

"Pressure-proof test" 4L218?

Stress test

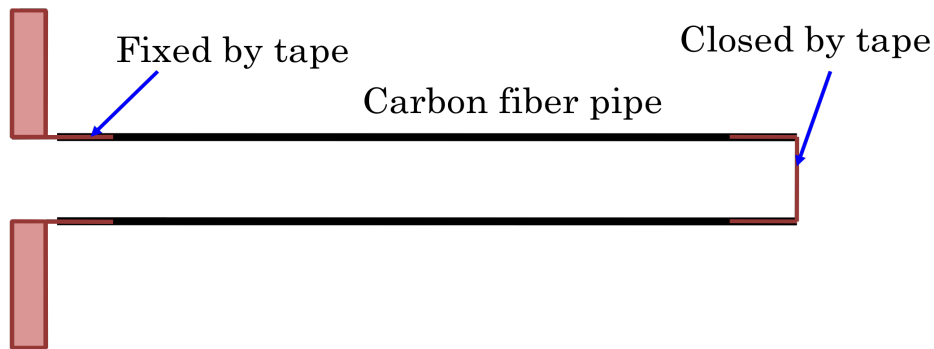
We applied to perform ^{ed} ~~the stress tests of 2.5m long~~ ^{pressure-proof test} Carbon fiber Reinforced Plastic (CFRP) pipes at 3 bar without mylar window. Therefore, ~~We~~ ^{for the} used tape to connect flange and close downstream side in order to disconnect them after the test. We explain how to set up and what we did in this ~~stress~~ test.

Pressure difference upto 3 bar was applied to them.

Set up for the test

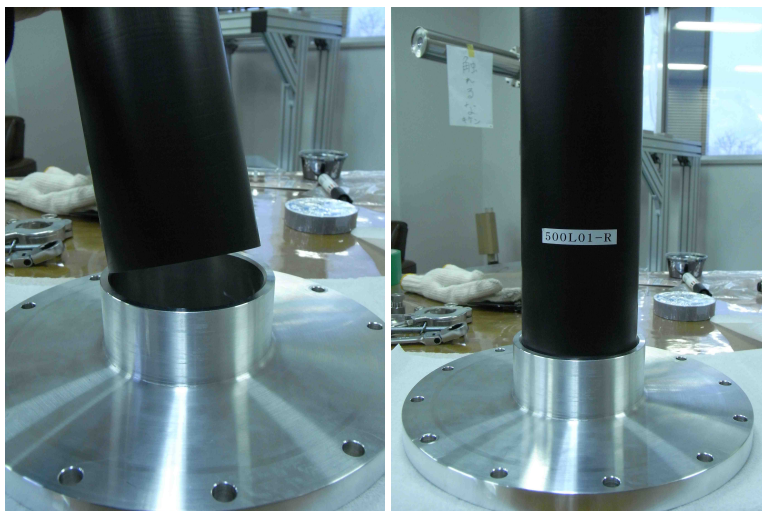
- 1) Sealing CFRP pipe

Aluminum flange

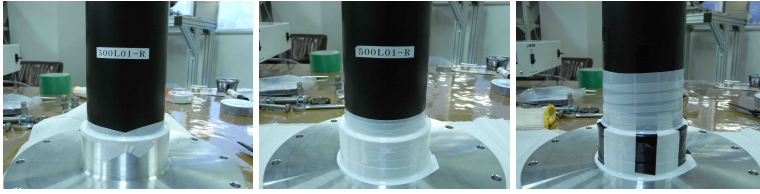


Picture 1:

- i) Upstream side



Picture 2



Picture 3:

We put some layers of tape to seal a small gap between the flange and the CFRP pipe.

ii) Downstream side



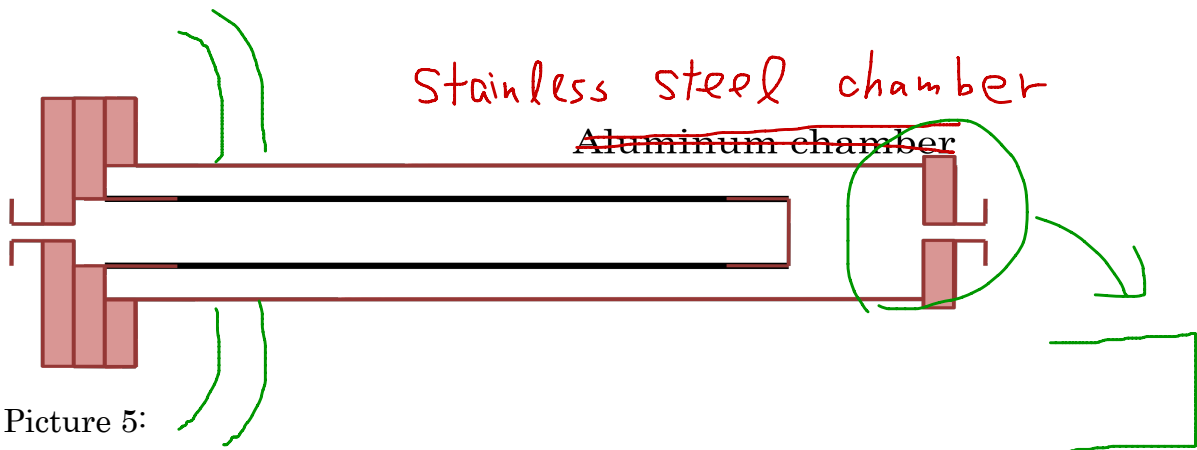
Picture 4:

