

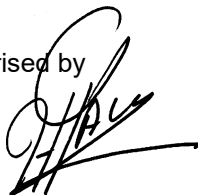
## Resistance of mounted assemblies to temperature cycling

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<b>Date of report</b>	02-01-2020	
<b>Total number of pages</b>	6	
<b>Performed request</b>	Determination of the resistance of mounted assemblies to temperature cycling	
<b>Requested by</b>	Kiwa Nederland B.V. Sir Winston Churchillaan 273 NL-2280 AB Rijswijk	
<b>Client</b>	GF Hakan Plastik Cerkezköy (TR)	
<b>Tested products</b>	Pipes GF Hakan Plastik, PP-RCT+GF pipes Fittings Fittings GF Hakan Plastik, PP-R fittings	
<b>Test method</b>	EN 12293 :1999	Plastics piping systems - Thermoplastics pipes and fittings for hot and cold water - Test method for the resistance of mounted assemblies to temperature cycling
<b>Referring documents</b>	ISO 15874-5	
<b>Reference number</b>	190702051	
<b>Requirements</b>	No leakage during testing of the assembly and no delamination of the multilayer pipes	
<b>Conclusions</b>	The assembly (pipe-fitting combination) did meet the requirements for no leakage of the assembly during testing	

Authorised by



Mr. Henk Pauw, Coordinator Lab C

- This report may only be duplicated as a complete set, without any modifications and with permission of the legitimate owner.
  - The test results in this report are exclusively related to the samples offered and tested.
  - With regard to measurement uncertainty information please check our website.
  - In case of dispute regarding this test report please contact Kiwa Nederland B.V.
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*Determination of the resistance of mounted  
assemblies to temperature cycling*

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**1 Sample definition**

**Piping system :**

Commercial name : Not specified  
Temperature profile ISO 10508 : Class 2  
Design pressure : 10 bar  
Rigid/Flexible : Rigid (C2 in figure 1)

**Pipes :**

Manufacturer : GF Hakan Plastik  
Production location : Cerkezköy (TR)  
Commercial name : Not specified  
Type of material/construction : PP-RCT+GF pipes  
Dimension : 25 mm  
Colour inside/outside : Green/green  
Marking : +GF+ Aquasystem 25 x 3.5 SDR 7.4 PP-RCT / PP-  
RCT+GF/ PP-RCT A Class 1/10bar EXT : PPS-03 04/12/18  
20:11:45 Made in TURKEY  
Date of production : Various per dimension

