DEUBLIN COMPANY

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CONFIDENTIAL

· PRECISION ROTATING UNIONS
· STEAM JOINTS & SIPHON SYSTEMS
· EXPANDING CORE HOLDING EQUIPMENT

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SEALING COMPOUND INDUCING SYSTEM

I. PRINCIPLES OF OPERATION

The union design is based on the classical "double seal" concept. The inner and outer mechanical seals, in conjunction with a pressurized barrier fluid, seal the product or media. Water is used as the barrier fluid which is sealed by the outer seal. The inner seal separates the water from the sealing compound.

By using a pressure reservoir with a bladder, the barrier fluid pressure is maintained at exactly the same level as the sealing compound, thereby eliminating contamination of the barrier fluid simultaneously, preventing dilution of the sealing compound.

Water as the barrier fluid performs the following:

- Provide delicate pressure balance to prevent internal seal leakage.
- Provide cooling to the union to dissipate the heat generated by friction between the seals and bushing bearing of the rotor.
- Wash away minute accidental leakage of the sealing compound from inside the union.
- Lubricate the seals and rotor bushing bearing.
- Prevent exposure of the internal seal components to air which could cause solidifying of the sealing compound.

II. DESIGN OF THE UNION

An attached drawing (1) shows the cross sectional view of the union. A diagram (2) is also included to illustrate connection of the union and the pressure reservoir to the customer's machine.

It is important to understand that a small pumping device is located inside of the union. During operation, the pumping device will circulate the water in order to keep the temperature of the union low. The internal seal is mechanically loaded by flexible, formed metal bellows. The external seal uses a more conventional coil spring and hydraulic pressure of the water to remain closed. There is a carbon-graphite bushing between the rotor and housing which is lubricated with water in the union.

The pressure reservoir includes an internal rubber bladder which may expand or collapse. This allows hydrostatic pressure of the sealing compound to be transferred to the pressure of the water. Flexibility of the bladder allows exact equalization of the pressures and prevents contamination of the barrier fluid or dilution of the sealing compound. The pressure reservoir is equipped with a pressure gauge to monitor water pressure, which is essential for proper functioning of the system. The support system also includes INLET and OUTLET water valves which are closed during regular operation, but are used for flushing of the system with fresh water. The hoses in the water system are made of transparent PVC plastic allowing frequent monitoring of contamination of the water system. During normal operation, the barrier fluid (water) of the system should be completely clear.

III. INSTALLATION AND PREPARATION FOR OPERATION

1. Engage threaded part of the rotor into the machine and secure tightly. Ensure that the O-ring sealing the union against the head of the machine is properly located in its groove.

2. Provide mechanical support for the union housing to prevent rotation. The best point to support is the tee fitting attached to the housing (see photograph No. 1). The mechanical support must be able to take the torque without applying any additional axial or radial forces to the union housing. Do not attach any torque bars to the union housing since this may apply additional, harmful load to the bushing bearing.

3. Install the pressure reservoir assembly within close proximity of the union. It is very important that the top of the reservoir is positioned at the same level as the top of the union or within 25 cm below it. This will allow proper circulation of water between the union and the pressure reservoir.

4. Connect the clear plastic hoses provided as shown on the attached diagram. The schematic shows water and sealing compound connections. Clear plastic hoses are recommended for all connections and hose lengths should be kept to a minimum. Hose clamps should be used in order to secure the hoses on the fittings.

IV. FLUSHING AND FILLING OF THE WATER SYSTEM

1. Open OUTLET valve.

2. Slowly open INLET valve and let the water run through the system for approximately one minute to purge out all visible air bubbles in the drain line.

3. Slowly close OUTLET valve, observing the pressure gauge on the tank. Pressure should increase and stabilize between 15 psi and 50 psi depending on the line pressure.

4. Rapidly open OUTLET valve and purge out remaining air bubbles from the drain line.

5. Repeat steps 3 and 4 two to three times until all air has been purged out of the system.

6. Close the OUTLET valve completely and let the pressure in the reservoir reach the pressure in the water line. The rubber bladder inside the reservoir gets squeezed by the water pressure allowing maximum amount of water to fill out the system. Lift the floating seal slightly allowing some water to leak out. This will ensure that the bearing chamber is completely filled with water and the outer seal will not operate dry.

7. With the INLET valve closed, open OUTLET valve, completely, for up to three seconds. This will cause the pressure in the reservoir to drop down to zero. The OUTLET valve requires to be shut immediately upon reaching zero pressure to prevent the rubber bladder from expanding. The water system is now ready for operation.

