

SUN CARTRIDGE VALVES

Hex body & sleeve assembly integrity

Several Sun Hydraulics cartridge valves include a hex body and sleeve assembly that use a red retaining ring to protect the integrity of the valve during assembly, shipping, handling and installation.

With the use of this retaining ring, approximately 300 pounds of force (1330 N) is required to shear the retaining ring and separate the sleeve from the hex body. When properly installed in a correctly machined cavity, all loading against the retaining ring is removed, and the sleeve is supported by the port 1 cartridge nose support shoulder in the cavity (see fig. 1 below). Because of this design, any separation of the hex body and sleeve assembly during service can be traced to three typical causes:

- Cavity dimensional issues
- Lack of port 1 shoulder support
- Trapped pressure on port 2

In the event that the hex body and sleeve are separated during cartridge removal, it is important to inspect the cavity and cavity tooling to ensure manufacturing meets Sun specifications.

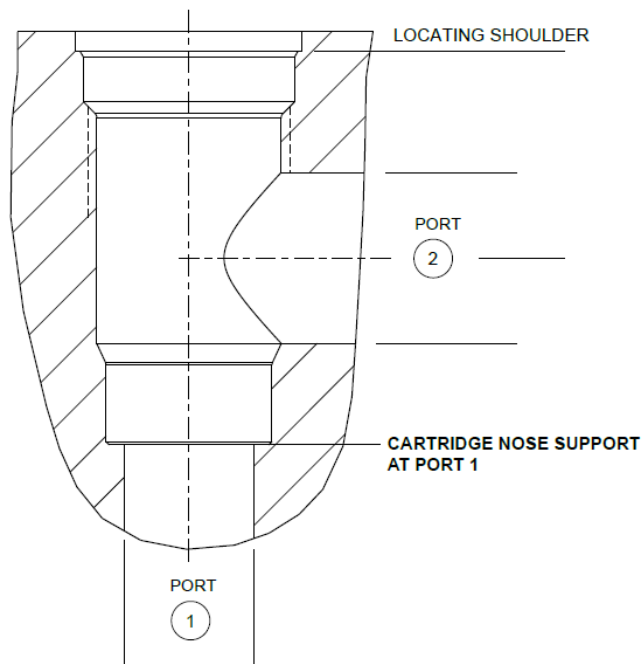


Fig. 1



CAVITY DIMENSIONAL ISSUES

The most common dimensional issues that can cause problems and potentially cause a separation of hex body from sleeve include the following:

- **Undersized cavity at port 1:** The cartridge sleeve can bind and resist removal if the cavity is undersized, which could result in shearing of the retaining ring during removal of the cartridge.
- **Cavity alignment issues:** With a poorly aligned cavity, the cartridge sleeve can bind and resist removal as well, which could also result in shearing of the retaining ring during removal of the cartridge.
- **Cavity depth not to spec:** A cavity depth that does not meet the required spec can result in lack of proper shoulder support and separation of the hex body and sleeve.
- **Cavity coating considerations:** When using Sun tooling, a maximum coating thickness of 0.0002" (0,005 mm) may be applied to the final machined cavity. A thickness greater than this can result in material interference between the cavity and the cartridge.
- **Worn form tool:** A worn form tool can create a taper at the nose that may not be easily detectable if it is not carefully measured. Taper at the cavity nose can cause the nose of the cartridge to wedge into the cavity during installation. When checking the nose dimensions, it is important to measure the diameter from the beginning of the nose down to the nose support to ensure that the nose is not tapered.

LACK OF PORT 1 SHOULDER SUPPORT

Sun cartridge valves require proper port 1 shoulder support of the cartridge nose diameter (sleeve). Problems can result from the following:

- **Cartridge not properly installed:** It is important to install the cartridge to the recommended torque to ensure that the cartridge nose is seated properly.
- **Cartridge backing out of the cavity during operation:** Although this typically will not happen with a properly installed Sun valve, excessive vibration or high-pressure cycling can cause the cartridge to back out of the cavity over time.



TRAPPED PRESSURE AT PORT 2

As with any system installation, trapped pressure is a potential safety hazard. If there is trapped pressure at port 2 when a valve is removed from the cavity, this can cause the hex body and sleeve to separate.

To properly remove a valve from a system, be sure to isolate the valve or manifold to be removed and vent the valve to atmosphere on all ports.

SAFETY FIRST



Before attempting to remove any cartridge valve or disconnect any oil lines, it is important to take the following steps:

- Turn off all pumps and isolate the prime mover lock out/tag out
- Relieve all residual hydraulic pressure from the system (bleed-down)
- Discharge any accumulators used in the system