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TO: Customers for
Varian Turbo-V550, -V551, -V700 and -V701 Pumps with ISO-K Flange

DATE: August 14, 2003

SUBJECT: **Technical Bulletin - HAZARD WARNING**

A rotor fragmentation in a Turbo-V550 pump has been recently reported. The fragmentation resulted in the projection of rotor fragments and parts of the pump into the room where the system was located.

The cause of this fragmentation was the degradation of the aluminum alloy of the rotor. This failure demonstrated that if the pump is not properly attached to the system, the pump and/or metal fragments could be projected.

WARNING: Degradation of the aluminum alloy of the rotor could cause the rotor to fragment. If a rotor fragmentation occurs, and the pump is not properly attached to the system, the pump and/or metal fragments could be projected causing serious injury or death and/or damage to surrounding equipment.

Therefore, this technical bulletin and hazard warning is being sent to remind OEMs and end-users of operating conditions that could cause a rotor fragmentation and to update connection specifications for each of the following pumps:

Turbo-V551 Navigator Pump ISO 160	Model # 9698922 and 9698922-Sxxx
Turbo-V551 Navigator Pump ISO 100	Model # 9698924 and 9698924-Sxxx
Turbo-V701 Navigator Pump ISO 200	Model # 9698926 and 9698926-Sxxx
Turbo-V550 Pump ISO 160	Model # 9699049 and 9699049-Sxxx
Turbo-V550 Pump ISO 100	Model # 9699047 and 9699047-Sxxx
Turbo-V700 HT Pump ISO 200	Model # 9699057 and 9699057-Sxxx
Turbo-V550 ICE Pump ISO 160	Model # 9699077 and 9699077-Sxxx
Turbo-V550 ICE Pump ISO 100	Model # 9699078 and 9699078-Sxxx
Turbo-V700 ICE Pump ISO 200	Model # 9699079 and 9699079-Sxxx
Turbo-V701 Navigator IIN Pump ISO 200	Model # 9698942 and 9698942-Sxxx
Turbo-V551 Split-Flow Pump ISO 160	Model # SQ370 and SQ399

OPERATING CONDITIONS THAT COULD CAUSE DEGRADATION OF THE ROTOR

Exposure of the rotor to corrosive materials could degrade the aluminum alloy of the rotor, which could cause the rotor to fragment. Corrosive materials include, for example, Gallium.

Extensive exposure of the rotor to excessive temperature could degrade the aluminum alloy of the rotor, which could cause the rotor to fragment. One or more of the following, among other conditions, could cause excessive temperature:

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Ambient operating temperature as high as 35 °C
Radiant heating applied to the pump
Exposure of the pump to magnetic fields
Inadequate cooling or ventilation
Inadequate coolant
Temperature of the inlet flange as high as 120°C
Bake-out of the pump at temperatures as high as 120°C
Flow of heavy gases like Argon or Xenon

Since operating and process conditions vary greatly, if you suspect that your operating conditions might be at risk of degrading the aluminum alloy of the rotor, you must ensure that the connection of the pump meets the requirements described below.

CONNECTION REQUIREMENTS
We have revised the installation section of the instruction manual for these pumps. A copy of the relevant page is attached.

We strongly recommend that the connection between the pump and the system be made with fixing devices of the types, quantities and tightening torque indicated below, or by an equivalent connection mechanism capable of withstanding a torque of 8,600 Nm around the axis.

Flange	**Fixing Device**	Varian P/N	**Quantity**	**Fixing Torque**
ISO 100	M10 steel clamps	IC63250DCMZ	16	35 Nm
ISO 160	M10 steel clamps	IC63250DCMZ	10	35 Nm
ISO 200	M10 steel clamps	IC63250DCMZ	8	35 Nm

WARNING: Exposure of the rotor to excessive temperatures or other degrading agents could cause the rotor to fragment. If a rotor fragmentation occurs, and the pump is not properly connected to the system, the pump and/or metal fragments could be projected causing serious injury or death and/or damage to surrounding equipment. If your pump might have been exposed to the operating conditions described above and the connection of the pump to the system does not meet the specifications described in these instructions, the pump should only be operated in an enclosed area without personnel present.

Please immediately forward this information to all end-users of the pumps listed above.

If you need assistance, please contact Varian Technical Support (see the attached page with contact information).

We are sorry for any inconvenience caused by this situation but Varian Inc. considers safety to be our top priority.

Best regards,

Luigi Dolcino
General Manager, VVT Torino

Attachments

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PUMP FIXING

WARNING!

