
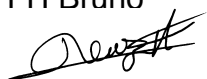




INSTALLATION MANUAL

TURBOPACK TC5-500, TC6-500

CARTRIDGE

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1. INTRODUCTION

This document gives the instructions of installation for the DTA expanders, serial TC5-500 and TC6-500.

It includes:

- The first installation of the cartridge
- Further cartridge removal and installation.

2. GENERAL INSTRUCTIONS

Always comply with the local safety regulations.

Any intervention on the expander must be approved by the plant manager, or his representative.

It is recommended that all unused parts be located in a clean area.

3. FIRST INSTALLATION OF A CARTRIDGE

3.1 EXPANDER STATUS

At this stage, the expander is welded on the cold box, and all pipes are connected. The links to the PLC have been fully checked.

The cleaning tool is inside the casing, in place of the cartridge (state of delivery from Air Liquide DTA).

The cold box has been fully cleaned.

The expander environment is therefore such that the expander could be safely started.

Ensure that there is no pressure indicated at the local gauges

3.2 REMOVAL OF THE CLEANING TOOL

[Fig. TC5001](#) Dismount the pressurization tube of the brake loop (spanner size: 22)

[Fig. TC5002](#) and [TC5003](#): Secure the spooler of the cooler and remove it from the casing (spanner size: 24). In case of a spooler, the piping between the cooler and the spooler must have first been dismantled.

[Fig. TC5004](#) : Remove the seal of the casing.

[Fig. TC5005](#) : Remove the stop flange of the cartridge , unfasten in staggered rows.

[Fig. TC5006](#) : Front view of the casing, with the stop flange and the seal of the casing both removed.

[Fig. TC5007](#) : Remove the instrumentation plugs on the casing.

[Fig. TC5008](#) : View of the cartridge installation tool.

[Fig. TC5009](#) : Install the cartridge installation tool on the casing (spanner size: 24)

[Fig. TC5010](#): and [TC5011](#): Insert the M16 screwed spindle inside the cleaning tool, and secure with the 2 nuts.

[Fig. TC5012](#) and [TC5013](#): Remove the cleaning tool by unfastening the nut (spanner size: 24)

[Fig. TC5014](#) : finalize the extraction with the hands, while securing.

Dismount cartridge installation tool.

[Fig. TC5015](#) : View of the inner part of the casing, without the cleaning tool. The inlet filter can be seen.

[Fig. TC5016](#) : View of the cleaning tool.

[Fig. TC5017](#) : Remove the inlet filter.

[Fig. TC5018](#) : View of the inlet filter.

[Fig. TC5019](#) : View of the inner part of the casing, without the inlet filter. The cryogenic seal of the inlet filter can be seen.

[Fig. TC5020](#) : check that there is no O-ring in this groove.

[Fig. TC5021](#) : Remove the cryogenic seal of the inlet filter, and the 3 O-rings.

Inspect the cryogenic seal and clean it with a wiper.

Blow the filter, degrease it if necessary.

Remount the cryogenic seal of the inlet filter.

3.3 INSTALLATION OF THE CARTRIDGE

[Fig. TC5022:](#) Mount the cryogenic seal of the cartridge; view of the casing with the 2 cryogenic seals and the 4 O-rings mounted.

[Fig. TC5023:](#) Insert the inlet filter inside the casing, larger thickness first, against the cryogenic seal.

[Fig. TC5024:](#) Slightly grease the 4 O-rings with Molycote (inside the startup package), and mount these 4 O-rings

[Fig. TC5025:](#) View of the casing, with the cryogenic seals, the inlet filter and the O-rings.

Remount cartridge installation tool

[Fig. TC5026:](#) Prepare the cartridge box. The arrow shows the direction of insertion inside the casing.

[Fig. TC5027:](#) Remove the cap of cartridge box, on the arrow side (spanner size: 10).

[Fig. TC5028:](#) view of the cartridge inside the cartridge box. Check the presence of the cryogenic seals.

[Fig. TC5029:](#) remove the outer plate of the cartridge installation tool.

[Fig. TC5030:](#) install the cartridge on the cartridge installation tool, and smoothly push it against the casing.

[Fig. TC5031:](#) Dismount the back cap of the cartridge installation tool (spanner size: 10)

[Fig. TC5032:](#) Align the mark on the cartridge a few degrees below the hole for the speed sensor (at the level of the screw driver).

[Fig. TC5033:](#) Mount the flange on the M16 screwed spindle and block it with the nut (spanner size: 24).

[Fig. TC5034:](#) Fully screw the flange of the cartridge.

[Fig. TC5035:](#) Place the nut close to the cartridge, and remount the back plate of the cartridge installation. The nut must be between the plate and the cartridge. Screwing the nut will insert the cartridge inside the casing. Some when some resistance is felt.

[Fig. TC5036:](#) Check the rough alignment of the 2 holes for the speed sensor (They should be slightly misaligned, as shown of the fig.).

[Fig. TC5037:](#) Remove the cartridge box, and the back plate of the cartridge installation tool. Remount the 2 caps on the cartridge box.

[Fig. TC5038:](#) Remove the cartridge installation tool.

[Fig. TC5039:](#) remount the stop flange of the cartridge without fully fastening.

[Fig. TC5040](#) and [41](#): fully align the 2 holes for the speed sensor (spanner size: 24), and remove the flange and spindle of the cartridge installation tool.

Fully fasten the stop flange of the cartridge, in staggered rows.

[Fig. TC5042](#): insert the temperature insert with its seal, for the bearing temperature sensor.

[Fig. TC5043](#): insert the temperature insert with its seal, for the brake temperature sensor.

[Fig. TC5044](#): insert the speed insert with its seal, for the speed sensor.

[Fig. TC5045](#): install the temperature sensors, and fasten the conical nut.

[Fig TC5046](#) and [47](#): install the optic fiber, and manually fasten the gland. Do not excessively bend the optic fiber.

[Fig. TC5048](#): install the seal of the brake loop on the spool piece or on the cooler, check that the casing seal is in place, and remount the spool piece or the cooler.

4. EXCHANGE OF A CARTRIDGE

4.1 EXPANDER STATUS

The procedure is to be used if there is a necessity to remove the cartridge.

The expander must imperatively been warmed up to room temperature, and all pipes vented with Nitrogen if the process gas is dangerous.

4.2 REMOVAL OF A CARTRIDGE

[Fig. TC5001](#) : Dismount the pressurization tube of the brake loop (spanner size: 22)

[Fig. TC5002](#) and [TC5003](#): Secure the spooler of the cooler, or the cooler itself if mounted directly on the casing, and remove it from the casing (spanner size: 22). In case of a spooler, the piping between the cooler and the spooler must have first been dismantled.

[Fig. TC5048](#): check the seal of the brake loop.

[Fig TC5046](#): remove the optic fiber, by manually unfastening the gland. Do not excessively bend the optic fiber.

[Fig. TC5045](#): remove the temperature sensors.

[Fig. TC5044](#): remove the speed insert with its seal.

[Fig. TC5043](#): remove the temperature insert with its seal, for the brake temperature sensor.

[Fig. TC5042](#): remove the temperature insert with its seal, for the bearing temperature sensor.

[Fig. TC5039](#): remove first the stop flange of the cartridge, and then, mount the spindle of the cartridge installation tool.

[Fig. TC5037](#): mount the cartridge installation tool, without the back plate.

[Fig. TC5027](#): remove the caps of cartridge box (arrow side).

[Fig. TC5049](#): install the cartridge box on the cartridge installation tool, and mount the back plate of the cartridge installation tool. The plate must be between the cartridge box and the nut. Fasten the nut to insert the cartridge inside the cartridge box.

[Fig. TC5034](#): remove the back plate of the cartridge mounting tool.

[Fig. TC5033](#): remove the flange and the spindle of the cartridge mounting tool.

[Fig. TC5050](#): mount the back cap of the cartridge box.

[Fig. TC5027](#): remove the cartridge box, and mount the front cap.

[Fig. TC5025](#): check the filter, the cryogenic seals and the O-rings.

4.3 INSERTION OF A NEW CARTRIDGE

[Fig. TC5025](#): Check that the inlet filter, the two cryogenic seals and the four O-rings are in place. The larger cryogenic seal should be changed at the third intervention. Inspect the filter and blow it with clean nitrogen if necessary. Install a new filter if the mesh is damaged.

[Fig. TC5026](#): Prepare the cartridge box. The arrow shows the direction of insertion inside the casing.

[Fig. TC5027](#): Remove the cap of cartridge box, on the arrow side (spanner size: 10).

[Fig. TC5028](#): view of the cartridge inside the cartridge box. Check the presence of the cryogenic seals.

[Fig. TC5029](#): remove the outer plate of the cartridge installation tool.

[Fig. TC5030](#): install the cartridge on the cartridge installation tool, and smoothly push it against the casing.

[Fig. TC5031](#): Dismount the back cap of the cartridge installation tool (spanner size: 10)

[Fig. TC5032](#): Align the mark on the cartridge a few degrees below the hole for the speed sensor (at the level of the screw driver).

[Fig. TC5033](#): Mount the flange on the M16 screwed spindle and block it with the nut (spanner size: 24).

[Fig. TC5034](#): Fully screw the flange of the cartridge.

[Fig. TC5035](#): Place the nut close to the cartridge, and remount the back plate of the cartridge installation. The nut must be between the plate and the cartridge. Screwing the nut will insert the cartridge inside the casing. Some when some resistance is felt.

[Fig. TC5036](#): Check the rough alignment of the 2 holes for the speed sensor (They should be slightly misaligned, as shown of the fig.).

[Fig. TC5037](#): Remove the cartridge box, and the back plate of the cartridge installation tool. Remount the 2 caps on the cartridge box.

[Fig. TC5038](#): Remove the cartridge installation tool.

[Fig. TC5039](#): remount the stop flange of the cartridge without fully fastening.

[Fig. TC5040](#) and [41](#): fully align the 2 holes for the speed sensor (spanner size: 24), and remove the flange and spindle of the cartridge installation tool.

Fully fasten the stop flange of the cartridge, in staggered rows.

[Fig. TC5042](#): insert the temperature insert with its seal, for the bearing temperature sensor.

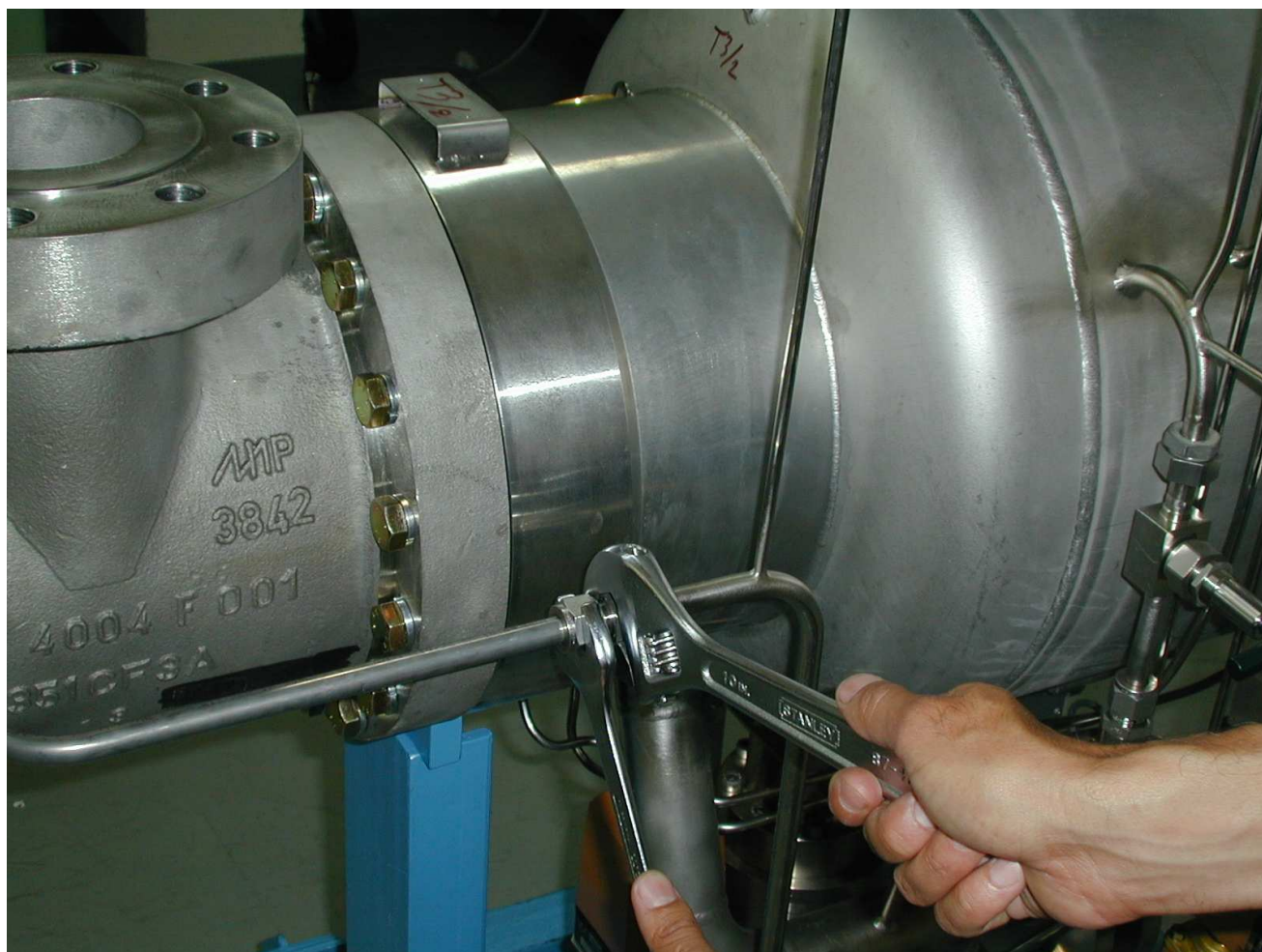
[Fig. TC5043](#): insert the temperature insert with its seal, for the brake temperature sensor.

[Fig. TC5044](#): insert the speed insert with its seal, for the speed sensor.

[Fig. TC5045](#): install the temperature sensors, and fasten the conical nut.

[Fig TC5046](#) and [47](#): install the optic fiber, and manually fasten the gland. Do not excessively bend the optic fiber.

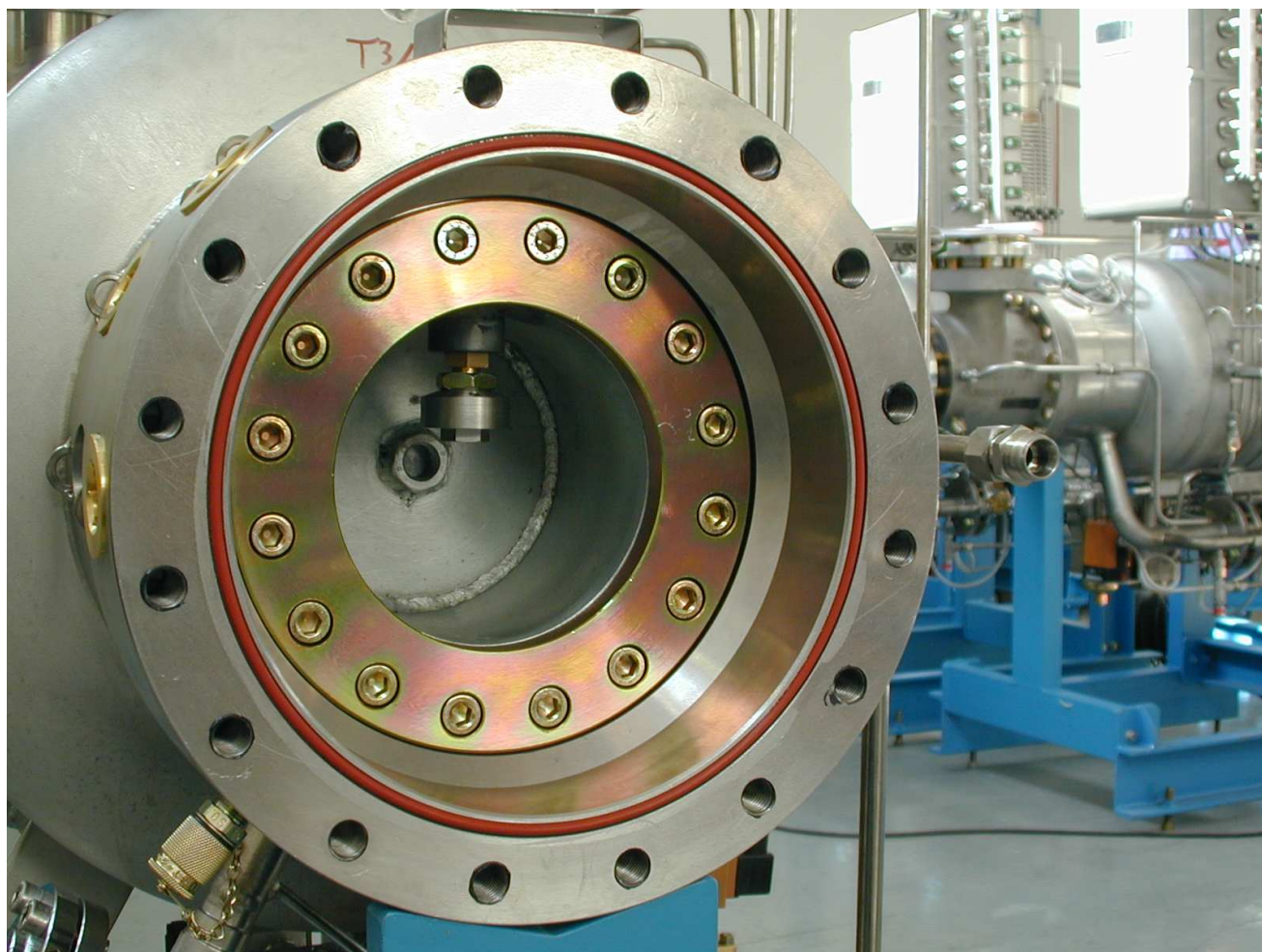
[Fig. TC5048](#): install the seal of the brake loop on the spool piece or on the cooler, check that the casing seal is in place, and remount the spool piece or the cooler.



