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## PIPE THREADS

### Leaks in the System:

Pipe thread fittings in high and low pressure breathing gas systems are often used as an alternative to straight thread O-ring or welded fittings due to cost, complexity and strength issues. Pipe thread fittings offer an alternative to large bend radius welded or compression joint systems, and produce exceptionally strong systems, however, shock and vibration especially in portable systems can cause movement between joints resulting in leaks. Unlike O-Ring fittings, minor pipe thread fitting leaks will not suddenly or drastically increase because the locking nature of pipe threads. Teflon tape is used primarily as a lubricant to keep the threads from galling but also acts as a sealant. Leaks in O-Ring fittings cannot be tolerated because the seal is being made by only the O-Ring, between two surfaces, leaks will normally increase and often parts of the O-Ring will extrude causing sudden massive leakage.

Minor leakage in pipe thread fittings is common, should be expected, and does not generally pose a operational hazard, or reduction in operational capability as long as the leaks can be identified and quantified. All leaks should be repaired as soon as practical.

The only proper way to remedy leaks in pipe thread fittings is to depressurize the system, disassemble the joint, remove old sealing tape, brush the threads, and then re-tape and re-make the joint. Because this is often difficult or impractical to accomplish in the field, minor leakage can be an acceptable alternative to field repairs in order to safely continue with diving operations.

**Warning: Never attempt to tighten fittings or components while the system is pressurized. Attempting to tighten fittings while the system is pressurized could result in component failure resulting in serious injury or death.**

### Checking and Quantifying Leaks:

To check for leaks, ensure the umbilical supply valves, pneumofathometer valves, and cross connect valves are shut, then slowly open each cylinder HP supply valve and each supply block valve approximately 1/4 -1/2 turn and pressurize each HP circuit using at

least a 2800 psig supply pressure. Load each regulator to 350 psig and allow the system to settle for at least one minute, then secure the cylinder valves only; and record the high and low pressures and the time. Allow the system to sit for five minutes then check the gauges. If there has been any loss of pressure, apply soapy water solution to all joints and fittings to identify the leaks. Very minor leaks at pipe threaded Teflon taped joints that cause a drop of pressure no more than 200 psig in five minutes, as noted on each of the high pressure gauges, do not require re-sealing. Pressure loss in excess of 200 psig represents a gas loss in excess of 1.0 liter per minute and should be corrected before the system is used. Any O-rings or valve seal leaks must be repaired before the system is used.

**Note: The purpose for the allowable leakage is to allow the system to be used until repairs can be made.**

Making up 1/4" or smaller thread fittings:

When making up pipe fittings of 1/4" or smaller, use three (3) mil thickness Teflon tape only for sealing and lubrication. Additionally, whenever possible/available the tape used should be 1/4" wide. Half inch (1/2") wide three (3) mil tape on 1/4" or smaller pipe threads can be used but will not stretch and form to the small diameter threads as well as 1/4" tape. Normally, 1-1/2 wraps applied under tension is all that is required on brass to brass fittings, however, stainless fittings may require up to two and a half (2-1/2) wraps to achieve a tight seal. The tape should be applied under tension starting 1-1/2 to 2 threads back from the start of the fitting.

Making up 3/8 to 1/2" Pipe Fittings:

When making up three eighths (3/8") or half inch (1/2") pipe fittings, three (3) mil thickness Teflon tape or six (6) mil thickness tape, half inch (1/2") wide may be used. If three (3) mil is used, use two (2) to three (3) wraps. If six (6) mil is used, use one and a half (1-1/2) to two (2) wraps. Apply tape under tension starting one and a half (1-1/2) to two (2) threads back from the start of the threads.

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