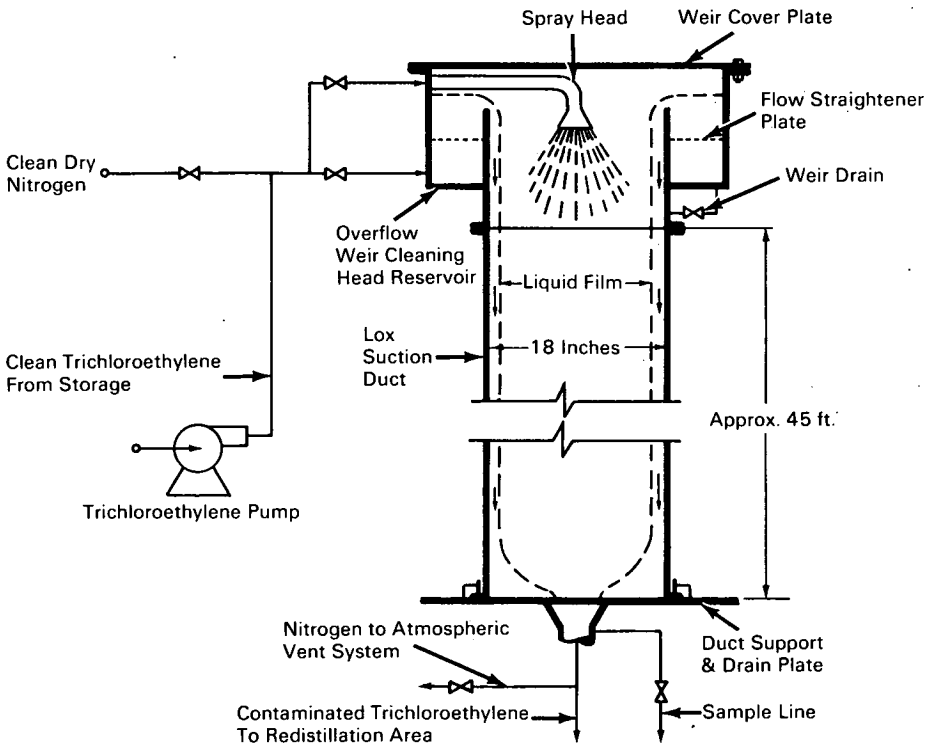
NASA TECH BRIEF

Liquid Oxygen Ducting Cleaned by Falling Film Method



The problem:

To clean contaminated large diameter and length liquid oxygen (LOX) cylindrical ducting with a small capital facility investment and at economical flow-rates.

The solution:

A facility that cleans such ducting at relatively low cost, using the principle of a vertical falling film.

How it's done:

The duct is vertically mounted on a support plate as illustrated, the support plate including a 5-inch diameter drain hole to prevent liquid buildup in the bottom of the duct during the cleaning operation. An overflow weir cleaning head reservoir is bolted and gasketed to the duct top flange and contains a perforated flow straightening plate to remove vorticity components in the solvent, plus a spray head required to clean the internal triaxial gimbal surfaces at the top and bottom of the duct. A solvent supply and redistillation unit with a pump capable of delivering 70 gpm, plus a 100 psig dry nitrogen supply, and appropriate piping and valves complete the cleaning facility.

(continued overleaf)

The cleaning cycle is performed by flowing 30 to 70 gpm specification grade trichloroethylene (100 micron maximum particle size) in a falling film down the duct for approximately one hour. Temperature of the solvent is increased during the latter part of the cleaning cycle to facilitate subsequent drying. Following cleaning, the duct is purged with clean, dry nitrogen until all residual solvent is removed. The duct interior is at atmospheric pressure throughout cleaning and drying.

Notes:

1. The falling film principle may be used as an economical way to clean straight, large diameter and length cylindrical piping or ducting of many materials. Multiple solvents, pickling solutions, alkaline cleaners, etc, may be used sequentially with common plumbing and overflow cleaning weir reservoir.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B67-10299

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Henry I. Paul
of The Boeing Company
under contract to
Marshall Space Flight Center
(MFS-11816)