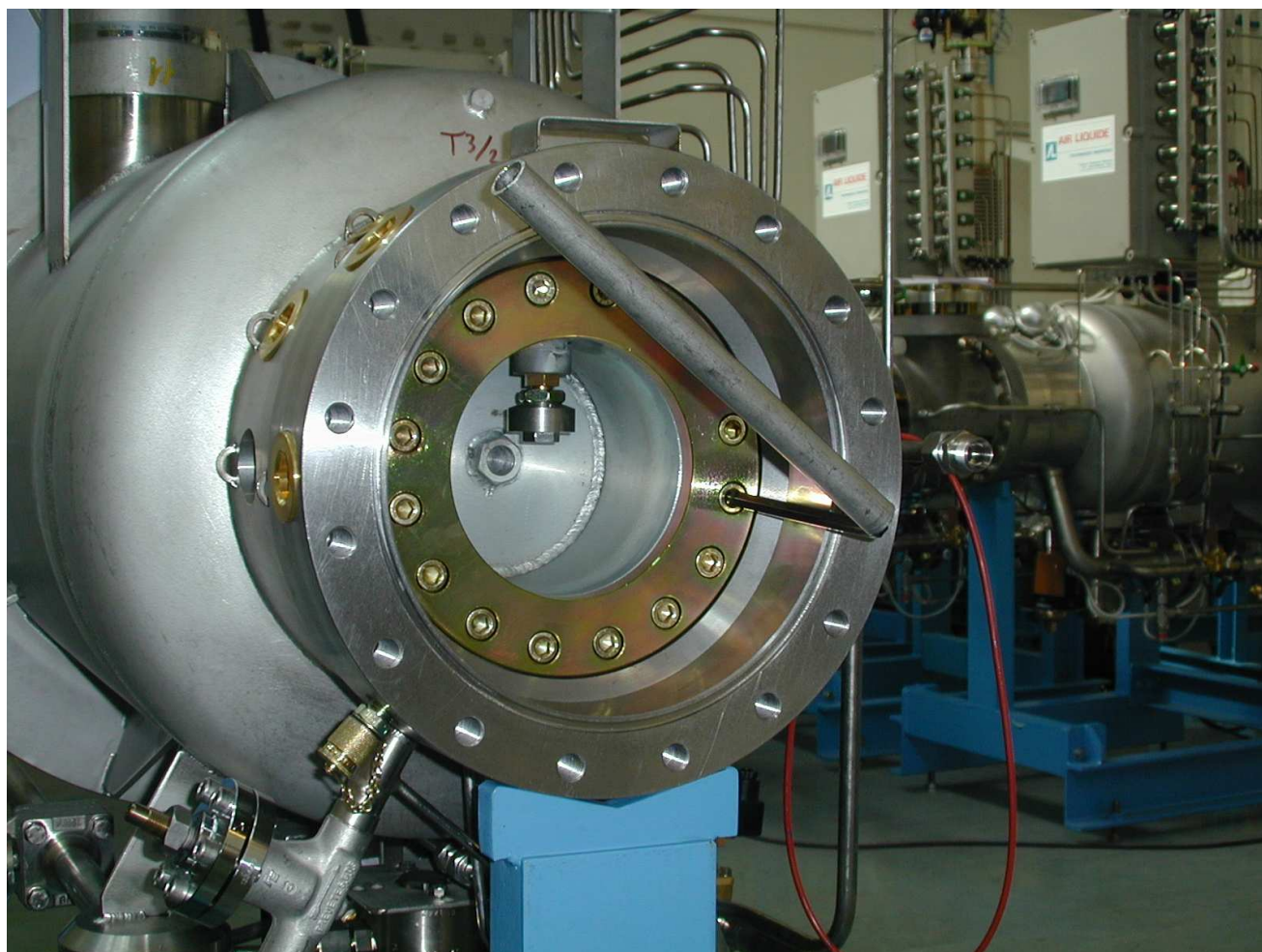
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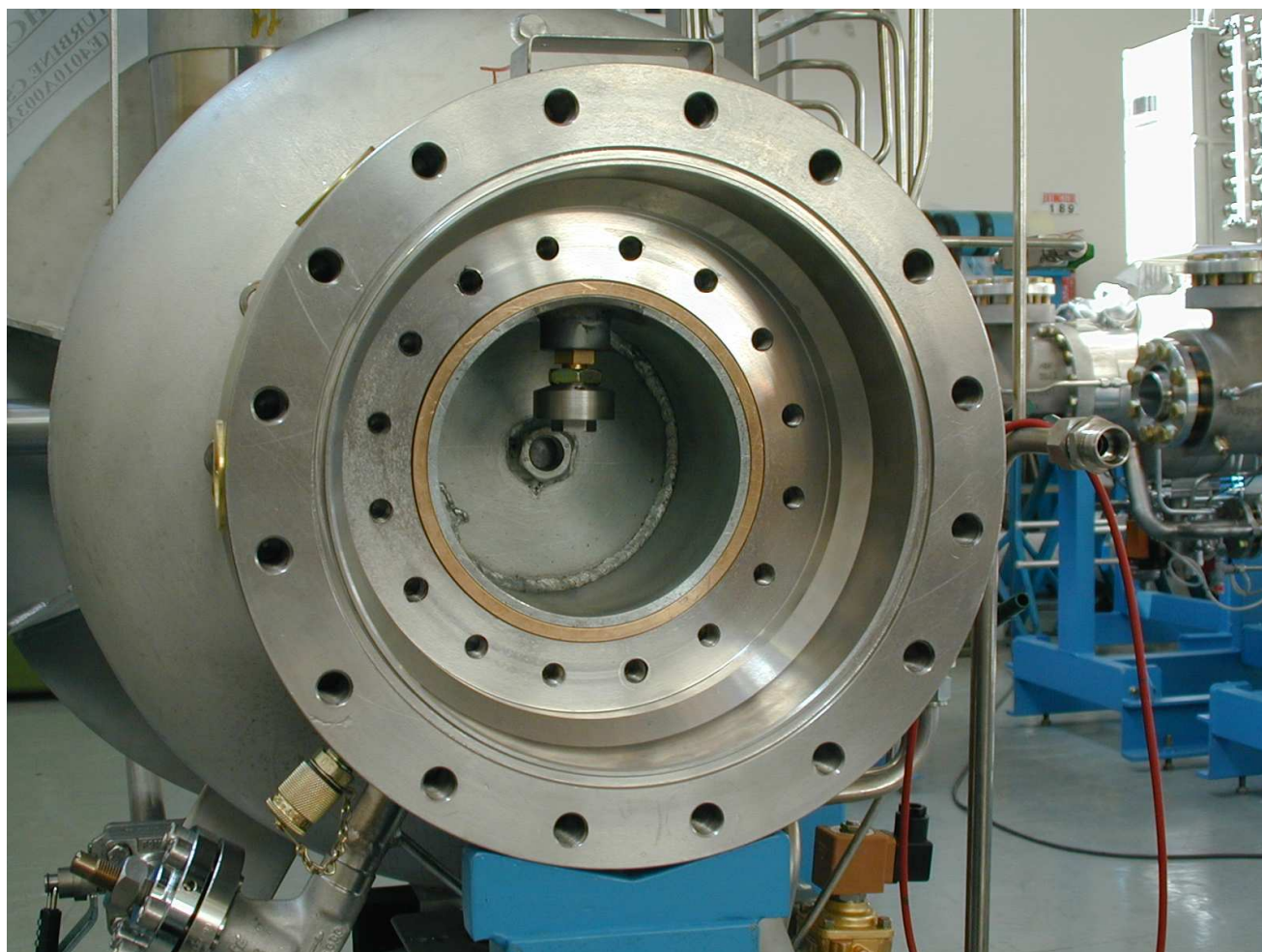
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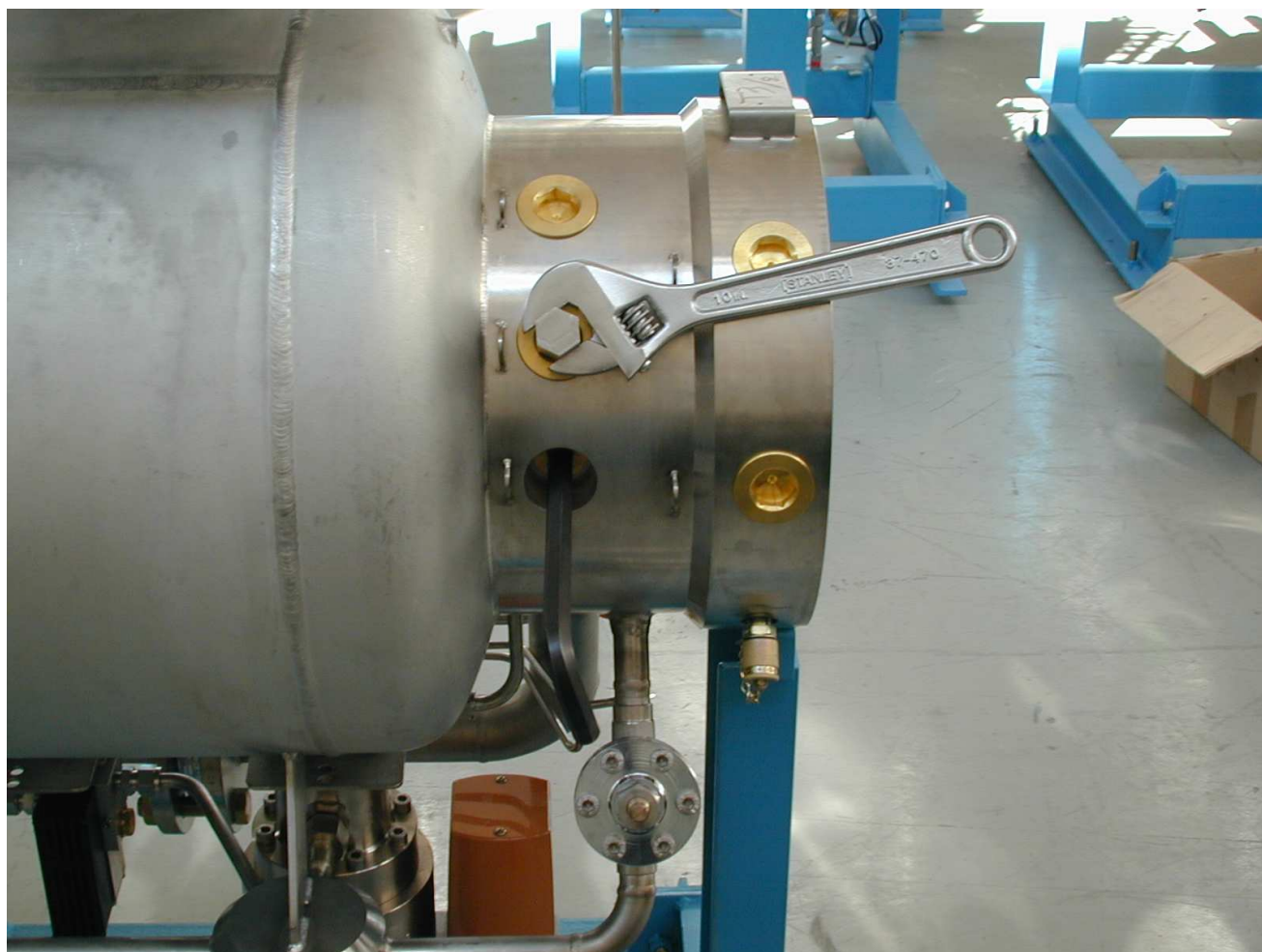
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TC5005



