

# POSITION STATEMENT

## USE OF TAPERED AND PARALLEL (STRAIGHT) THREADS IN ALUMINUM ALLOY CYLINDERS

### Question

What is the recommended valve thread type, tapered or parallel (straight), for aluminum alloy cylinders?

### Answer

Each valve thread type has its own advantages. If there are no regulatory requirements that specify the valve thread type, the choice of valve thread type is up to the individual or organization (packager) doing the valve installation.

### Background

For decades throughout the world, aluminum alloy cylinders have been successfully manufactured using the cold extrusion or hot extrusion process to produce both tapered and parallel (straight) thread designs. However, aluminum alloy cylinders manufactured from 6351 or 6082 alloys can exhibit sustained load cracking (SLC) in the shoulder and the neck of the cylinder. The use of shrunk-on neck rings provides additional reinforcement to the cylinder neck and can reduce the chance for neck crack growth.

Aluminum alloys cylinders are no longer permitted to be manufactured from 6351 or 6082 alloys. Today, 6061 and certain 7000 series alloys are the most commonly used aluminum alloys as cylinders manufactured from these aluminum alloys do not develop SLC.

Cylinders manufactured from 6351 or 6082 aluminum alloys may still be in service and have additional regulatory limitations and/or requirements. In the United States, see Title 49 of the U.S. Code of Federal Regulations (49 CFR) Parts 173 and 180 [1]. In Canada, see CSA B339-18, *Cylinders, spheres, and tubes for the transportation of dangerous goods*, Clause 24.2.10 [2].

Valves properly installed, whether with parallel (straight) or tapered inlet thread design, have proven to be reliable.

### Comparisons of tapered and parallel (straight) threads

Table 1 lists the characteristics of each thread design as they relate to various aspects of the compressed gas industry.

**Table 1—Thread design comparisons for high pressure aluminum alloy cylinders**

Aspect	Parallel (Straight)	Tapered
History	Stresses in the neck/threaded region are less, which is an important design consideration if the cylinder alloy is susceptible to stress cracking (for example, SLC).	Stresses in the neck/threaded region are greater due to use of mechanical torque on threads to achieve a leak-tight cylinder/valve connection. This is an important design consideration if the cylinder alloy is susceptible to stress cracking (for example, SLC).  NOTE—Tapered threads have been the preferred thread design worldwide for toxic, flammable, and corrosive gases.