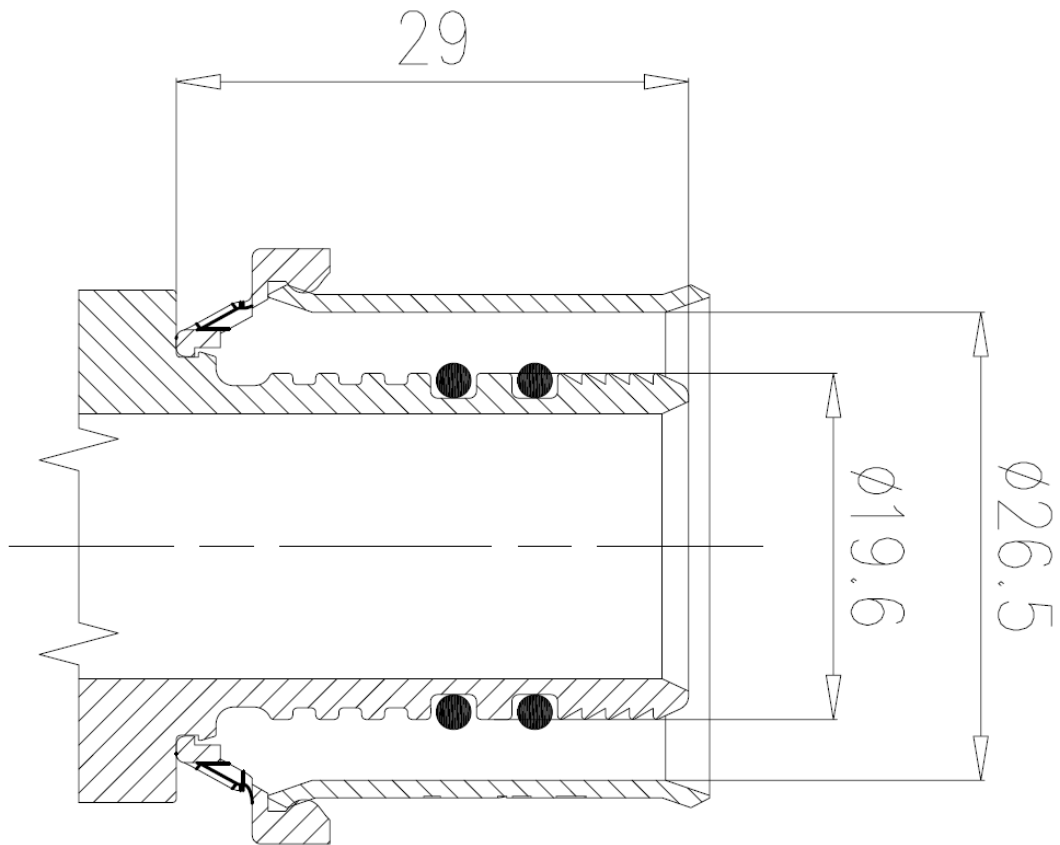
Dipl. Eng. Dietwalt Jansen



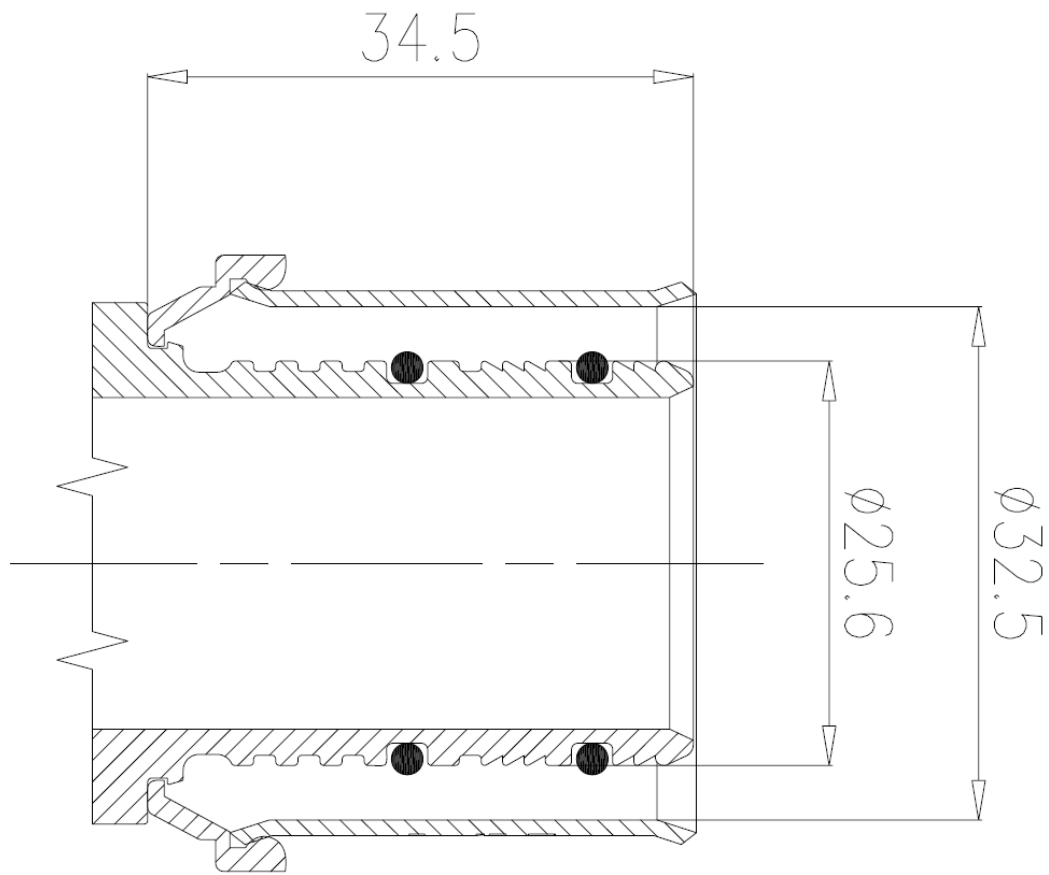
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