TC5006



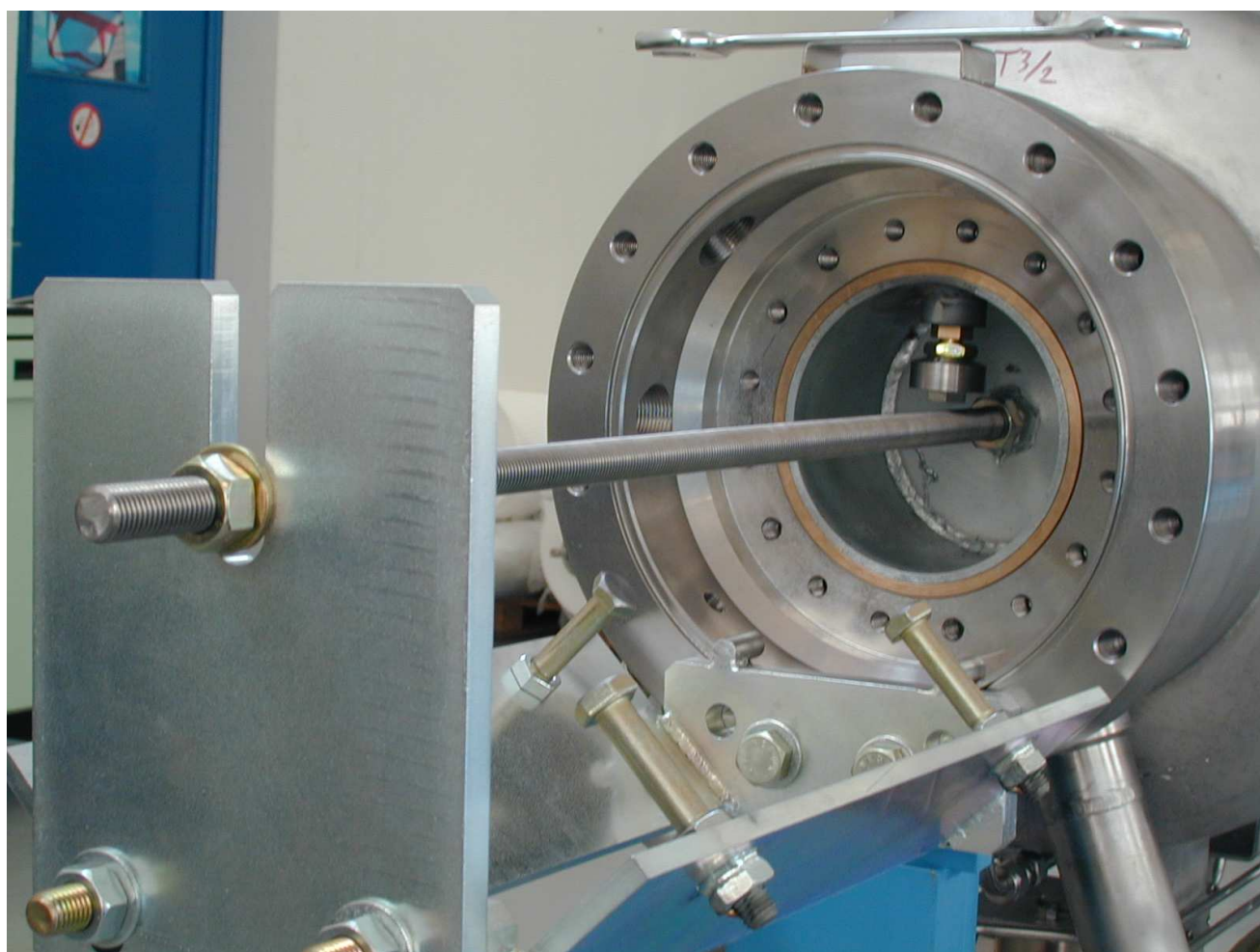
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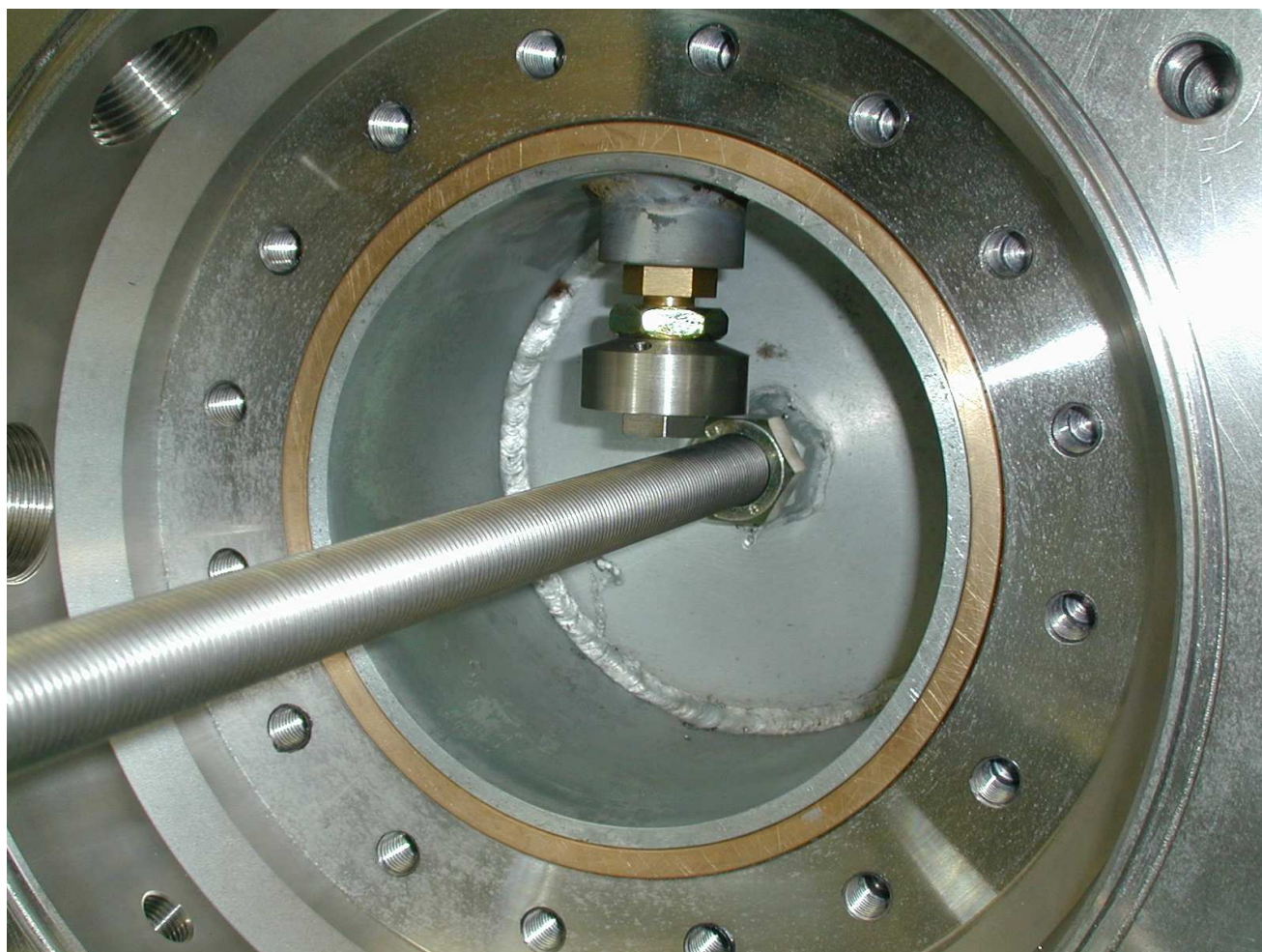
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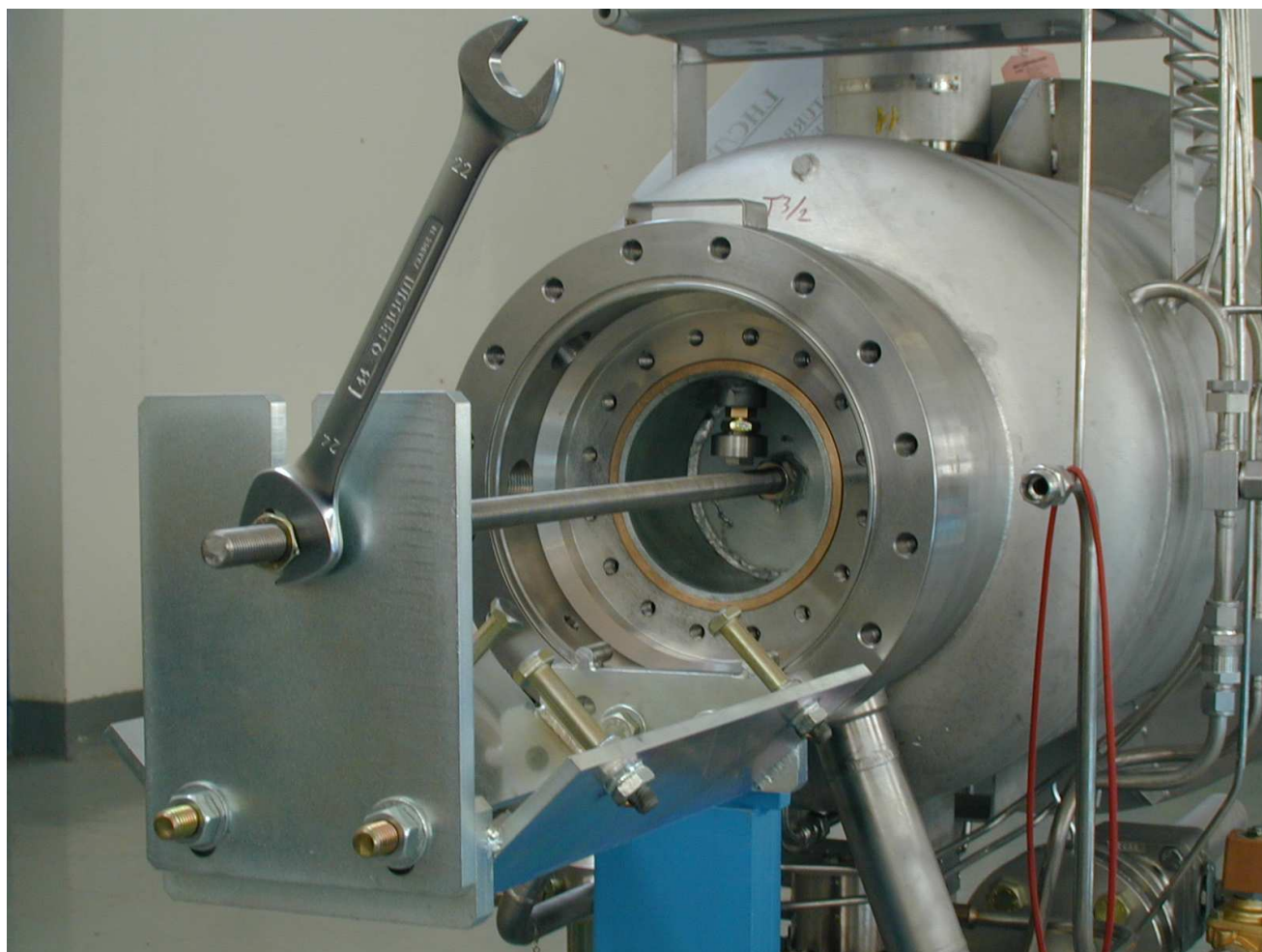
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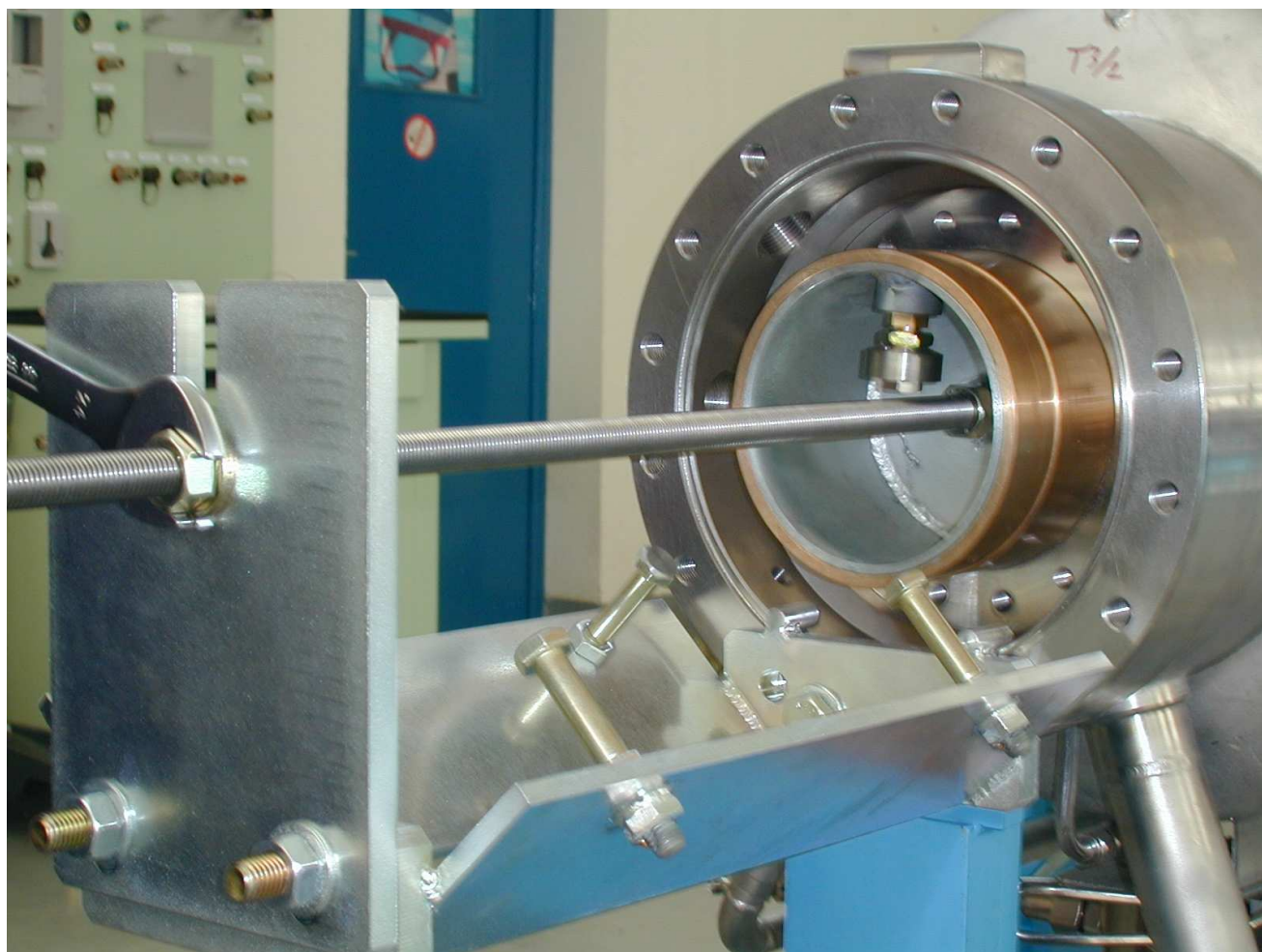
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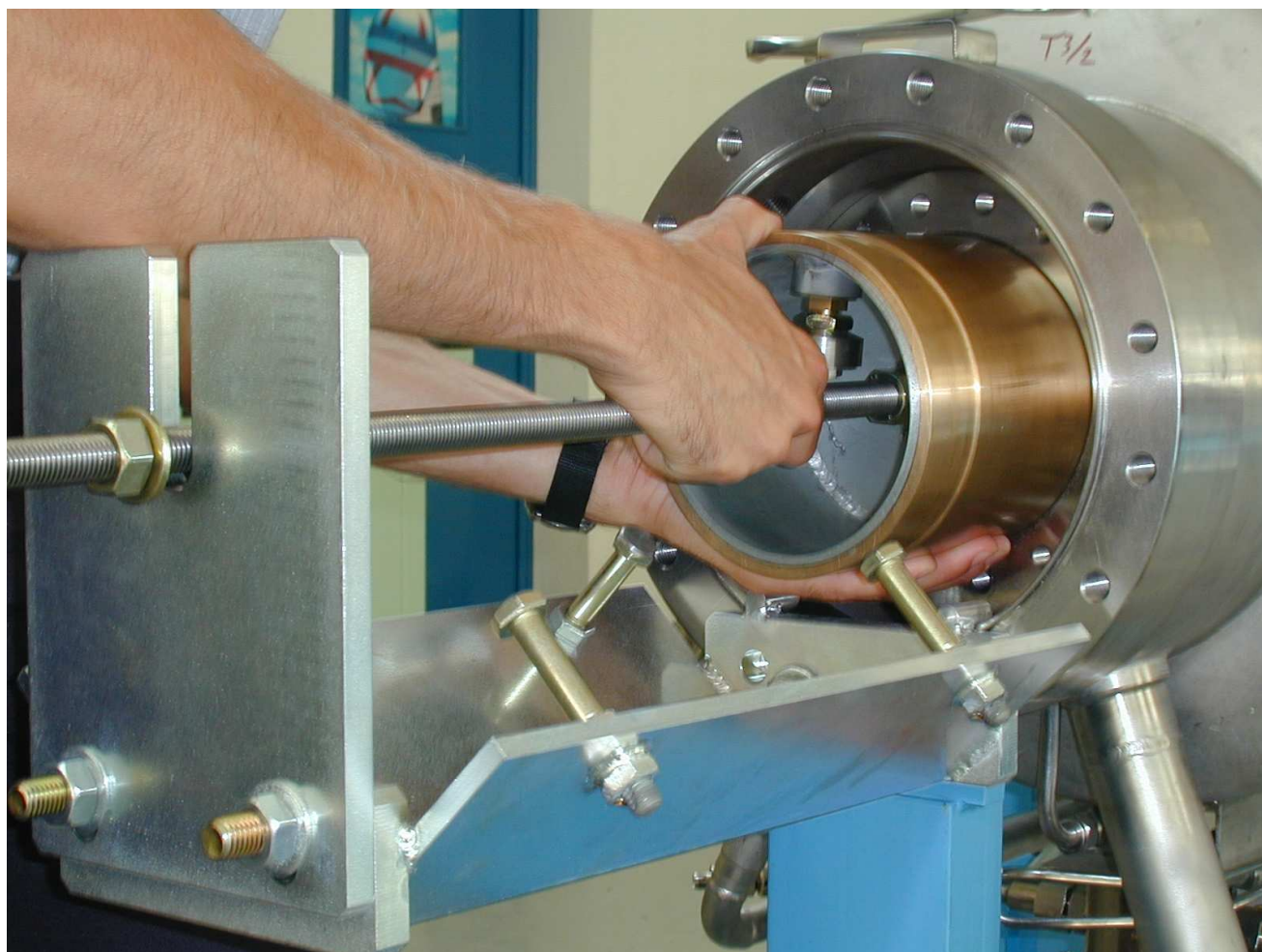
