

BLEED/RELIEF VALVE CLEANING INSPECTION AND OVERHAUL PROCEDURES Appendix 4

The bleed/relief valve should be disassembled, cleaned, and inspected at least once a year, anytime the valve fails monthly lift testing, or fails to maintain a seal when within the specified range. The bleed/relief valve is easily cleaned using a nylon toothbrush and a 50/50 solution of vinegar and fresh water. Cleaning for 15 minutes in an ultrasonic sink, if available, with the 50/50 vinegar solution is highly recommended.

Repair parts are available from Kirby Morgan Dive Systems International (KMDSI). Normal replacement parts include the o-ring, soft seat, spring, and hex nut. The o-ring should be replaced at least annually. The other parts require replacement only if worn or damaged. An exploded view of the valve is located in all KMDSI Helmet and Band Mask Operations and Maintenance Manuals.

CLEANING:

Tools:

1/2" open-end wrench

1/8" Allen wrench

Nylon toothbrush

Vinegar

Fresh water

Mild dish detergent

Ultrasonic sink, if available

Magnifying glass

New valve body o-ring

WARNING: DO NOT use cleaning solvents (i.e. mineral spirits, bleach, etc.) when cleaning the bleed/relief valve. The use of cleaning solvents may lead to failure of the bleed/relief valve.

1. Secure gas pressure to the first stage regulator, then bleed off.
2. Remove the bleed/relief valve from the regulator body using the 1/2" open-end wrench.
3. Remove, cut, and discard the bleed/relief valve body o-ring.
4. Using the 1/2" open-end wrench to hold the bleed/relief body, use the 1/8" Allen wrench to remove the Allen head adjustment screw. Then, shake out the spring and soft seat.
5. Place all parts in the 50/50 solution of vinegar and water and allow to soak for 15 to 30 minutes. If using an ultrasonic sink, reduce time to 15 minutes.
6. Using the nylon toothbrush, brush all components to remove corrosion and mineral deposits. Then, rinse with fresh water and blow or air dry.
7. Using the magnifying glass, carefully inspect all components for excessive corrosion and/or damage. Replace the spring and/or adjustment nut, if either part is excessively corroded or shows signs of wear and/or damage. Inspect the soft seat for nicks, cuts, and wear and replace if any damage is found. Replace the entire assembly if any damage to the valve body is present.

NOTE: A deep groove in the soft seat is normal. Replacement is only necessary if the rubber seat is deteriorated, cut, and/or chipped.

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REASSEMBLY:

1. After cleaning, inspection and/or parts replacement reassemble the valve by installing the soft seat, spring, and adjustment nut. Screw the adjustment nut down until it is approximately 1/2 thread from being flush with the top of the valve body.
2. Lightly lubricate a new o-ring, then install on the valve body.
3. Test the bleed/relief valve according to the test procedure below.

LIFT CHECK/SETTING THE BLEED/RELIEF VALVE:

Tools required:

Adjustable first stage scuba regulator or controlled adjustable pressure source

Intermediate test gauge

1/2" open-end wrench

1/8" Allen wrench

HP air source at least 500 psig (34.4 bar).

Mild dish detergent

The purpose of lift checking the bleed/relief valve is to ensure it operates properly, allowing excess pressure to escape in the event the first stage develops a slight leak. Without the bleed/relief valve, high-pressure gas will continue to increase until the emergency supply hose ruptures, possibly causing injury and a complete loss of the Emergency Gas System (EGS). This procedure explains the steps necessary for readjusting the bleed/relief valve after it is cleaned, overhauled or any time the valve is tested.

CAUTION: Ensure the bleed/relief valve is only installed in a low-pressure port of the first stage regulator.

DANGER: Do not use oxygen, or mixed gas containing more than 23% oxygen by volume, for lift checking the bleed/relief valve. The use of oxygen, or mixed gas, in a high-pressure supply system not designed and cleaned for oxygen service, can result in a fire or explosion causing serious injury or death.