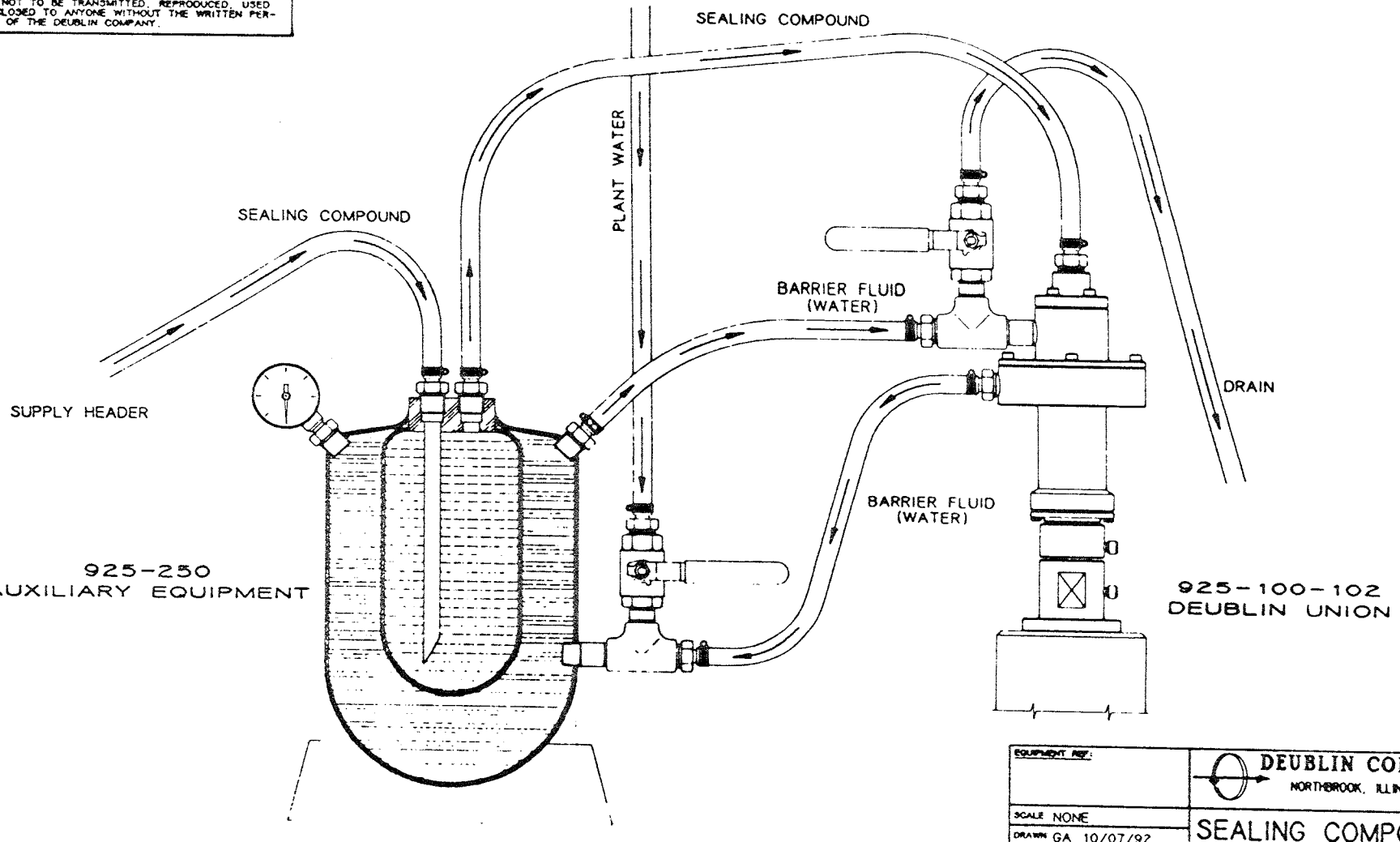
Flushing the system with clean water is recommended (only if water is not clear) ~~twice a week~~ during production operation. This can be accomplished by following steps 1 through 7. Should there be a visible contamination of the barrier fluid (water) by the sealing compound, immediate flushing and replacing of the barrier fluids is recommended. *NOTE*: When flushing the water system, the pressure of the sealing compound must be zero. Any residual pressure will cause the rubber bladder to expand preventing proper filling of the reservoir with water.

