

## **Guidance Note: Inspection and Gauging $\frac{3}{4}$ " NPSM (USA) Threads – 11/07. Amendment 01 – 09/11.**

In response to requests for clarification, from members in the Far East and Australasia, the following guidance is issued for Scuba cylinders and valves that utilise the  $\frac{3}{4}$ " NPSM (USA) thread form.

ASSET recommends that technicians, involved in the assembly and maintenance of Scuba cylinders and their valves, use the appropriate, calibrated, thread gauges as a means to ensure that they are both within tolerances and compatible with each other. Additionally, the technician should have received training in their use, as provided in the ASSET Dive Industry Technician's and Cylinder Tester's Courses and Handbooks.

### **Thread Gauges**

It is established practice when inspecting cylinder and valve threads to use Go and Not-go, full-form, ring and plug gauges to verify that threads are within acceptable tolerances.

Note: In the EC, there is a statutory requirement for cylinder inspection and testing. In the UK, in order to gain approval, the technician must be ASSET certified and have access to calibrated thread gauges for all thread forms to be inspected.

The following thread gauges are recommended:

For the cylinder neck thread: A double ended screw plug gauge (Style E) should be used. This gauge comprises a "Go" element which tests that the Major and Effective diameters are not too small. It also tests for pitch and flank errors in the thread. The "Not Go" element tests only that the Effective diameter is not too large. The following specification is recommended:

**$\frac{3}{4}$ " x 14 Parallel Threaded NPSM Male Screw "Plug" gauge to HS28 part 2, double ended, Go and Not Go, medium fit, Class 2B.**

For the valve stem thread: A pair of full form ring gauges should be used. These gauges comprise a "Go" element which tests that the Major and Effective diameters are not too large. It also tests for pitch and flank errors in the thread. The "Not Go" element tests only that the Effective diameter is not too small. The following specification is recommended:

**$\frac{3}{4}$ " x 14 Two Parallel Threaded NPSM Female Screw "Ring" gauges to HS28 part 2, solid, Go and Not Go, medium fit, Class 2A**

*For other thread forms, see either the Appendix of either the ASSET Dive Industry Technicians Handbook or the ASSET Cylinder Testing Handbook Pt 1.*

Gauges should be checked and their accuracy certified on an annual basis.

The names for these gauges indicate their purpose. A "Go" gauge should screw all the way to the full extent of the number of threads to be engaged. A "Not Go" gauge should engage with the thread but it should not be possible to screw it in/on at all.

However, in many industries, an allowance, the result of "custom and practice", of 1½ - 2 threads engaged on the "Not Go" gauge is often considered acceptable to account for post manufacture wear and tear. Such additional "tolerances" are **not** found in thread manufacturing standards.

### Precedent

In the mid 1980's Luxfer UK addressed the question of how many threads could be allowed to be engaged on a "not go" gauge when used on an aluminium cylinder containing a G¾" (ISO 228) neck thread. At that time, by experimentation, a determination was made that, some "go" on the "Not Go" gauge could be allowed, whilst leaving sufficient strength in the connection to adequately withstand the forces acting on the threads.

### Guidance

Although not identical, the ¾" NPSM thread is very similar to the G¾" and has a similar strength. It is therefore reasonable to assume that a similar allowance could be made:

Firstly, the threads of both the cylinder and valve must be visually inspected to ensure that they are free from significant corrosion and mechanical defects.

Secondly the "Go" gauge must screw all the way in/on for the full number of threads to be engaged.

Finally, when a valve with 11 threads is fitted, the "Not Go" gauge may be allowed to "go" by a total of not more than three full turns.

Note that this is the total number for the combination of both cylinder and valve threads; therefore, for example:

- If there is one thread engaged on the "Not Go" gauge in the cylinder neck thread, two threads can be allowed on the "Not Go" gauge for the stem thread of the corresponding valve.
- If the cylinder neck thread has two threads engaged on the "Not Go" gauge then only one thread can be allowed on the "Not Go" gauge for the stem thread of the corresponding valve.
- If the cylinder neck thread has three threads engaged on the "Not Go" gauge then nothing can be allowed on the "Not Go" gauge for the stem thread of the corresponding valve.

And so on.

Even new cylinders and valves should be checked. Never assume that a new product will automatically be correctly manufactured; experience shows that manufacturing defects can and do occur. Defective products should be returned to the supplier for replacement or refund.

Always inform manufacturers of such defects stating, wherever possible, the serial number and place of purchase. A conscientious manufacturer will want to investigate why defects are getting past their quality control.

## Safety Warning

It is entirely possible to incorrectly assemble a G3/4" (ISO 228) valve stem thread into a cylinder containing a 3/4" NPSM thread and vice versa. These two threads look similar and have the same pitch (14 tpi) and are similar in diameter. **However, the angle of these threads differs by 5 degrees and if incorrectly paired, produces a weak assembly, which can cause a catastrophic failure of the thread, resulting in the valve being ejected when pressurised.**

**Do not assemble cylinders and valves without proper training and the use of thread gauges. For safety it is essential that the compatibility, condition and tolerance of cylinder neck and valve stem threads are verified.**

*This guidance is offered in good faith and is believed to be correct to the best of our knowledge. Nothing contained herein shall be deemed to override good practice, manufacturers' policies, the relevant Standards and the Law.*

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