It was very difficult operation to seal a ~~leak by tape only~~ in the downstream side. ^{With tape} At first we made bridges with tape changing its angle and put tape along the circumference of the pipe (Picture 4). We repeated ~~to put tapes~~ until the leak level is low enough. ~~The leak was checked by~~ ^{the procedure} pressuring inside pipe, ~~leak tightness was confirmed.~~

2) Assemble of test bench ^{chamber}

We ~~connect an aluminum pipe that we can pressurize outside~~ pipe.

^{used stainless steel} to install the CFRP pipe.



Picture 5:



Picture 6:

Samples of ~~Carbon Fiber Reinforced~~ ~~Plastics~~ (CFRP) Pipes

- 500L01 : 50 cm length and 8 cm diameter
- 500L02 : 50 cm length and 8 cm diameter
- 500L03 : 50 cm length and 8 cm diameter
- 500L04 : 50 cm length and 8 cm diameter
- 2580L01 : 2580 cm length and 8 cm diameter
- 2580L02 : 2580 cm length and 8 cm diameter
- 2580L03 : 2580 cm length and 8 cm diameter

50 cm long and 8 cm in diameter

Pressure-Proof test
~~Stress test~~ procedure

Definition :

- 3 bar outside : 4 bar outside and atmosphere pressure inside the pipe
- 3 bar inside : 4 bar inside and atmosphere pressure outside the pipe

- outside test : 3 bar outside → 0 bar → 3 bar outside → ... → 0 bar : 10 times
- inside test : 3 bar inside → 0 bar → 3 bar inside → ... → 0 bar : 10 times

We did ^{made} outside test at first and ^{the} inside test ^{next} ~~in the second~~ (except the first test with 500L02, ~~following~~ ^{the} test results below). We pressurized gas by a compressor and kept ^{it} about ~~40~~ ^{air} seconds and then released the pressure.

it as described in

Test results

1. 500L02:

Date: 20.1.2012, Operator: Iwata and Nukazuka

Outside test and ^{the} inside test ~~were no problem.~~

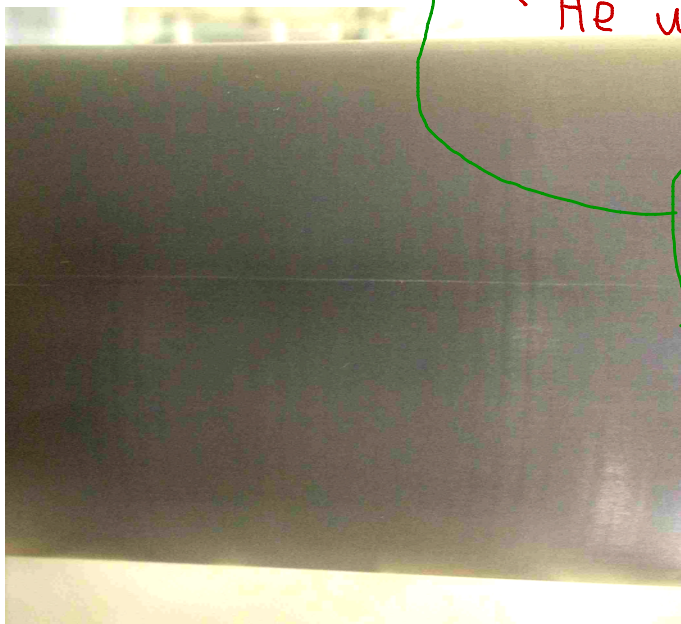
No problem was found in the

2. 2580L03

- Date: 20.1.2012, Operator: Nukazuka

Inside test was applied at first. A big leak was found and ~~put~~ ^{was added} additional tape. Even after repeating ^{it} ~~four~~ ^{four} times, the leak was still remained.

Therefore outside test was attempted instead. After one minute in the first attempt of pressurizing outside, Nukazuka listened a sound something broken and he stopped the test. A white line, which ~~was~~ ^{is} 1 m long ^{running} from 50 cm far from the downstream edge, was found (see Picture 7).



He unmounted the CFRP pipe from the chamber.

However, the pressure ^{then} still remained.