V. APPLYING SEALING COMPOUND PRESSURE

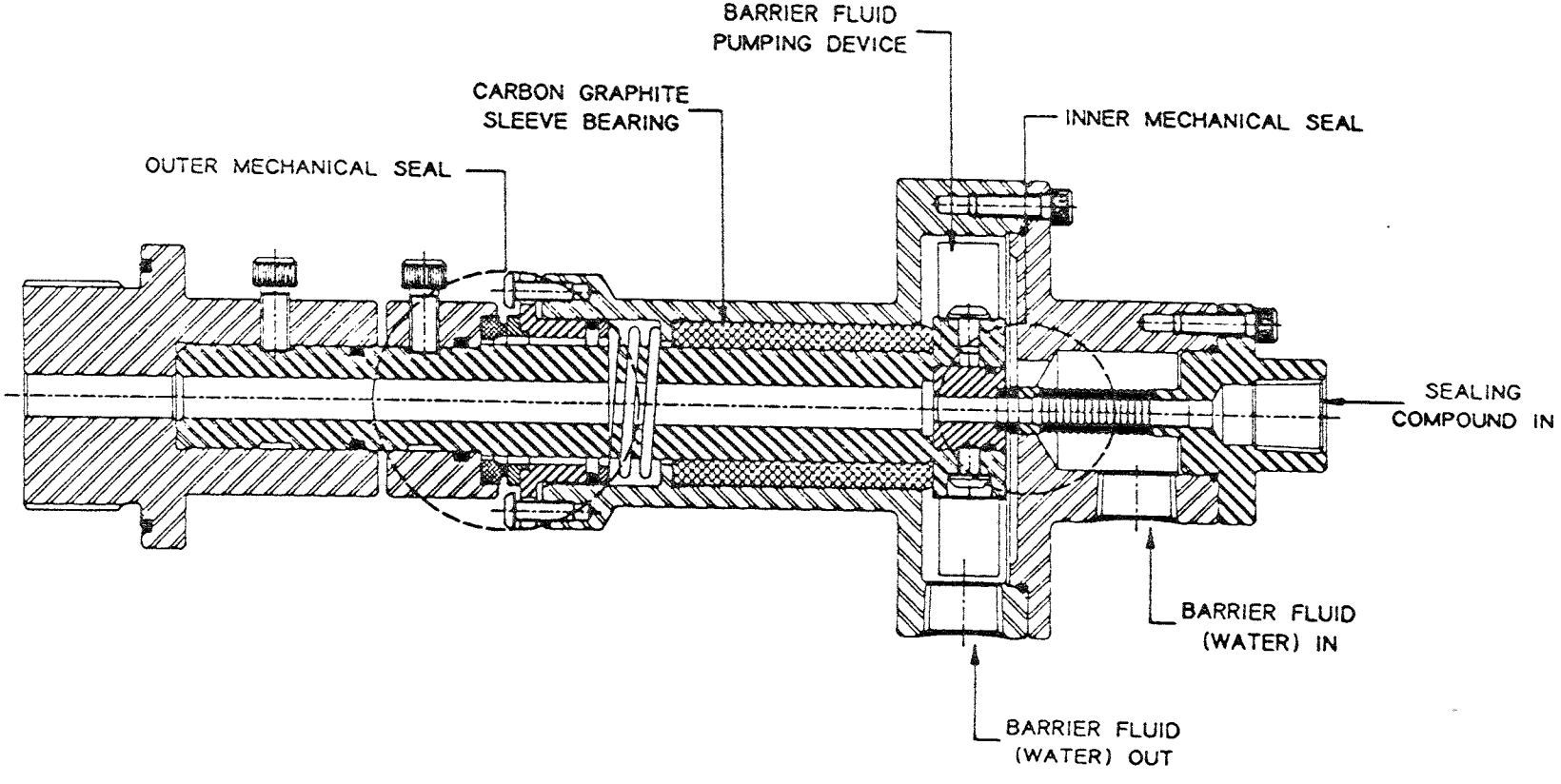
The pressure of the sealing compound may be applied only after the water system is flushed and completely filled with both the INLET and OUTLET valves shut. The sealing compound will enter the rubber bladder through the siphon tube, fill it out, and then proceed onto the union. With all air purged out of the system, the sealing compound will pressurize the inner walls of the bladder which, in turn, will pressurize the water circuit. The pressure gauge on the reservoir will indicate the magnitude of pressure. *WARNING*: The system may not be operated if the pressure gauge does not register any pressure. This would be an indication that either there is still some air left to be purged out or the OUTLET valve is open. During regular operation, the barrier fluid pressure is maintained at a level exactly equal to the sealing compound pressure thereby preventing leakage in either direction across the internal mechanical seal.

Attachments

cats, 10/7/92



EQUIPMENT REF:	DEUBLIN COMPANY NORTHBROOK, ILLINOIS, U.S.A
SCALE NONE	SEALING COMPOUND INDUCING SYSTEM
DRAWN GA 10/07/92	
ENGR GA 10/07/92	
APP'D GA 10/07/97	NO 925-001
UNTOLERANCED DIMENSIONS ± 0.13 DECIMALS AS APPLICABLE DIMENSIONS IN ( ) ARE IN MILLIMETERS	



EQUIPMENT REF:	DEUBLIN COMPANY NORTHBROOK, ILLINOIS, U.S.A.
SCALE FULL	DEUBLIN UNION
DRAWN GA 10/07/92	SEAL SPECIFICATIONS
CHKD GA 10/07/92	NO
APP'D GA 10/07/92	925-100-102
UNTOLERANCED DIMENSIONS ± .010 DECIMALS AS SPECIFIED DIMENSIONS IN ( ) ARE IN MILLIMETERS.	