
THE GAMGRAM

No. 49

IMPORTANT FACTS ABOUT AIRCRAFT REFUELING HOSE

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In GamGram 35, we covered many aspects of aircraft refueling hose. In this GamGram, we cover more. Hose is taken for granted. It is very reliable, and surprisingly strong and durable. But you, the operator, have a responsibility to handle it properly.

For example, would you allow a doctor to operate on you using instruments that had never been cleaned? Using accessories that had never been tested? Failing to inspect his equipment prior to use?

Much of what is in this GamGram is **CRITICAL** to your operation. This GamGram is **NOT** background information. **YOU** are supposed to soak and flush hose before use. **YOU** are supposed to retest hose periodically. This GamGram is meant to illuminate these and other facts. Your oil company and/or airline customer's guidelines should be followed. They may require different or more frequent inspections or more strenuous testing.

NEW HOSE INSTALLATION

Upon installing a new piece of hose, do not just flow fuel into the aircraft! Hose is made on a metal form, called a mandrel. It forms the inside diameter of the hose. This mandrel is covered with a mold release compound (a wax-like substance) to keep the raw rubber of the liner or tube from sticking to the mandrel. Raw rubber is putty-like and sticky. After the yarn or fabric is added to the hose as reinforcement, and the cover is applied, the hose is baked in an oven to cure the rubber.

When the mandrel is removed, some of the wax-like substance remains inside the hose. The water used in pressure testing the hose does not remove all of this material. But more than that, the rubber itself needs to be soaked in fuel and flushed prior to use. This is because the rubber will release some material (plasticizers) into the fuel when first used. No manufacturer can avoid this, it has to do with the chemistry of rubber.

MINIMUM

The API standard requires flushing, but has no set procedure. It recommends the following as an example. Flush 500 gallons of fuel through the hose, let it sit unused with fuel inside for 8 hours, and repeat the flush. (API-1529 - 1998). In the field, the standard practice we have seen is to recirculate this fuel back to storage.

INSPECTION

Many people consider inspection of the hose to be a periodic operation. Some people inspect hose visually once every 3 months. The API-1529 requires visual inspection **DAILY!** Do you do this? Hose failure is arguably the worst possible equipment failure you could experience. Think of it, fuel under pressure, a hot aircraft engine...

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MINIMUM INSPECTION

DAILY	Visual inspection of hose
MONTHLY	Pull hose out fully and carefully inspect for any irregularities including soft spots. Pressurize the hose and inspect again. This is literally a "hands-on" inspection, not a simple visual look-over
EVERY 6 MONTHS	Pressure test the hose to the maximum working pressure and conduct the same examination as done monthly. (Not your normal operating pressure, the hose's rated working pressure)

RECOUPLING WITH REATTACHABLE FITTINGS

Many of you are now thinking, "We can't recouple or use reattachable couplings at our airport; we are not allowed." If your oil company or if other rules prohibit reattachable fittings or the reuse of them, it is probable that they are unaware that the majority of aircraft refueling hoses that are in service outside of the USA, have reattachable couplings. It is not prohibited by API-1529, BS-EN 1361 (which replaces the old BS-3158), or the NFPA-407.

In the past, the NFPA did not allow the use of reattachable couplings, but now it does. The API has a recoupling procedure. To meet the API standard, the fittings must pass a strenuous test of the hose/fitting combination before a reattachable fitting can be used at all. To certify a coupling brand/model and a hose brand/model together, the API requires a 15,000 cycle pressure test to maximum working pressure. The fitting must not slip. There are at least three brands of hose presently made in the USA that meet this standard using special German-made fittings. **DO NOT USE ANY BRAND OF REATTACHABLE FITTING UNLESS IT IS SPECIFICALLY APPROVED BY THE SPECIFIC HOSE MANUFACTURER TO API-1529 (or BS-EN-1361 and, if so, approved by your oil company).** Internationally, the oil company approval requirement supersedes all other approvals.

Some of you may be asking, "Why recouple?" The method in some parts of the world is to buy hose a little longer than absolutely necessary. You may or may not reverse the hose after the nozzle end starts to show wear, but when one end shows too much wear, you cut off a few feet, and recouple.

MINIMUM TEST

If you do recouple hose with reattachable fittings, you must:

1. Have a formal written procedure and training manual.
2. The fitting must be approved for use on that specific brand and size of hose.
3. Permanently mark the fitting to show the date and who performed the recoupling.
4. The hose must be tested to the PROOF (not working) pressure prior to returning to service.
5. If the hose is recoupled with the exact same fitting that was removed from that piece of hose, a test only to maximum working pressure is allowed by the API, but we recommended a test to proof pressure.
6. Complete records must be kept for the life of the hose.

There is a lot to the care of refueling hose, and you should not take it for granted. It is made by humans, and can have flaws. It can be damaged in use. A hose failure can be catastrophic.