**Fittings :**

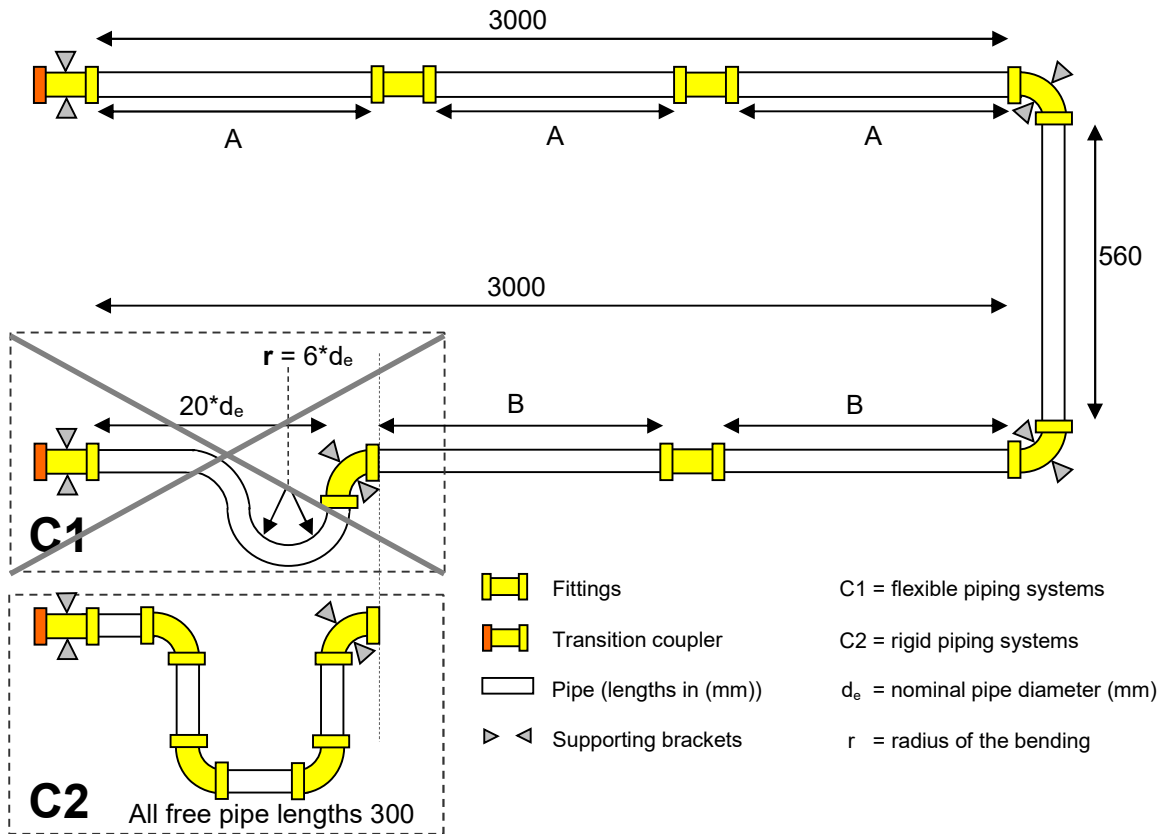
Manufacturer : GF Hakan Plastik,  
Type of material/construction : PP-R fittings (socket fusion)  
Type of fittings  
transition couplers  
- number : 2  
- dimensions : 25 mm × ½" male thread  
- marking : 025 ½" PP-R +GF+  
straight couplers  
- number : 4  
- dimensions : 25 mm  
- marking : PPR100 PN25 Ø25 5 +GF+ hakan  
elbows  
- number : 6  
- dimensions : 25 mm  
- marking : Ø25 PP-R +GF+

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**2 Sample preparation and conditioning**

The build up of the assembly is depicted in the figure below and in accordance with EN 12293.



**Figure 1, schematic representation of the build up of the construction (lengths in mm)**

**3 Apparatus**

The equipment is in accordance with EN 12293:1999. The equipment is a thermal cycling testing apparatus manufactured by IPT Germany.

**4 Test method**

The test method used is in accordance with EN 12293:1999.

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**5 Test parameters**

Test pressure	:	(10±0,2) bar
Test temperature cold	:	(20±2) °C
Test temperature hot	:	(93±2) °C
Temperature difference in/out	:	< 5°C
cycle time cold	:	(15 <sup>+1/-0</sup> )min
cycle time hot	:	(15 <sup>+1/-0</sup> )min
total cycle time	:	(30 <sup>+2/-0</sup> )min
alteration time cold → hot	:	≤ 60 sec
alteration time hot → cold	:	≤ 60 sec
Water velocity	:	>0,5 m/s
Number of cycles	:	> 5000 (see test results)
Environment	:	water in air
Environmental temperature	:	(23±5)°C
Applied pre tensile stress	:	(638±1)N
Bending radius branch C1	:	not applicable
Conditioning period	:	1 h
Accuracy pressure equipment	:	+2%/-1%
Number of tested assemblies	:	1
Number of joints tested	:	22
Construction assembled by	:	Kiwa
Date received at Kiwa Lab C	:	26-08-2019
Test started at	:	02-09-2019
Test performed by	:	Mr B. Bonekamp

**6 Test results**

Number of cycles executed	:	5010
Signs of leakage	:	Where :
- pipe	:	No
- fitting	:	No
- jointing	:	No
Observation of delamination	:	No

**7 Remarks**

None

**8 Conclusions**

The tested joints as described above did not show any failure and no leakage was observed during testing time.

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