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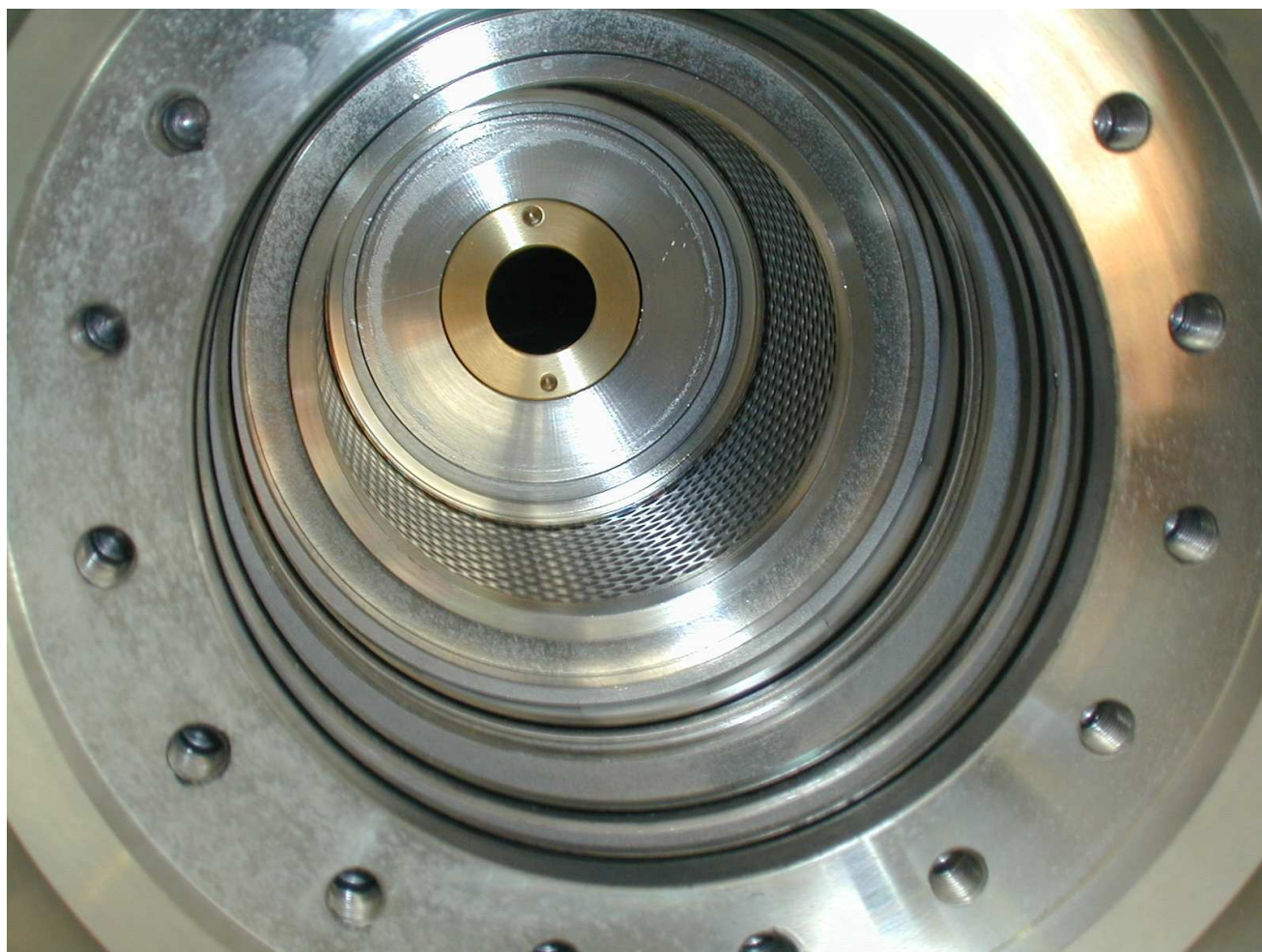
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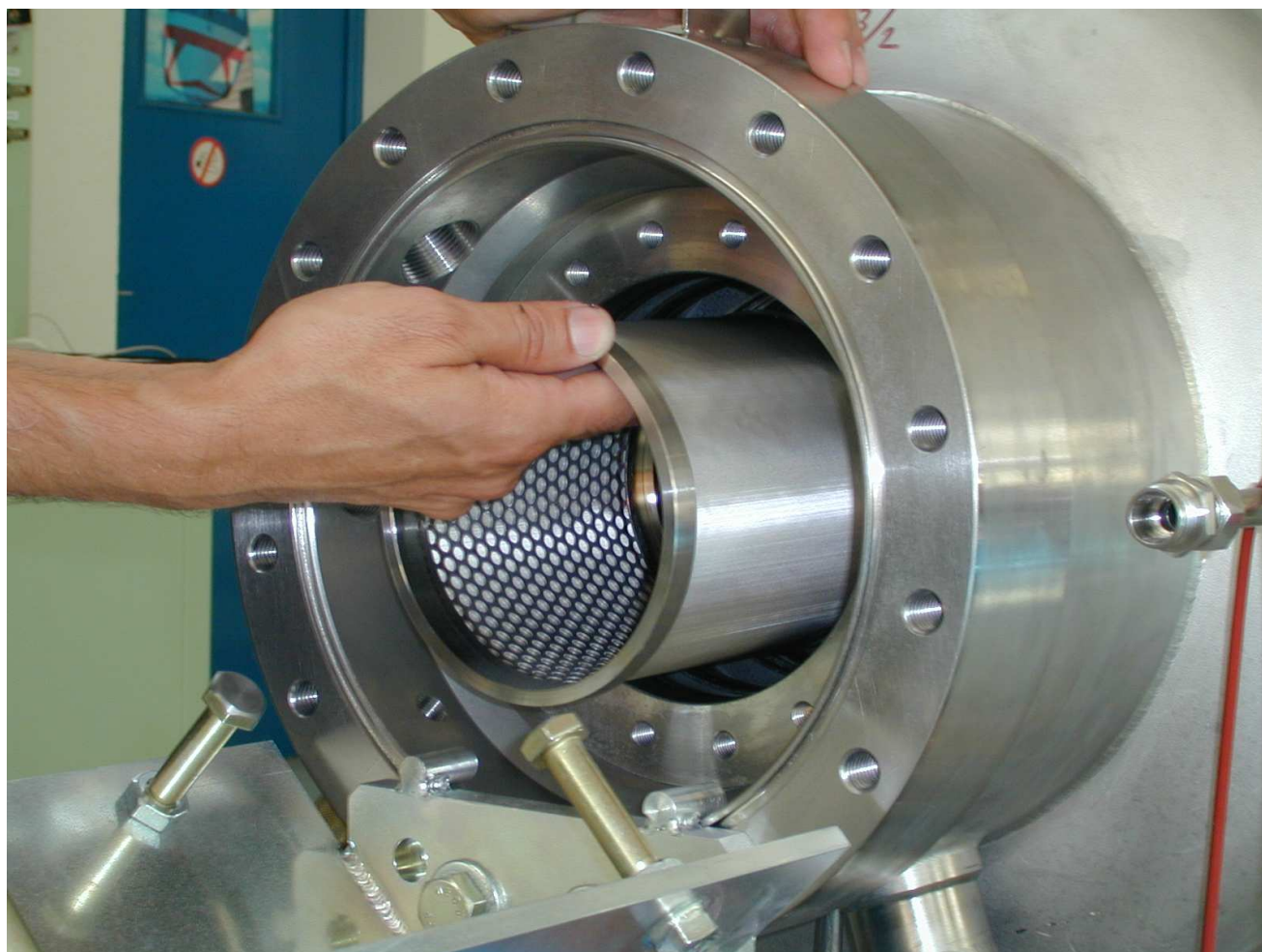
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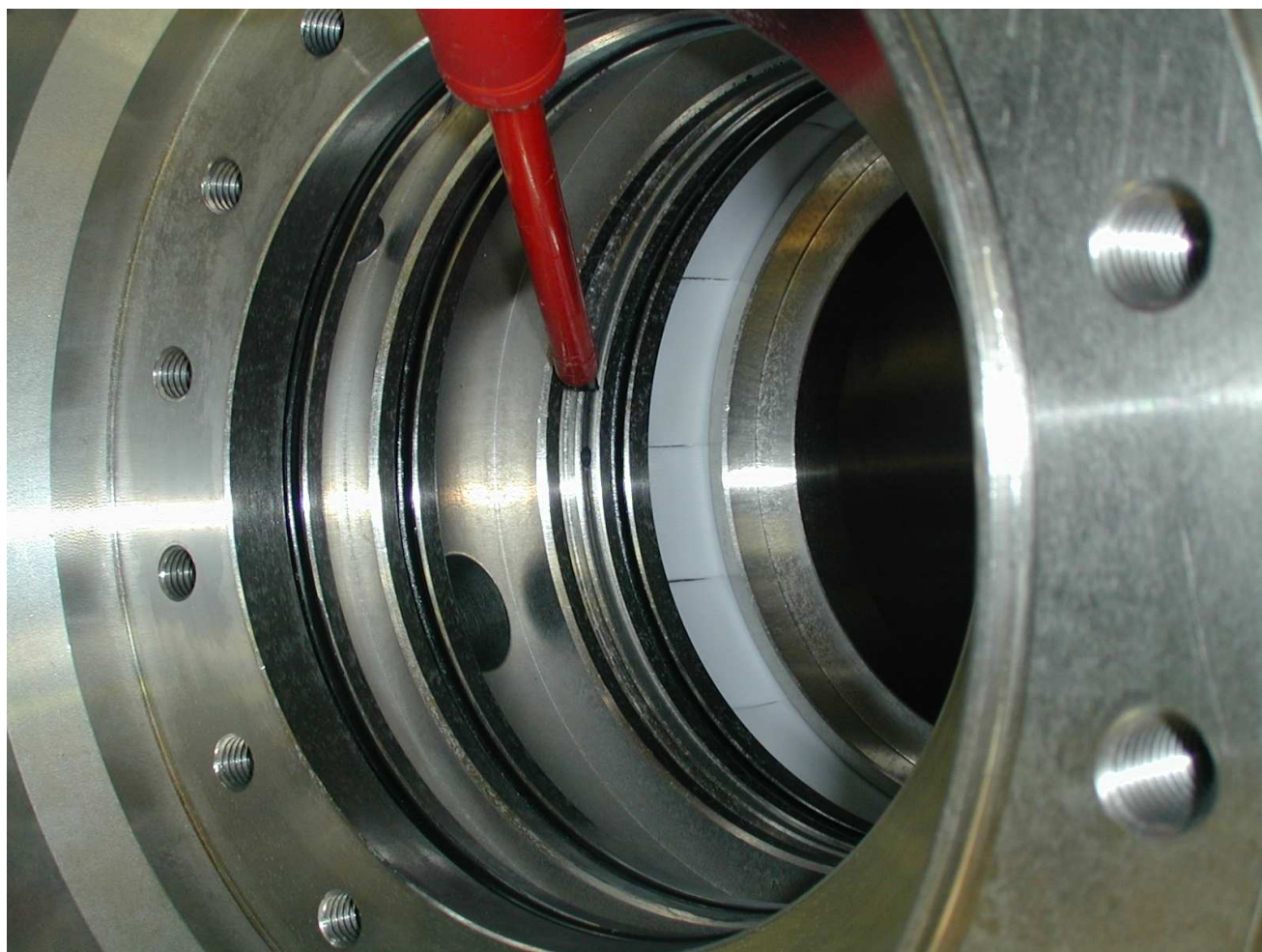
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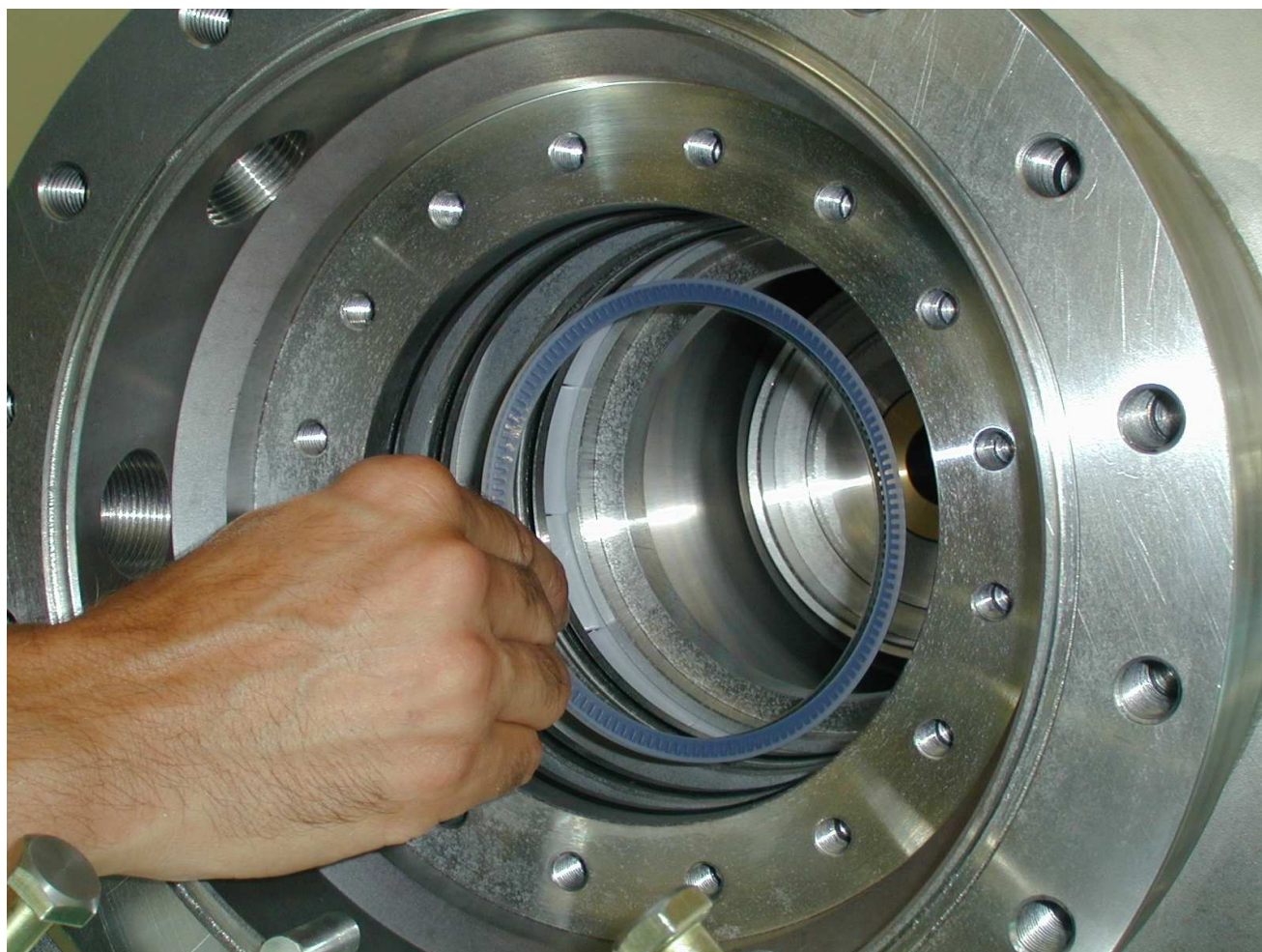