If a rotor failure occurs, the connection of the pump to the system could be subjected to a significant torque. If the connection is not sufficient to withstand that torque, the pump could detach from the system or the motor housing could detach from the pump envelope. In this case metal fragments could be projected from the pump or system, which could cause serious injury or death and/or damage to surrounding equipment.

Fix the TV 551/701 Navigator in a stable position, mounting the inlet flange of the turbopump to the system counter-flange, with a connection capable of withstanding a torque of 8600 Nm around its axis.
For example the ISO-K flange can be fixed using high strength steel clamps (like Varian model IC63250DCMZ).
The following table shows, for each flange, the necessary number of IC63250DCMZ clamps and the relevant fixing torque.

FLANGE	N.	FIXING TORQUE
ISO 100	16	35 Nm
ISO 160	10	35 Nm
ISO 200	8	35 Nm

The turbopump with ConFlat inlet flange must be fixed to the vacuum chamber by means of the appropriate Varian hardware. See the appendix "Technical Information" for a detailed description.
The TV 551/701 Navigator can be installed in any position.

NOTE

The TV 551/701 Navigator cannot be fixed by means of its base.

CAUTION

The TV 551/701 Navigator belongs to the second installation (or overvoltage) category as per directive EN 61010-1. Connect the device to a mains line that satisfy the above category.
The TV 551/701 Navigator has Input/Output and serial communication connectors that must be connected to external circuits in such a way that no electrical part is accessible.
Be sure that the insulation of the device connected to the TV 551/701 Navigator is adequate even in the case of single fault as per directive EN 61010-1.

USE

This paragraph details the fundamental operating procedures.
Make all electrical an pneumatic connections before the use of the system.
While heating the vacuum chamber, the temperature of the inlet flange must not exceed 120 °C.

WARNING!

Never use the turbopump when the inlet flange is not connected to the vacuum chamber.
Do not touch the turbopump or any of its accessories during the heating process. The high temperatures may cause burns.

CAUTION

Avoid impacts, oscillations or harsh movements of the pump when in operation. The bearings may become damaged.
Use air or inert gas free from dust or particles for venting the pump. The pressure at the vent port must be less than 2 bar (above atmospheric pressure).
For pumping aggressive gases, these pumps are fitted with a special port to allow a steady flow of inert gas (like N_2, Ar) for pump bearing protection (see the appendix "Technical Information").

WARNING!

When employing the pump for pumping toxic, flammable, or radioactive gases, please follow the required procedures for each gas disposal.
Do not use the pump in presence of explosive gases.

Switching on and Use of TV 551/701 Navigator

To switch on the TV 551/701 Navigator it is necessary to supply the mains. The integrated controller automatically recognizes the interlock and start signals presence and start up the pump.
The first pump start up is in "Soft Start" mode. When the start up cycle is finished, the "Soft Start" mode automatically is disabled, and the following start ups are without the "Soft Start" mode. To re-enable the "Soft Start" mode it must be activated by the suitable software command (see the paragraph "RS 232/485 COMMUNICATION DESCRIPTION" in the appendix "Technical Information").
The green LED located on the TV 551/701 Navigator base front panel indicates with its flashing frequency the system operating conditions:

- with no flashing: the pump is normally rotating;
- slowly flashing (period of about 400 ms): the system is in ramp, or in braking, or in Stop, or in "Waiting for interlock" status;
- fast flashing (period of about 200 ms): error condition.

TV 551/701 Navigator Switching off

To switch off the TV 551/701 Navigator it is necessary to remove the mains. The integrated controller immediately stops the pump.

Emergency Stop

To immediately stop the TV 551/701 Navigator in an emergency condition it is necessary to remove the supply cable from the mains plug.

MAINTENANCE

The TV 551/701 Navigator does not require any maintenance. Any work performed on the system must be carried out by authorized personnel.

WARNING!

Before carrying out any work on the system, disconnect it from the mains, vent the pump by opening the appropriate valve, wait until the rotor has stopped turning and wait until the surface temperature of the pump falls below 50 °C.

In the case of breakdown, contact your local Varian service center who can supply a reconditioned system to replace that broken down.

NOTE

Before returning the system to the constructor for repairs, or replacement with a reconditioned unit, the "Health and Safety" sheet attached to this instruction manual must be filled-in and sent to the local sales office. A copy of the sheet must be inserted in the system package before shipping.

If a system is to be scrapped, it must be disposed of in accordance with the specific national standards.