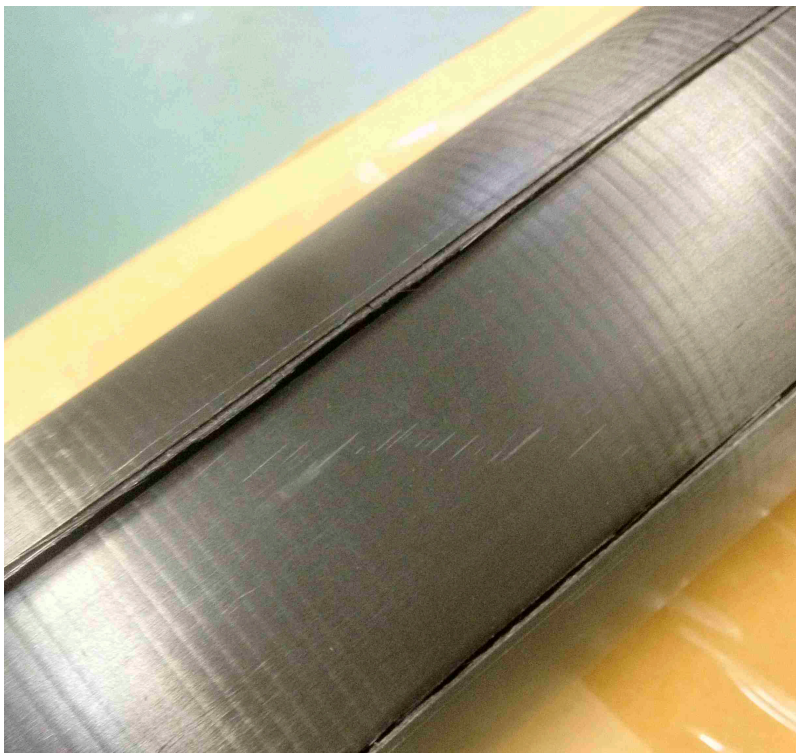
Picture 7:

- Date: 26.1.2012, Operator: Iwata and Nukazuka

After the test in January 20 the pipe was kept as it was. Leak of the pipe 2580L03 was checked using soapy water and no leak was found. After that, inside test was succeeded without any problems. However outside test was attempted ~~as well~~, they listened another sound from the pipe in ~~the first pressurization~~. They stopped the compressor and released the pressure. They tried pressuring again. And then the pipe was broken with a big noise after 30 seconds (see Picture 8).

firstly

when the



Picture 8 :

3. 2580L01

- Date: 24.1.2012, Operator: Nukazuka

No problem was found in inside test and outside test.

the the

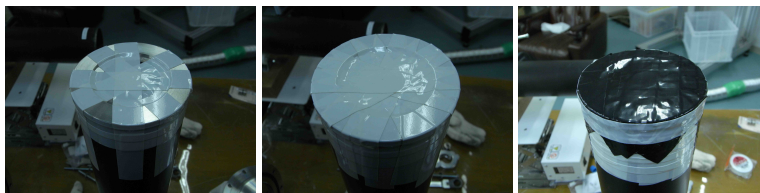
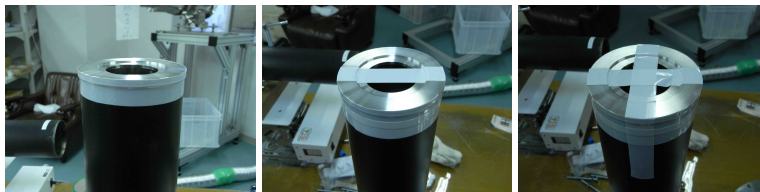
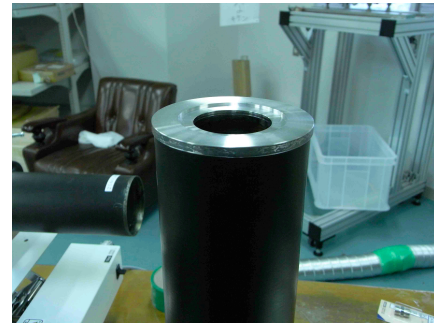
4. 2580L02

- Date: 24.1.2012, Operator: Nukazuka

No problem was found in inside test and outside test.

the the

After these tests we decided to use a support flange in the downstream side, ~~that is used for silver coating~~, to avoid additional mechanical stress to the pipe during the operation of putting the tape (see picture below).



Picture 9:

5. 500L01

- Date: 5.2.2012, Operator: Nukazuka

No problem was found in inside test and outside test.

the the

6. 500L03

- Date: 5.2.2012, Operator: Nukazuka

No problem was found in inside test and outside test.

the the

7. 500L04

- Date: 11.2.2012, Operator: Nukazuka

No problem was found in inside test and outside test.

the the

Proposal for the test of 2675mm long pipes

We ordered additional two 2675mm long pipes and we have six pipes for the 2012 run. We propose