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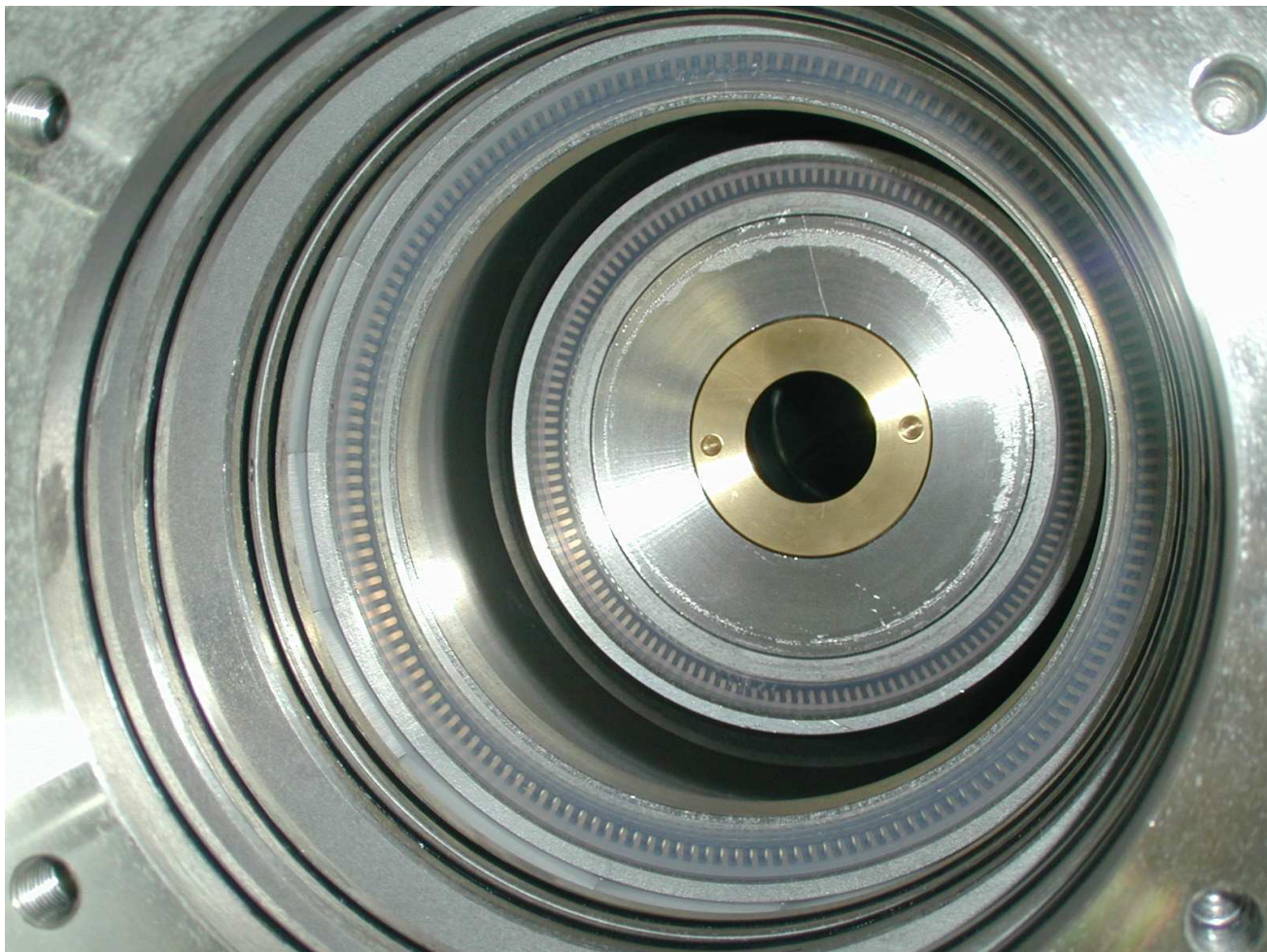
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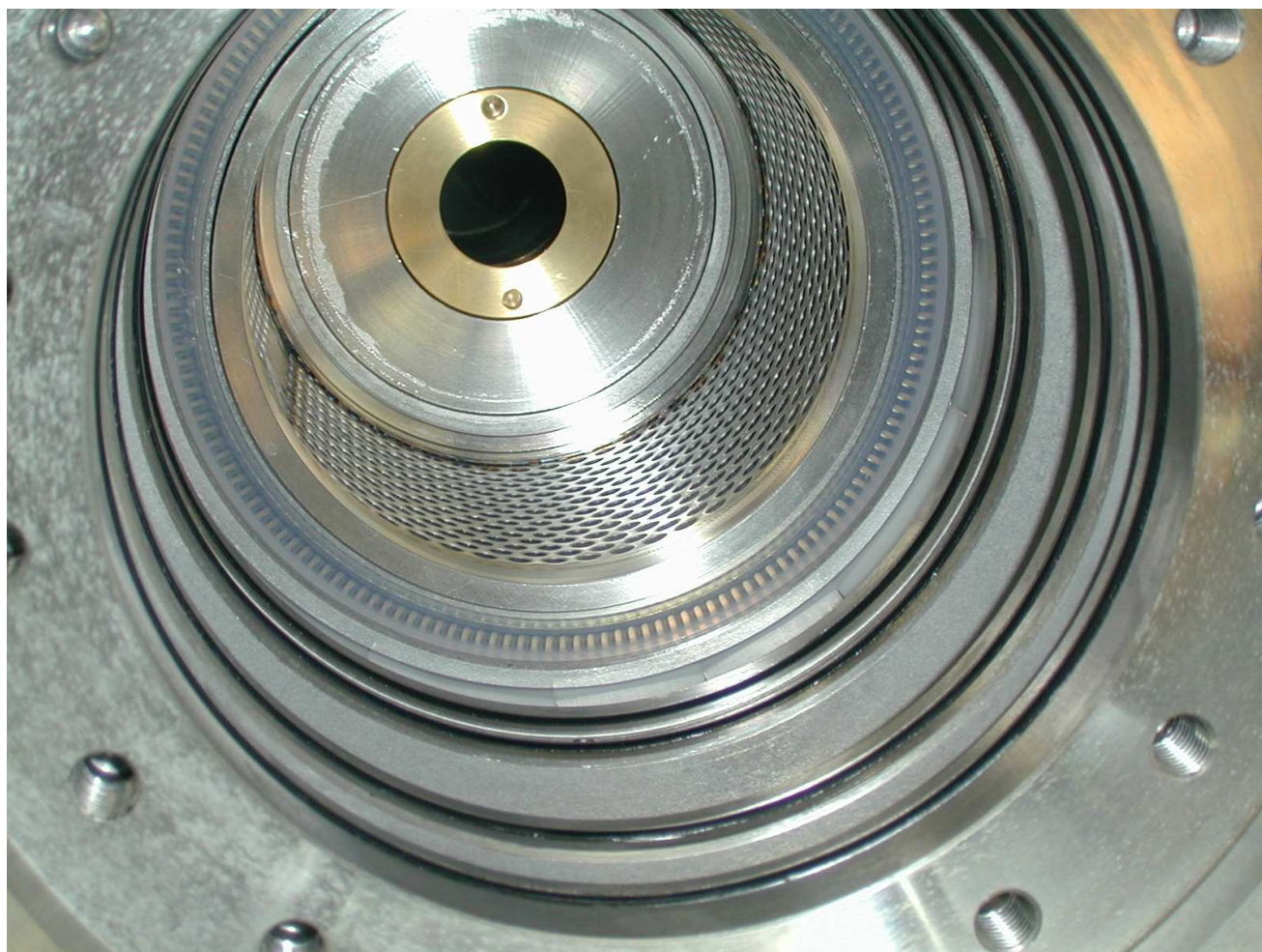
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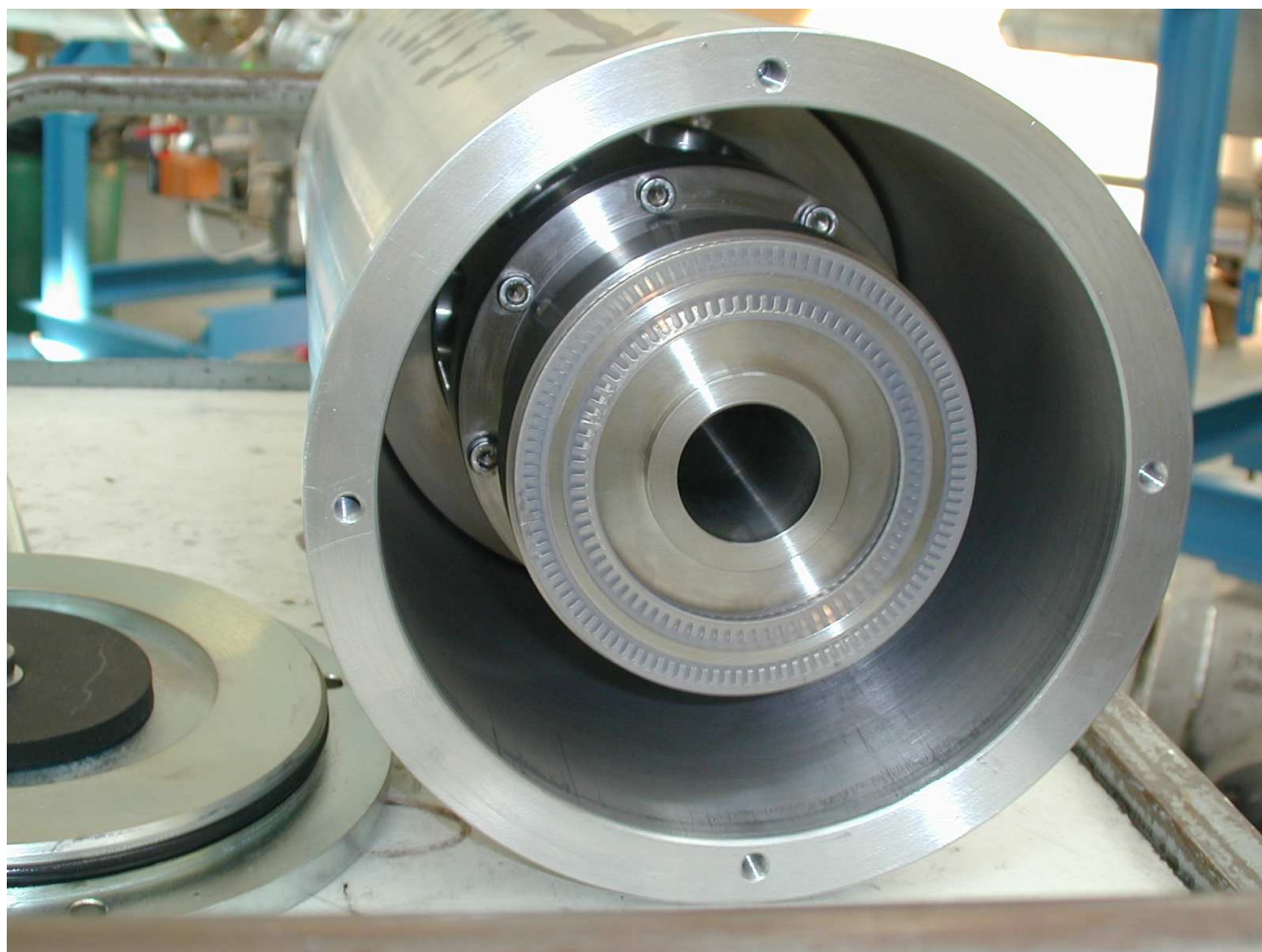
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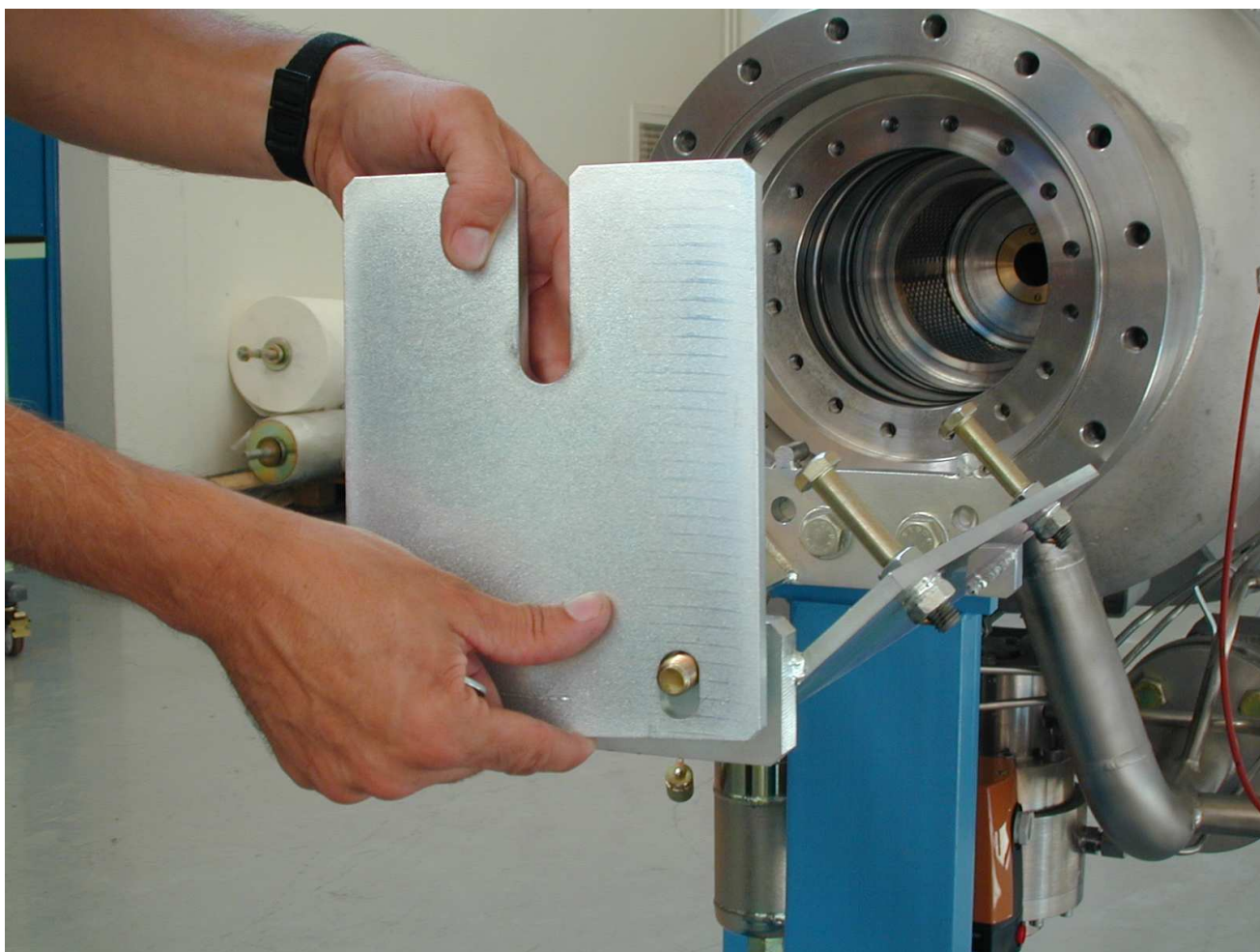
