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ASSEMBLY PROCEDURE

POLYIMIDE HEATERS ON ATLAS BEAMPIPE

Abstract

This document describes how to mount the polyimide heaters on the ATLAS beampipe.

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History of Changes

Rev. No.	*Date*	*Pages*	*Description of Changes*
0	24.07.2002		First release

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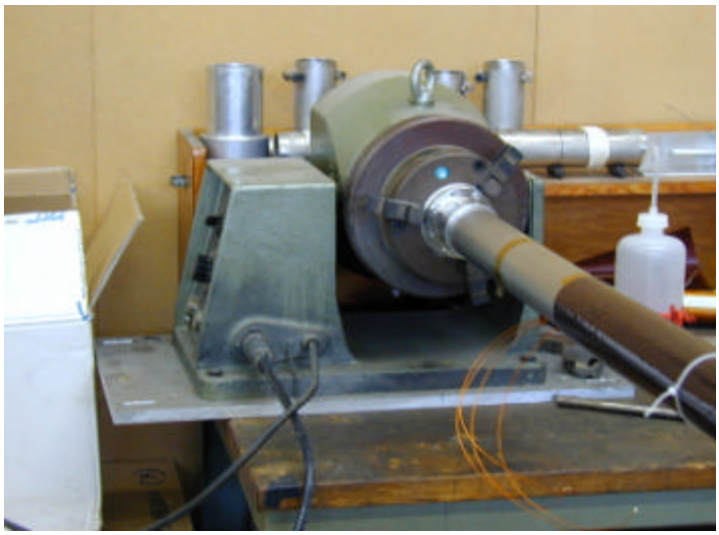
OPERATION # A

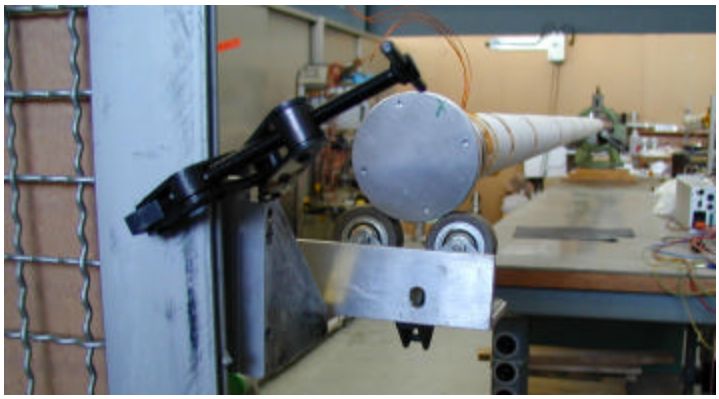
Operation description

- Preparation inner tube.
- One extremity in manipulator, other extremity on rolling support.
- Make sure that the tube surface is clean and without sharp irregularities.

Resources required

- Manipulator.
- Rolling support.





OPERATION # B

Operation description

- Mounting heater.
- Attach heater to the tube with self adhesive tape and cable ties.
- Fill the gaps in between the heating patches with polyimide tape, glue side on the outside.

Resources required

- Polyimide tape, Pixeo Kaneka.
- Cable ties L=250.
- Gloves
- Heater, Rica.
- Polyimide self adhesive tape, Permapack P221.

OPERATION # C

Operation description

- Polyimide tape spirally wrapped around the tube, half overlapped. This gives two layers of polyimide tape around the heater.
- When wrapping polyimide tape, remove self adhesive tape and cable ties.
- The polyimide tapeshould never be glued to the tube, only to itself or to the polyimide heater.

Resources required

- Polyimide tape, Pixeo, Kaneka.

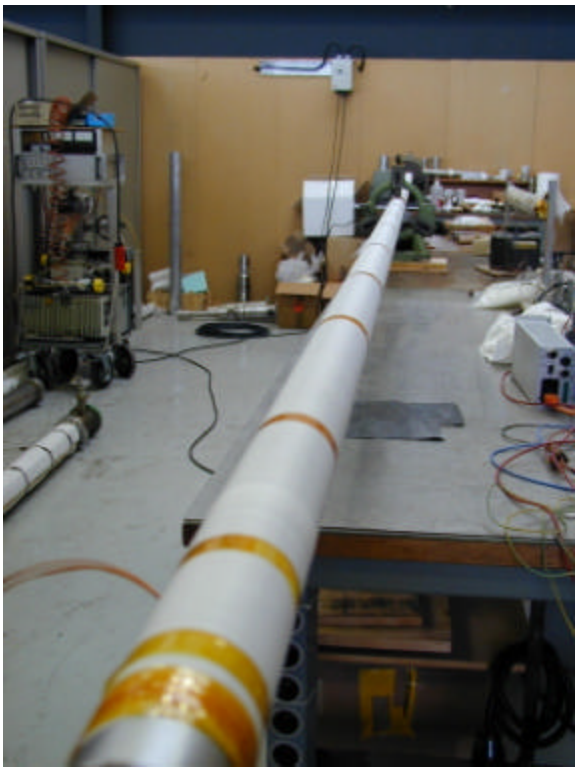
OPERATION # D

Operation description

- The polyester tape is wrapped spirally around the assembly. First 3 rotations straight, than with an angle to create a 50% overlap, giving two layers.
- At the extremities and also at every half a meter the polyester tape is attached by polyimide self adhesive tape.

Resources required.

- 30 mm polyester tape, Fratec 117803.



