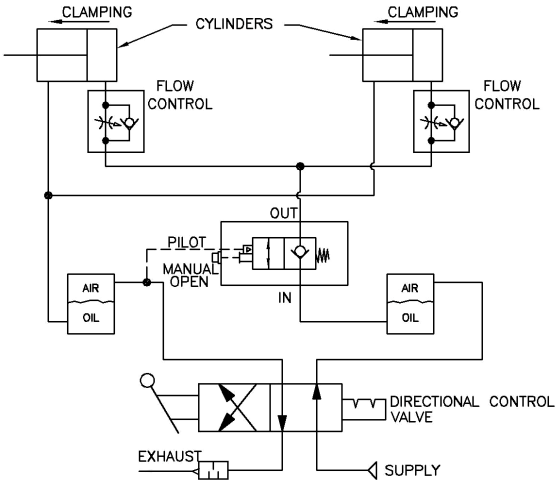
## Some Guidelines For Air Over Oil Applications

Nu-Check® valves have been successfully used on oil lines in a wide variety of air over oil applications. The suitability of using a Nu-Check® valve may be influenced by a wide variety of design and operating characteristics. Some of the following guidelines may need to be considered in the system design:

CIRCUIT FOR CLAMPING BY TRAPPING OIL




1. **Use only air for pilot override of the check valve**. The Nu-Check® pilot piston and pilot port orifice are designed to be piloted by air. The Nu-Check® valve may be piloted by oil, but the high viscosity of oil results in a much slower valve response time compared to that obtained when air is used.

2. **When a Nu-Check® valve is used in the oil line, it should be used on only one side of the hydraulic component**. When the check valve is overridden, the check ball is displaced into the checked fluid. If both sides of a hydraulic component are checked, the incompressible hydraulic fluid will restrict the movement of the check ball. Also, if both sides of a hydraulic cylinder are checked tight, the fluid expansion from a temperature increase could generate high pressures and damage seals and components.

3. **If there is no pressure spike (+200 PSI) in the system, standard Nu-Check® valves (Buna-N check ball) can be used.** When a standard Nu-Check® valve is used on an oil line, the hydraulic component must not be capable of applying a high back pressure. High pressure spikes can occur when work or a load is applied to the hydraulic component or the load is stopped rapidly. Repeated pressure spikes will eventually shorten the life of the check ball.

4. **For applications that involve pressures above 120 PSI or pressure spikes, high pressure (HP) versions of the Nu-Check® valve may be suitable**. A HP Nu-Check® valve uses a Delrin check ball instead of a rubber check ball. A HP Nu-Check® valve will routinely check pressures of up to 600 PSI. When designing the system, the pilot pressures required for checked high pressures must be considered. For example, 150 PSI is required at the pilot port to override the valve checking a pressure of 600 PSI.

5. **The system must be designed to avoid hammering of the valve.** For example, hammering would occur when the system uses the check valve to rapidly stop a large load. As in fully hydraulic systems, hammering can damage valves, seals, connectors, hydraulic components and mechanical linkages.

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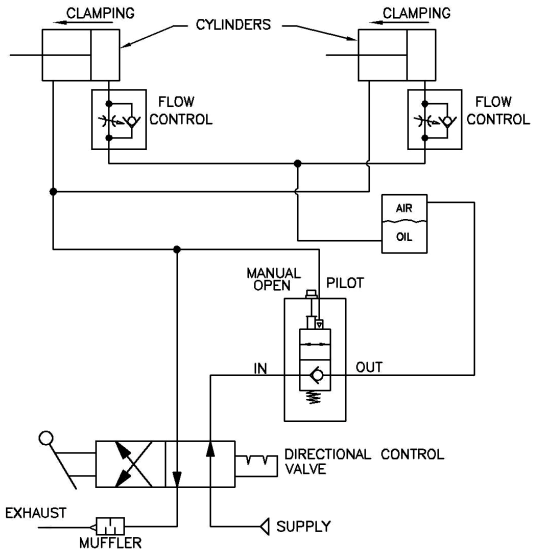
6. **Air pockets in the lines or within the components should be avoided.** Attention must be paid to the position and orientation of the oil receiver, valve, hydraulic components and lines to avoid pockets where air bubbles could be trapped. Mount the Nu-Check® valve so that the manual override button is in the upright position. With the override button up, air bubbles will not be trapped in the checked section of the valve. Some designs may require incorporating an active air bleed valve.

AIR OVER OIL BY TRAPPING AIR




7. **The working fluid must be compatible with either Buna-N or Viton,** the two types of seal material available for Nu-Check® valves. Buna-N and Viton seals are compatible with most hydraulic oils, but they are not compatible with all types of hydraulic fluids.

8. **System designs should avoid having a Nu-Check® valve routinely checking oil on a piston at the end of its stroke**. When the piston is at the end of its stroke, the piston movement is restricted. Restricted piston movement combined with checking incompressible hydraulic fluid will increase the required piloting pressure and slow the valve response time. It also is expected that the check ball life would be shortened.

9. **The system should be designed to avoid development of high negative pressures.** High negative pressures can cause some seals to shift and allow air to leak into the Nu-Check® valve as seals reseat. For example: Negative pressures may occur in a load tipper or rotator system when the load's center of mass is above or to side of the rotation axis.

10. **For systems that have air on one side of a piston there is a possibility of air leaking past the piston into the oil side.** High negative pressure spikes increases the possibility of air leaking past the piston. Designing a system so there is oil on both sides of the piston makes air leakage past the piston almost impossible.

11. **The following Nu-Check® valve characteristics need to be considered in the system design and operation**: 1. When the check valve is overridden by using air, the pilot port needs to be vented for the check function to reengage. 2. When the check valve is manually overridden, releasing the manual button will reengage the check function.