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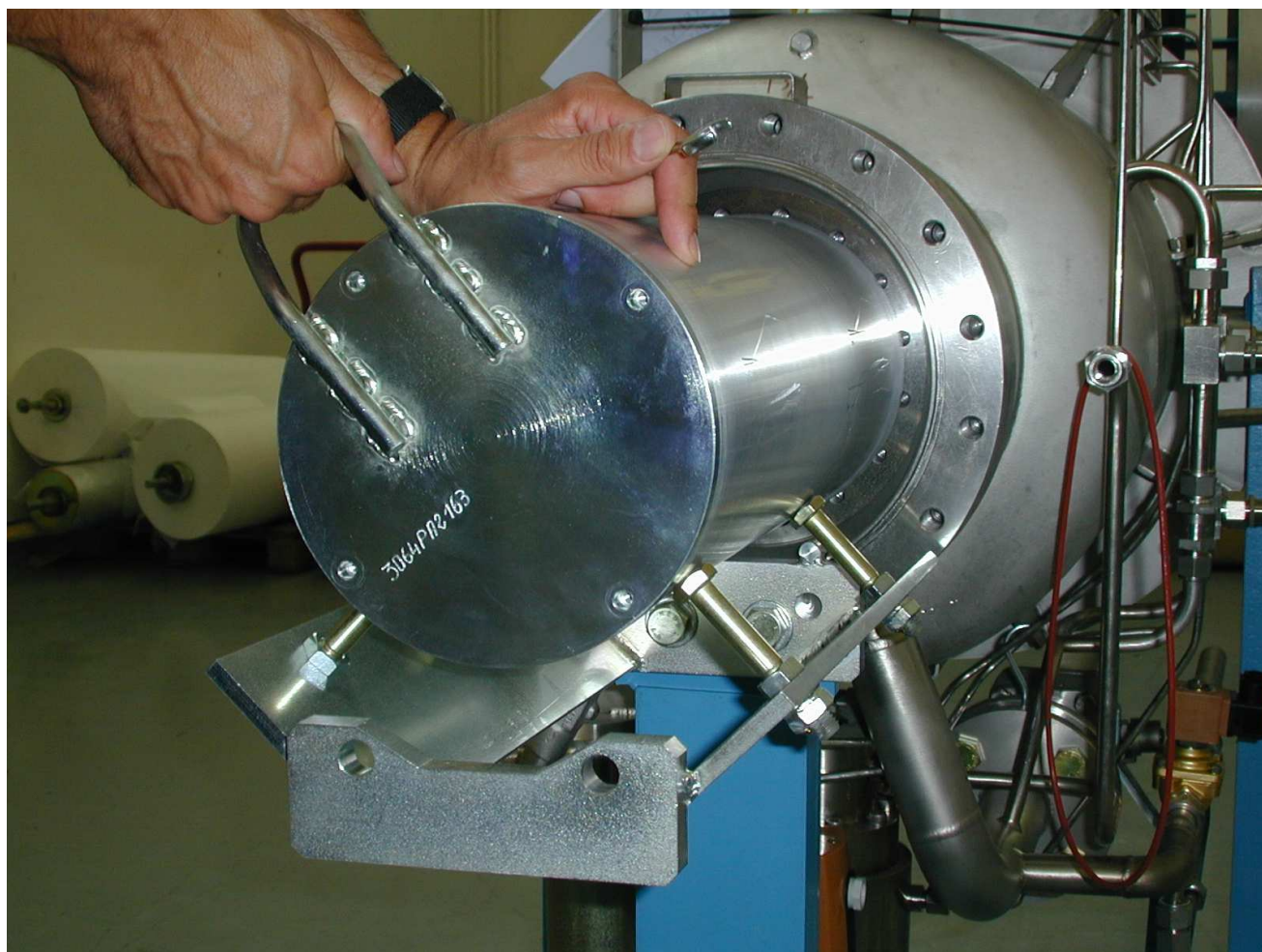
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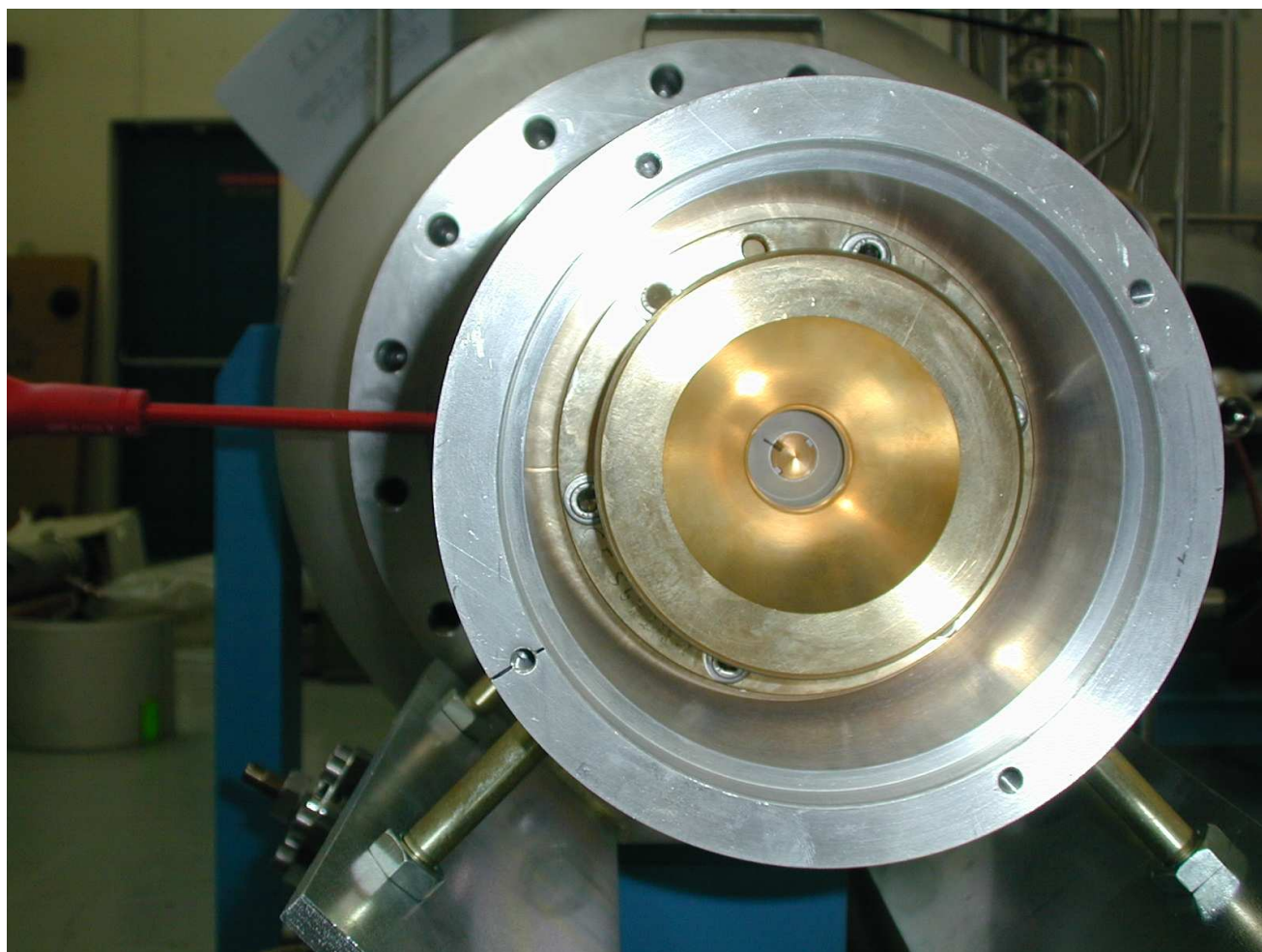
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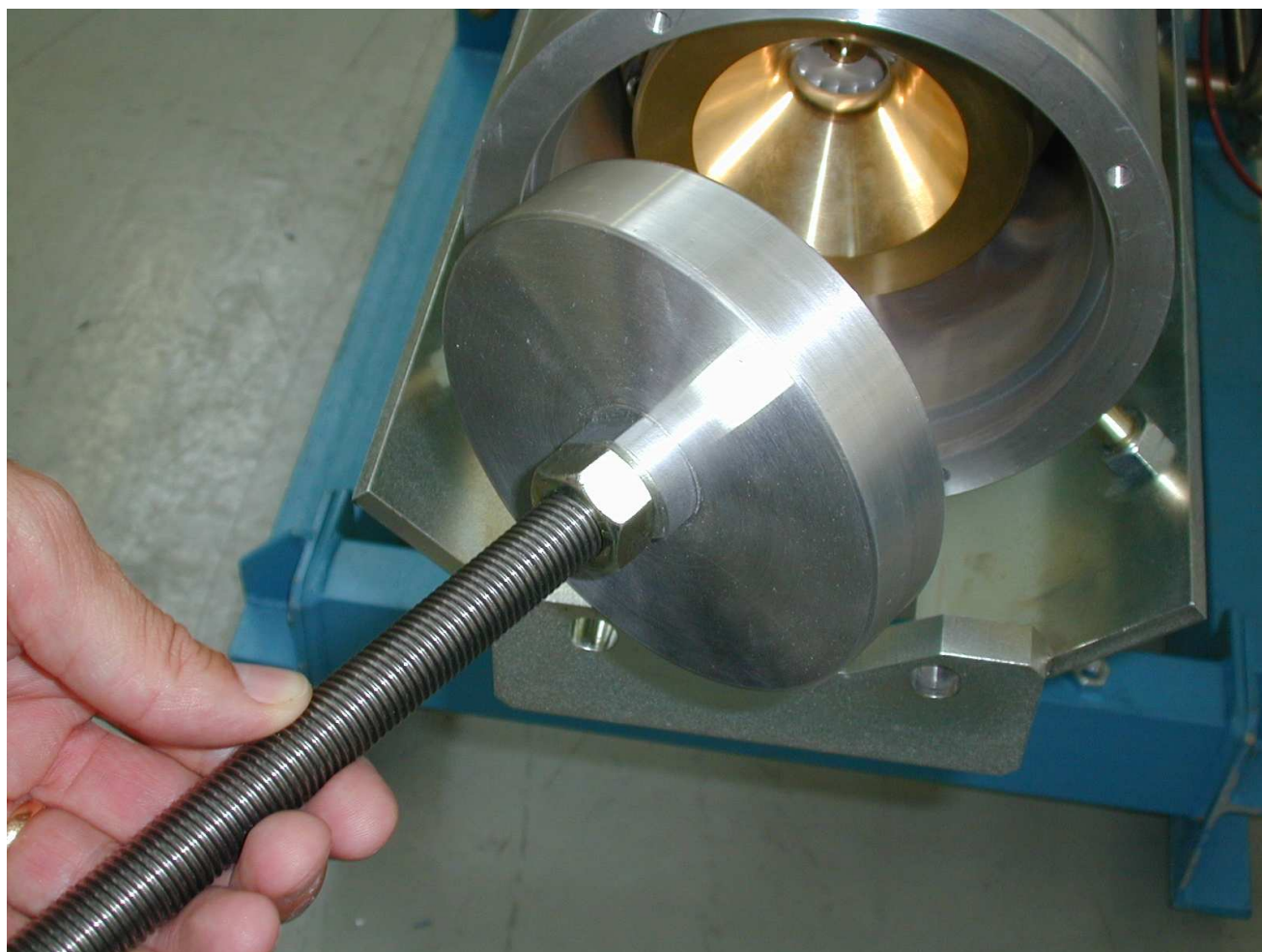
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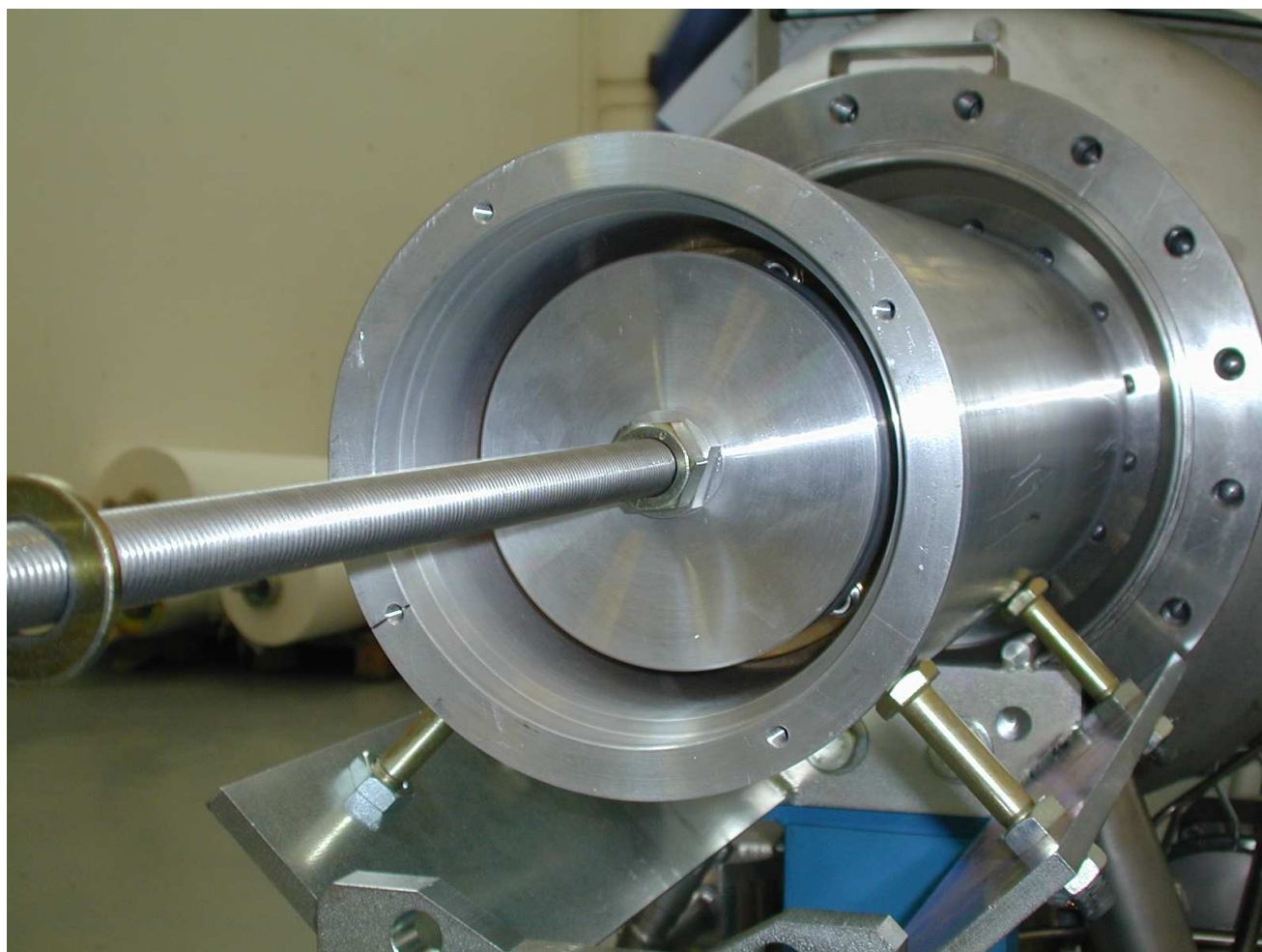