OPERATION # E

Operation description

- One layer of aluminized polyimide foil is wrapped around the assembly and attached by means of polyimide self adhesive tape.
- Ceramic spacers are taped around the tube with self adhesive tape with glass-cloth, to avoid thermal losses to the vacuum chamber.
- The distance between the spacers is 2.5 meters.

Resources required

- Aluminized polyimide, Tricon.
- Self adhesive tape with glass-cloth, 3M scotch 27.
- Ceramic spacers.

OPERATION # F

Operation description

- Heater connected electrically with flexible wire, polyimide, and ceramic connector blocks to electric feedthrough.

Resources required

- Flexible wire, polyimide, Habia H-H2419.
- Ceramic connector blocks.
- Electric feedthrough for vacuum chamber.

OPERATION # G

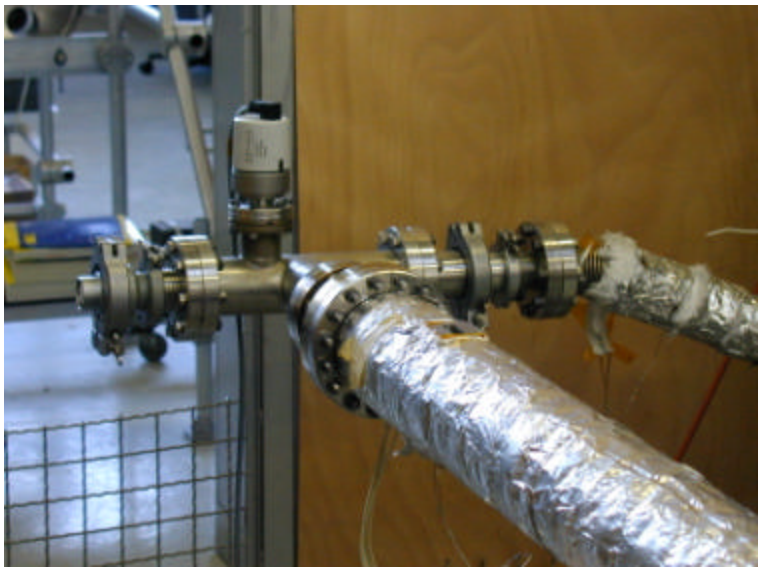
Operation description

- Elecrically test the circuits.
- Insert assembly into vacuum chamber.
- Thermocouples on the inside of the tube.

- Close vacuum chamber.
- Pump vacuum chamber down.

Resources required

- Vacuum chamber, inner diameter 100 mm+, 7.5 m+ long.
- Vacuum pumping station.
- 4 thermocouples, E-type.
- Thermocouple recorder.
- Multimeter.



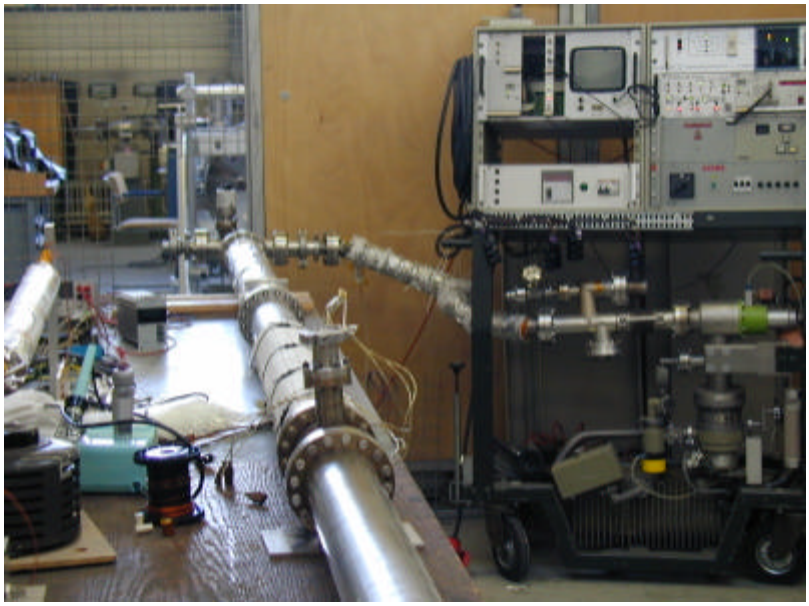
OPERATION # H

Operation description

- First several hours of pumping, preferably overnight, to obtain a good vacuum.
- Start heating. Two times 150 V AC gives a stable 200° C .
- 200° C for 1 hour will cure the glue.

Resources required

- Two variable transformers. Each transformer feeds two serial linked circuits of the heater.



OPERATION # I

Operation description

- Stop Pumping.
- Let the tube cool down.
- Open vacuum chamber and take the assembly out.
- Take of the aluminized polyimide foil and ceramic spacers.
- Check visually if everything is OK.
- Electrically test circuits.

OPERATION # J (For double wall option.)

Operation description

- Mount vespel spacers.
- Wrap two layers aluminized polyimide foil loosely around the tube.
- Cut small holes in the aluminized polyimide foil where the spacers touch the outer tube.
- Carefully insert the inner tube into the outer tube.

Resources required

- Vespel spacers
- Cutter.
- Polyimide strips cut out of a 0.15 mm foil, 2 mm wide, 300 mm long.

OPERATION # K (For double wall option.)

Operation description

- Compress bellows 12 mm.
- Make sure that 4 wires protrude from each pumping port.
- Weld second flange on the inner tube.
- Release bellows compression tool.
- Check electric resistance of the polyimide heaters.
- Close pumping ports with KF covers.

Resources required

- Bellows compression tool.
- Welding equipment.
- Multimeter.
- KF covers.