NOTE: The bleed/relief valve is lift checked and/or adjusted using an adjustable first stage regulator, equipped with a low-pressure test gauge, which is used for adjusting the intermediate pressure of scuba regulators. The check/adjustment can be performed using a standard scuba test stand, or a gas control console, using air or mixed gas with an oxygen content below 23% by volume. If a first stage scuba regulator is used, it must be able to be adjusted to the desired lifting pressure. The pressure gauge should be compared to a gauge of known accuracy.

1. Install the bleed/relief valve in a low-pressure port on an adjustable first stage regulator, or install on a scuba test stand that has an adjustable pressure supply, then tighten with the 1/2" open-end wrench.

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2. Install an intermediate pressure gauge in one of the low-pressure ports of the first stage regulator.
3. Install the first stage regulator on the cylinder. Ensure the bleed/relief valve and intermediate pressure gauge are attached to low-pressure ports facing up.
4. Wet the bleed/relief valve with soapy water to help indicate when gas flow starts.
5. Slightly crack open the gas supply so a very slight flow of gas is traveling to the first stage, until the intermediate pressure gauge travels no further. Leave the supply valve only slightly cracked open. Most first stage regulators use an intermediate setting between 130 - 150 psig (9.3 – 10.3 bar).
6. Slowly, increase the intermediate setting of the first stage until the pressure gauge indicates 180 psig (12.4 bar). If the bleed/relief valve starts venting before a pressure of 180 psig (12.4 bar) is reached (as indicated by small bubbles forming or by "popping"), turn the adjustment screw in (clockwise) using the 1/8" Allen wrench on the bleed valve hex nut 1/16th -1/8th turn, or until all leakage stops as indicated with the soapy water. If a pressure above 200 psig (13.8 bar) is reached with out the bleed/relief valve forming bubbles or popping, slowly back out (counterclockwise) on the adjustment hex nut 1/16th of a turn at a time until bubbles form.

NOTE: If the Allen screw on the bleed/relief valve hex nut is rotated too far, too fast, the bleed/relief valve will pop open. This could possibly require the air to be secured at the cylinder to reset the seat before the adjustment can be accomplished.

7. Continue this procedure as necessary until the bleed/relief valve consistently starts to forms bubbles at a pressure between 180 and 200 psig (12.4 -13.8 bar). After the valve has been set to just bubble or pop off, back out on the regulator adjustment nut until the pressure is set back to 135 psig (9.3 bar), or at the factory setting of the first stage regulator.
8. Re-wet the bleed/relief valve, and then slowly increase the intermediate pressure on the first stage regulator to recheck the lift pressure once more. The bleed/relief valve should start forming bubbles between 180 - 200 psig (12.4 -13.8 bar) After final adjustment; reset the first stage regulator to 135 psig (9.3 bar), or to the manufacturer's recommended pressure setting. Spray the bleed/relief valve with soapy water and ensure there are no leaks.
9. After a successful leak check, the bleed/relief valve may be reinstalled into the system.

NOTE: The bleed/relief valve can now be installed in any first stage regulator, providing the first stage has an intermediate setting of 135 - 165 psig (9.3 – 11.4 bar).

TROUBLESHOOTING:

Problem:

Valve pops open and will not stop flowing:

Check:

If while setting the bleed/relief valve the valve pops open and will not stop flowing, secure the air supply valve and allow the valve to reseal. Try the procedure again, ensuring that the supply valve is only **slightly** cracked open, allowing full test pressure but minimizing high flow potential.

Problem:

After resetting the first stage to 135 psig (9.3 bar), the valve continues to leak:

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Check:

This indicates the valve body seating surface or the soft seat is either dirty or damaged. Usually, cleaning both the metal body seating surface in the valve body and the soft seat will fix the problem. If, after cleaning, the problem persists, replace the soft seat and spring and retest the unit. If, after this has been accomplished, the seat continues to leak, then replacement of the complete valve will be necessary.

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