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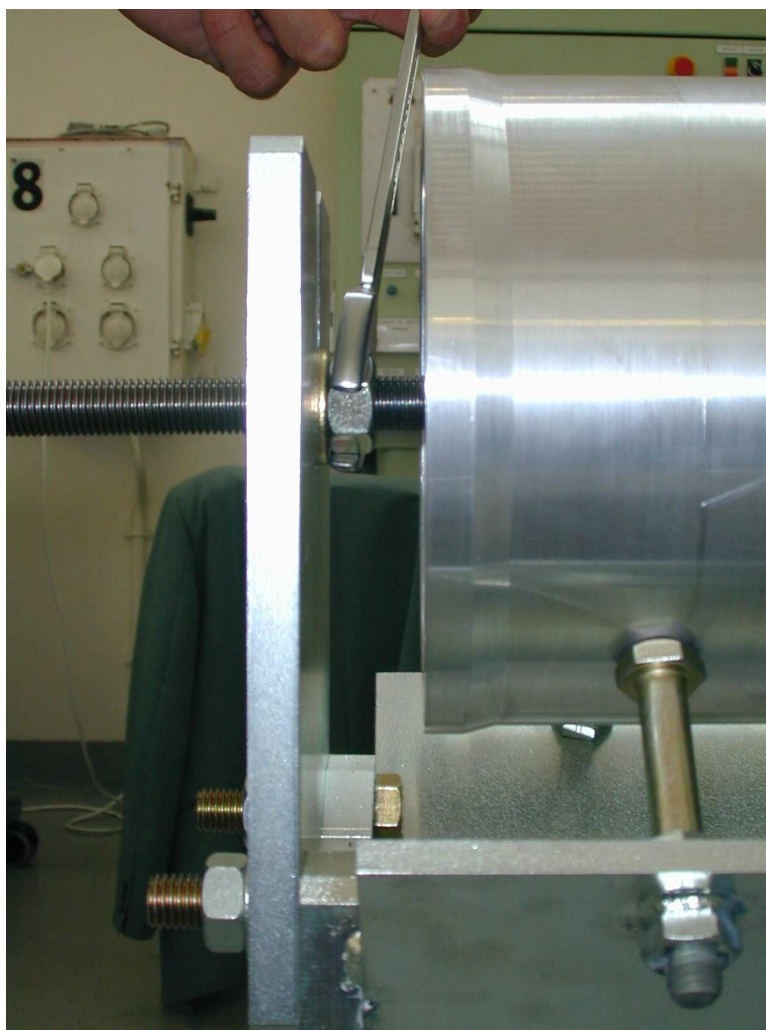
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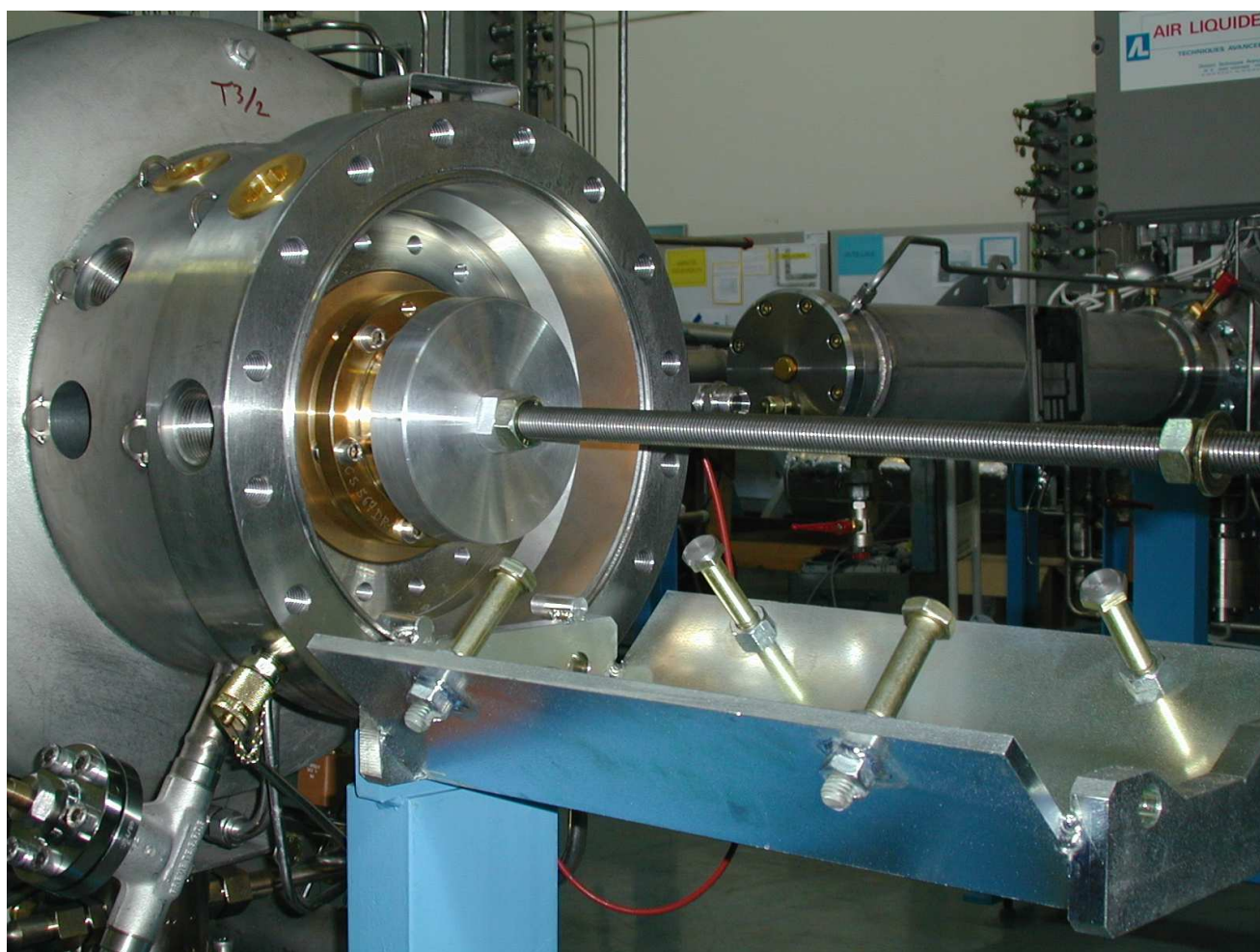
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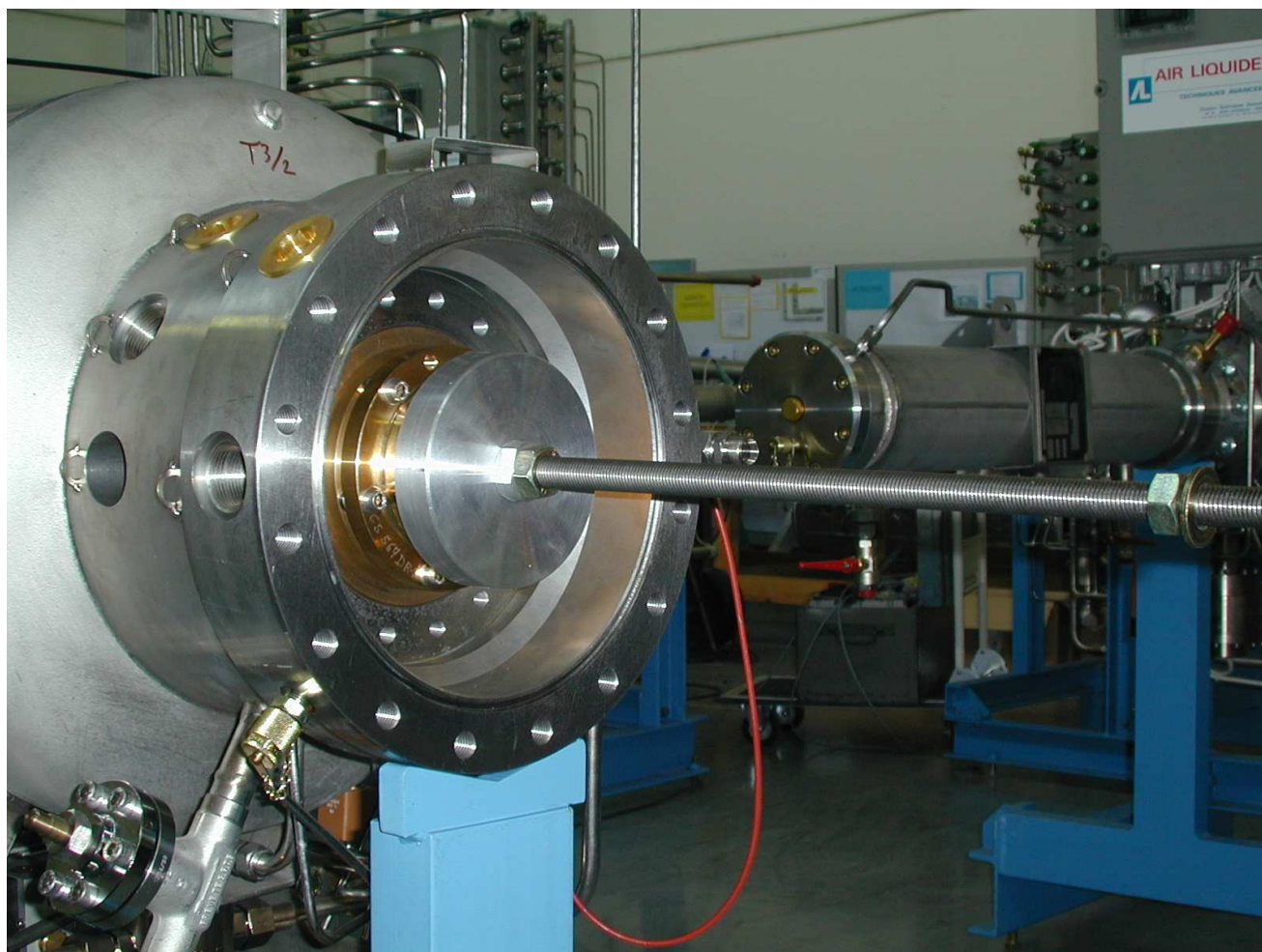
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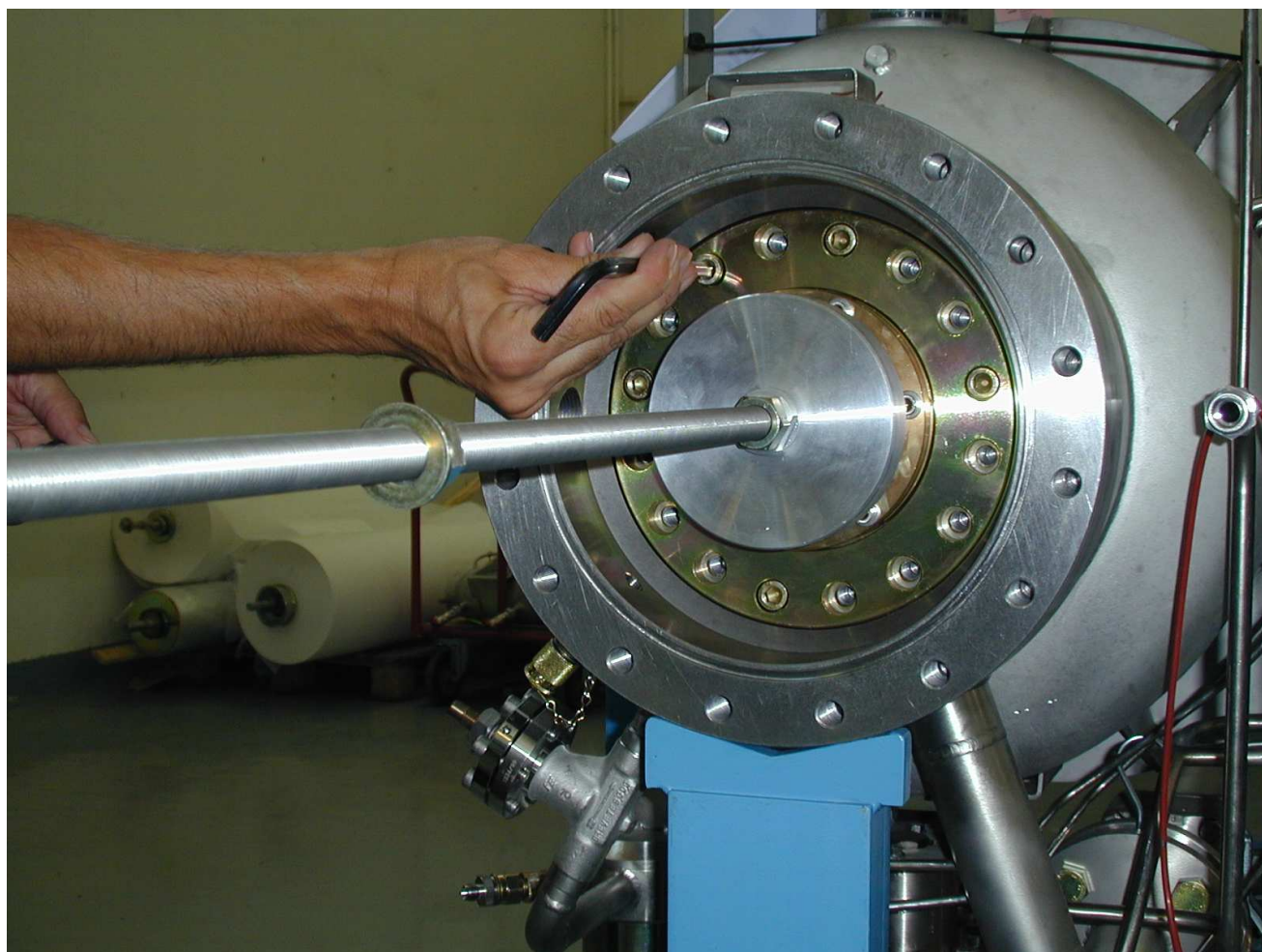
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TC5037



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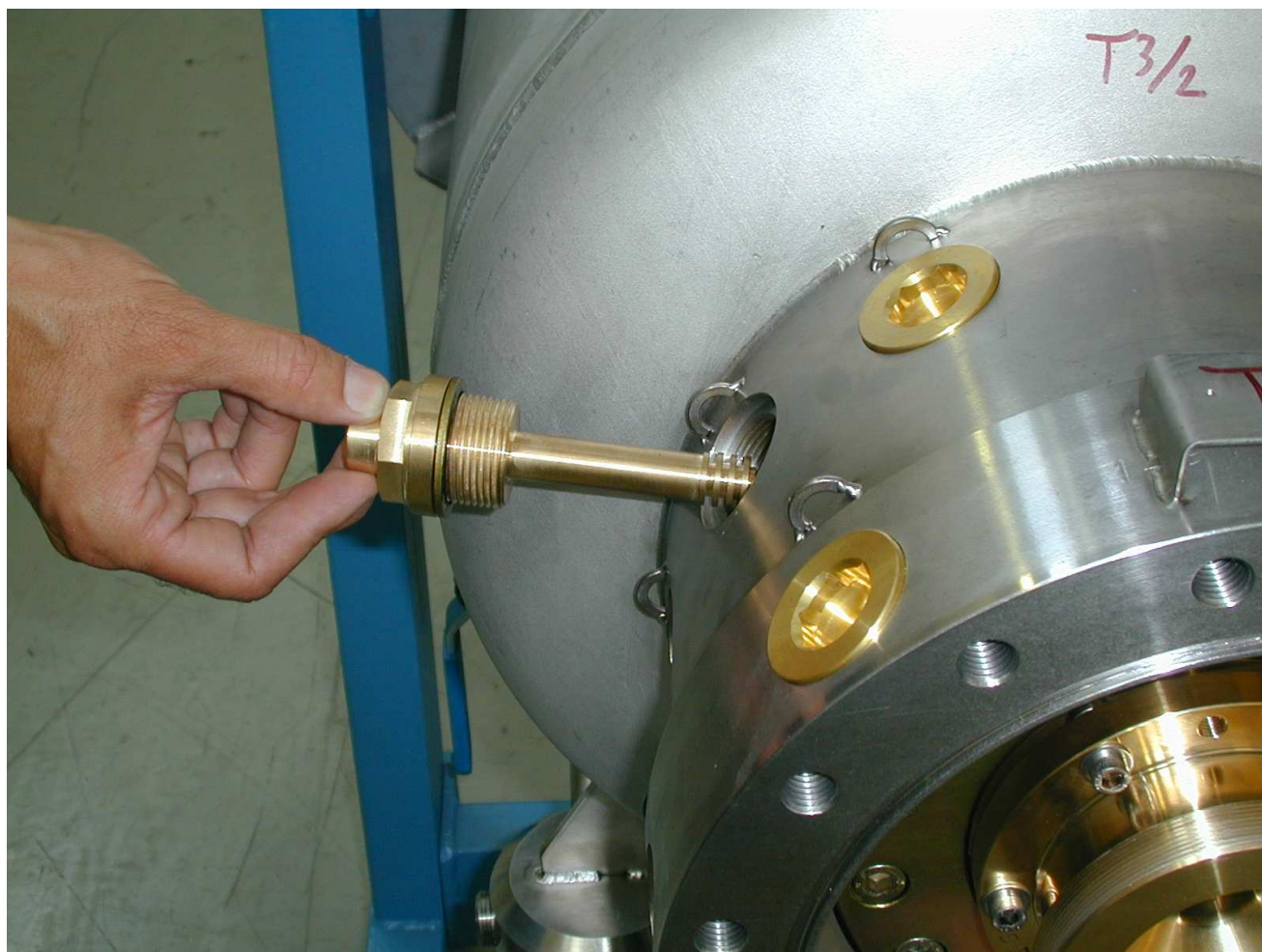
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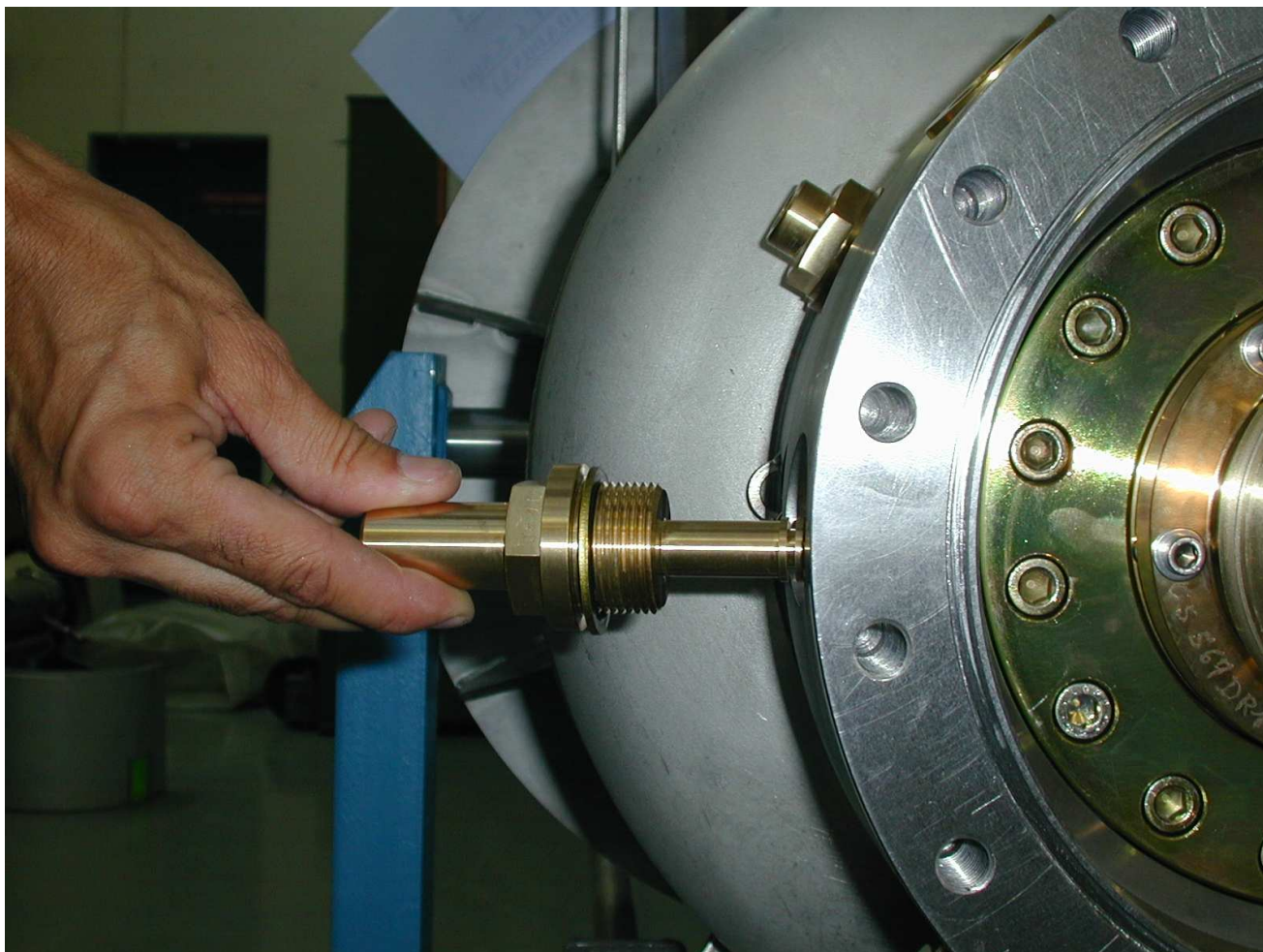
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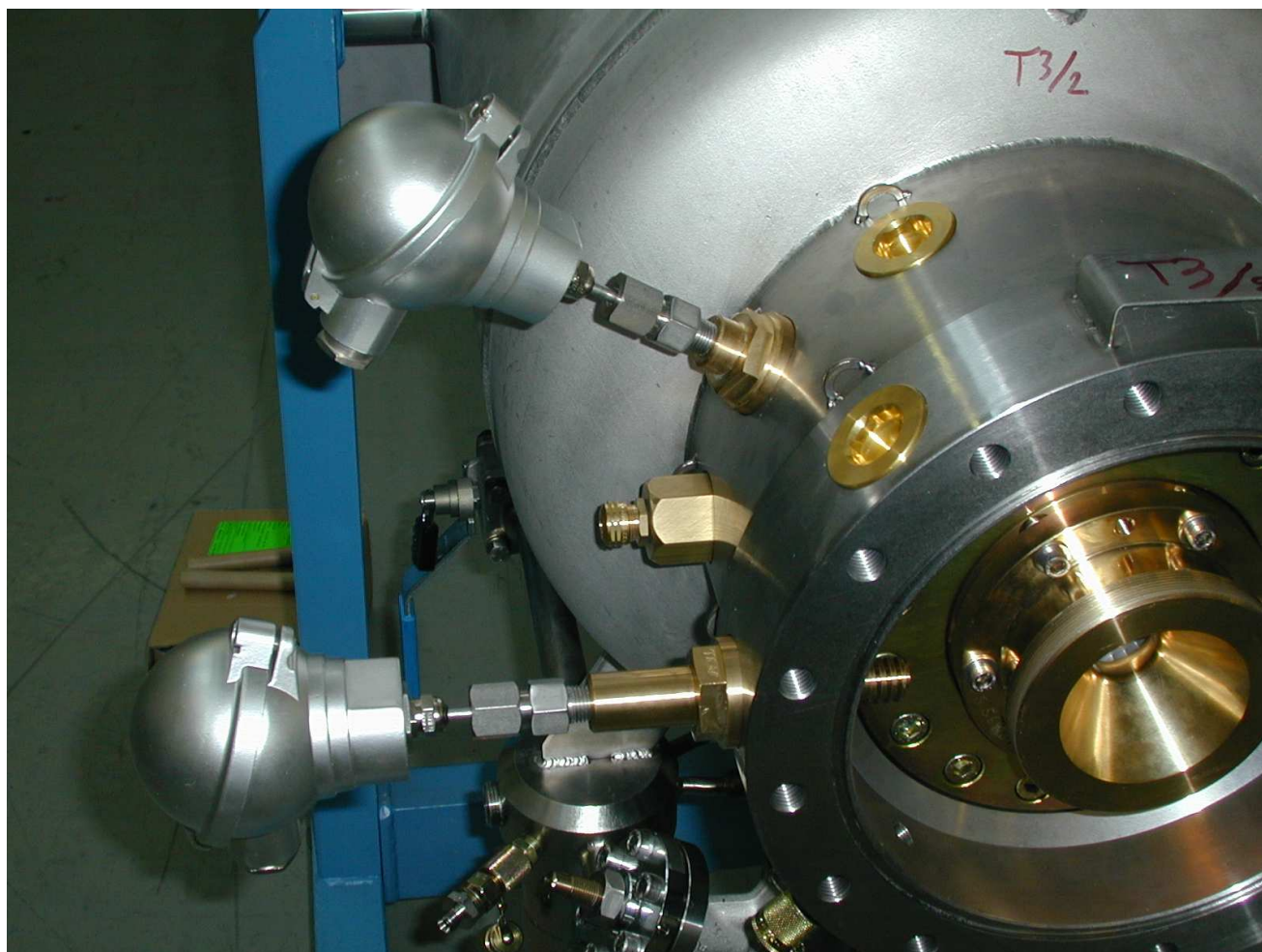
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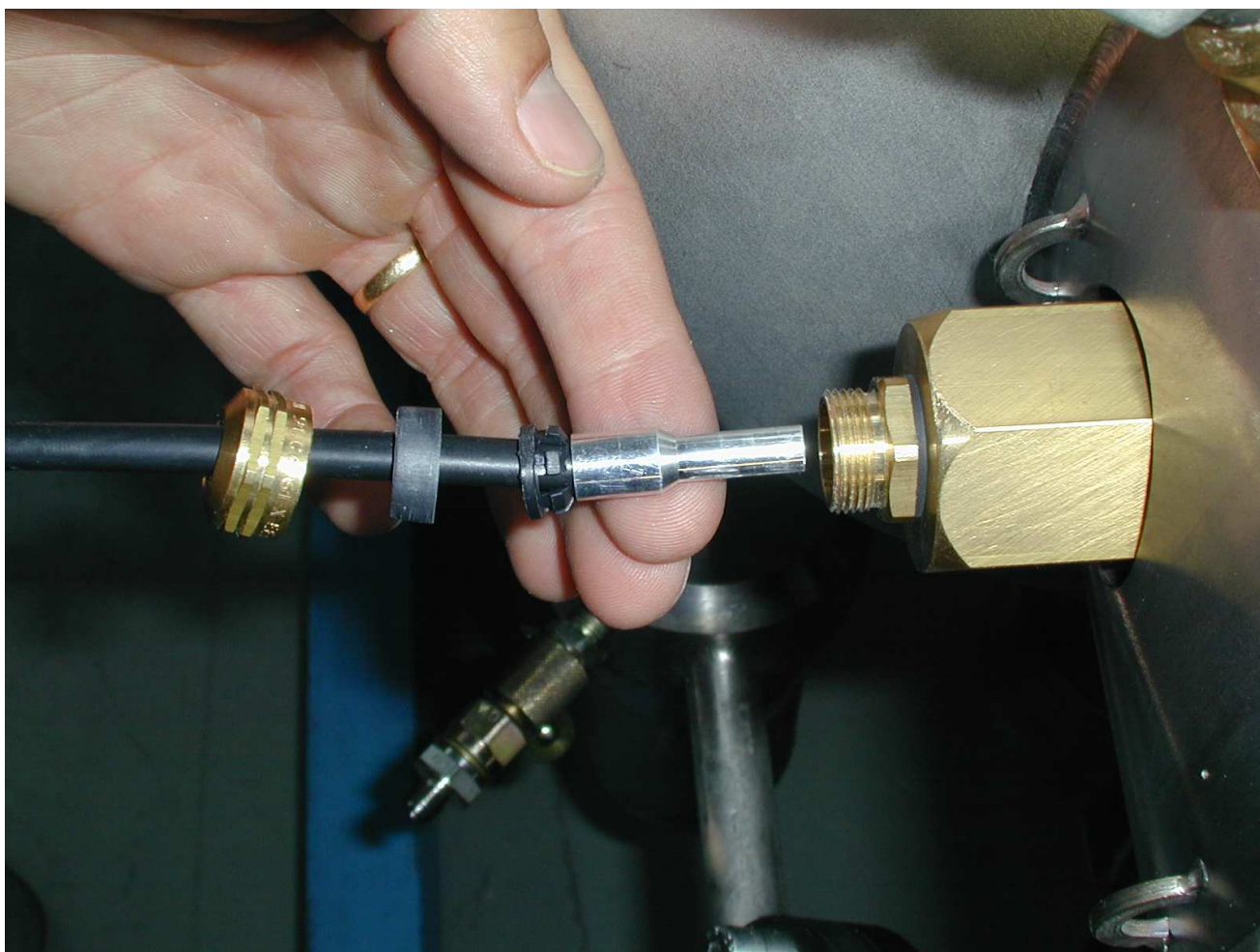
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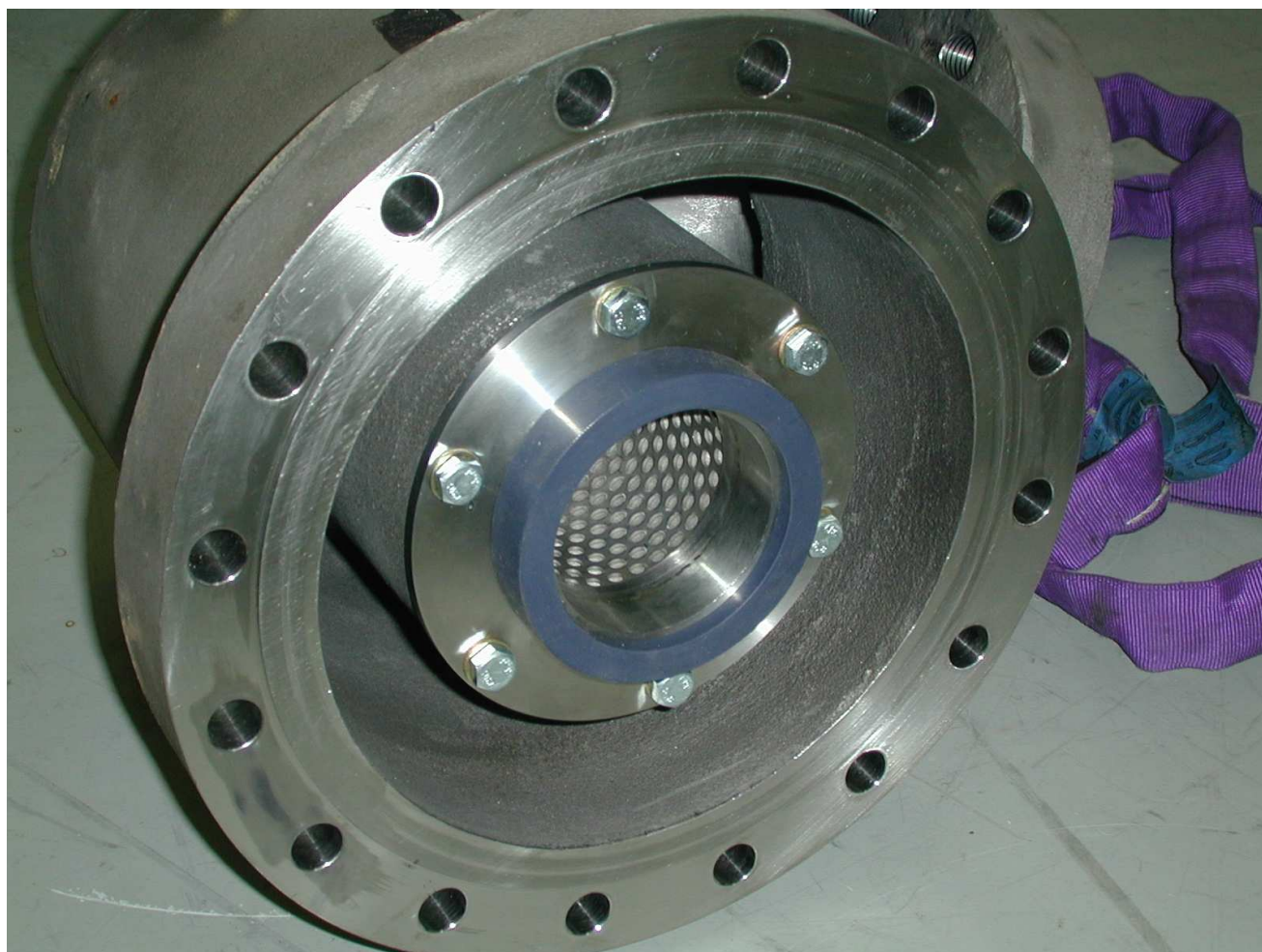
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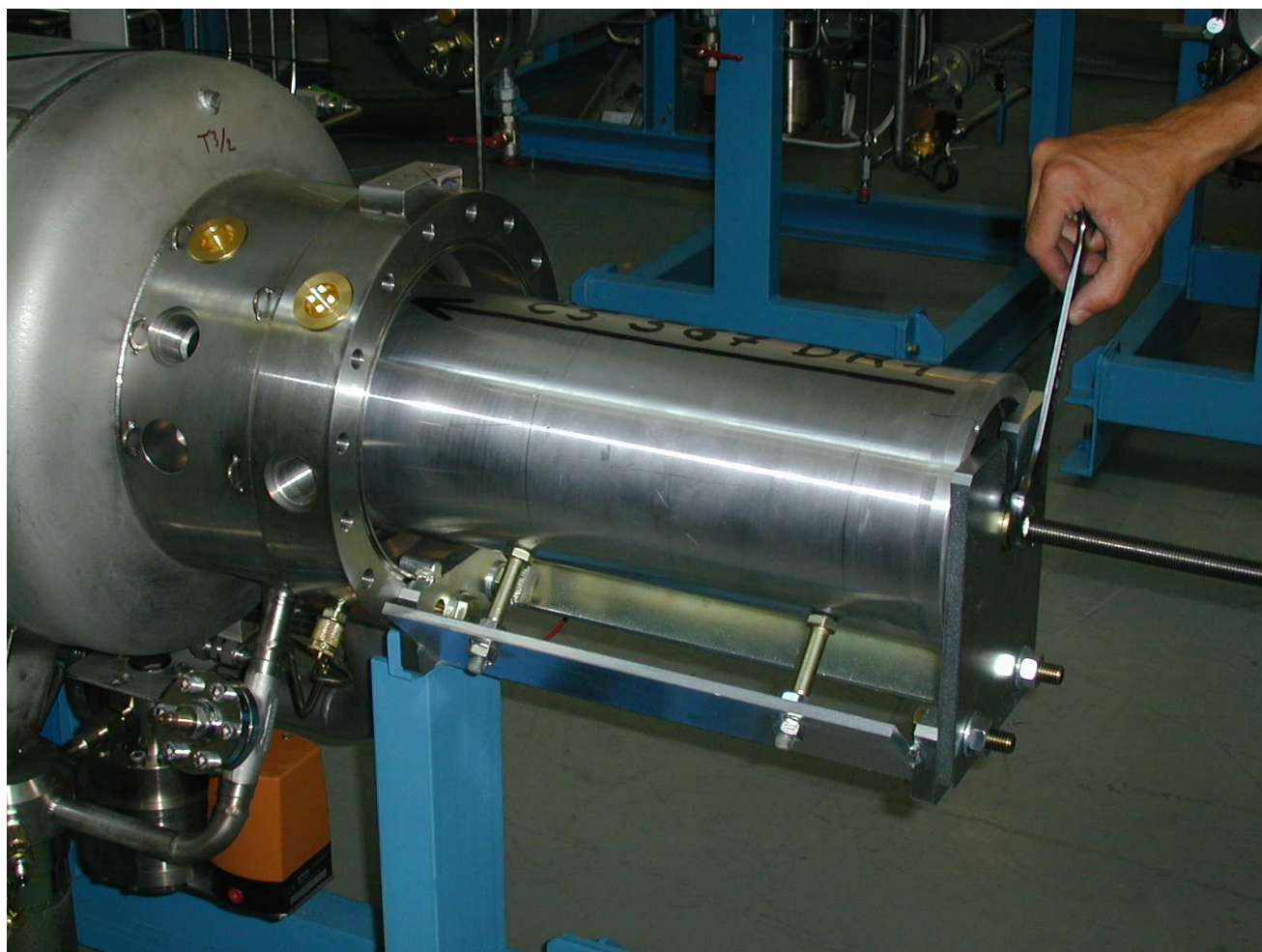
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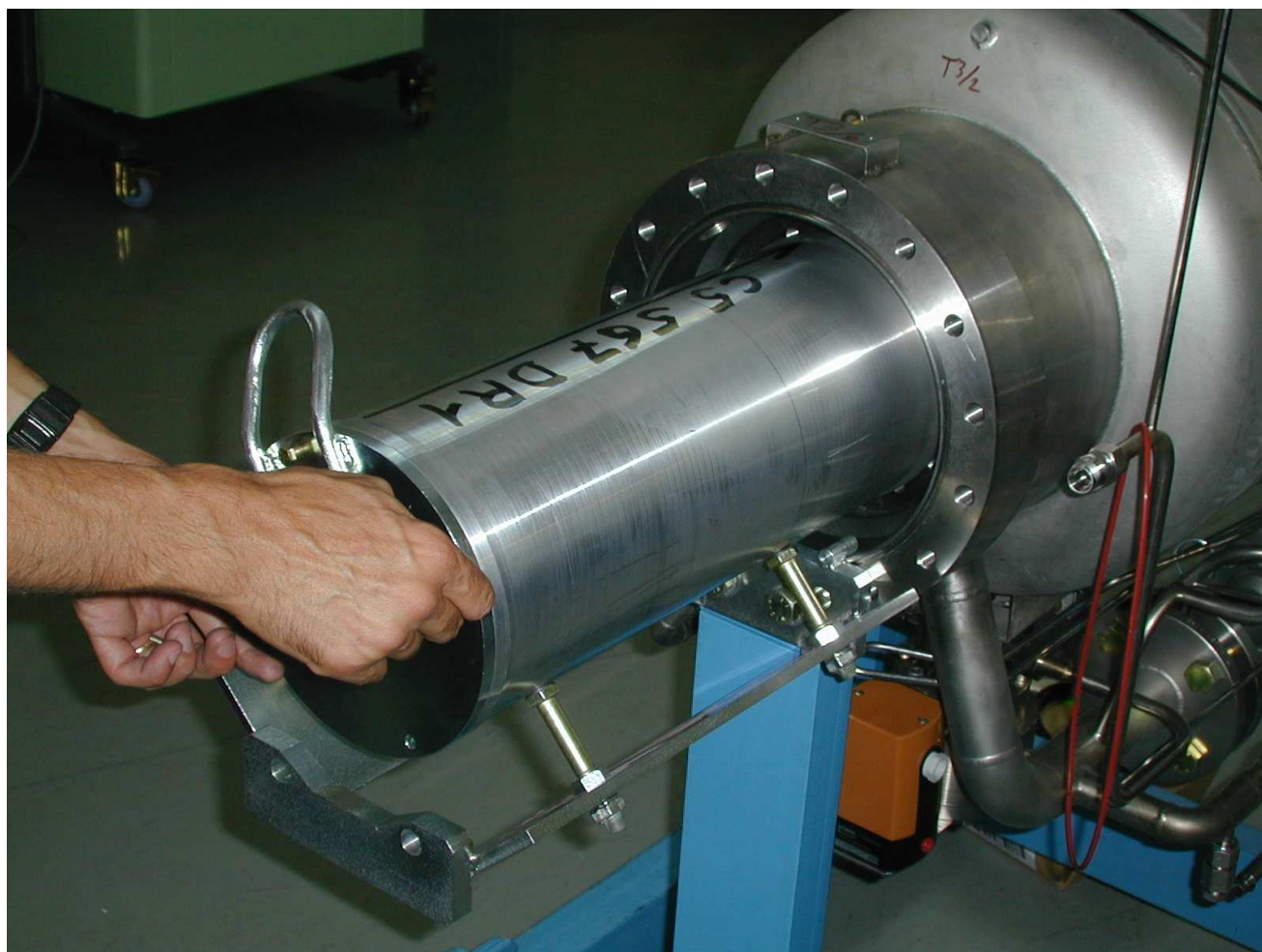
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TC5048



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TC5050