AEROSPACE RECOMMENDED PRACTICE

ARP5102™	REV. A

Issued 1996-03
Reaffirmed 2013-01
Stabilized 2023-11

Superseding ARP5102

Fluid Fittings - Jump Size Limitations

RATIONALE

This technical report is being stabilized because it covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

STABILIZED NOTICE

This document has been declared “STABILIZED” by SAE G-3, Aerospace Couplings, Fittings, Hose, Tubing Assemblies Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/ARP5102A/

1. SCOPE:

   For tube fitting standards with reduction/expansion, to provide precautions against the use of large changes in tube size.

2. REFERENCES:

   There are no referenced publications specified herein.

3. REASONS:

   a. Fatigue Failure: Vibration/flexure which may be normal for a large tube can be excessive for a smaller tube. For example, a tee fitting with large tubes on the run but with a small side connection focuses the “normal” vibration of the large tubes on the small branch.

   b. Overtorque: An “expander” union in a threaded port (i.e., a reducer with the small end in the boss) is likely to be torqued to the value appropriate to the large end. The small end (which is invisible) may be damaged.

   c. Energy Loss: A large diameter transition causes a loss of fluid flow energy. This may be significant in some systems.

   d. Cost and Availability: Fittings with large reductions, in spite of being listed in a standard, are little used, so are seldom available from stock. This results in a higher cost fitting, and one that may be difficult for an operator to replace.

3. (Continued):

The recommended limit is “the largest tube diameter in the fitting shall be less than 2 times the smallest tube diameter.” For both the inch and metric series, this limits the change to two or three tube sizes in the commonly used diameters (see Figures 1 and 2).

The limit in tube size change is a recommendation. If a user chooses to address the problems listed previously (e.g., extra tube supports, extra-thick tube walls, vibration tests of the installation, etc.), larger reductions could be used.

4. RECOMMENDATIONS:

a. Reducer/expander fitting standards with tabulated dimensions shall have those dimensions crosshatched or shaded if the ratio of maximum and minimum tube diameters is 2.0 or greater, per the example in Figures 1 and 2.

b. Fitting standards whose tabulated sizes include large tube size reductions should carry a notice “Reducer fittings which fall in the shaded area of Table X should be avoided. If they must be used, special attention should be given to clamping or other means to protect the smaller port or tube.”

Standard Hydraulic Tube Sizes

TUBE SIZE	TUBE O. D.	Ratios of Tube Diameters													
		-2	-3	-4	-5	-6	-8	-10	-12	-14	-16	-20	-24	-32
-2	0.125	1.00	1.50	2.00	2.50	3.00	4.00	5.00						
-3	0.188	0.67	1.00	1.33	1.67	2.00	2.67	3.33						
-4	0.250	0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00					
-5	0.313	0.40	0.60	0.80	1.00	1.20	1.60	2.00	2.40	2.80	3.20			
-6	0.375	0.33	0.50	0.67	0.83	1.00	1.33	1.67	2.00	2.33	2.67	3.33		
-8	0.500	0.25	0.38	0.50	0.63	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00	
-10	0.625		0.30	0.40	0.50	0.60	0.80	1.00	1.20	1.40	1.60	2.00	2.40	3.20
-12	0.750			0.33	0.42	0.50	0.67	0.83	1.00	1.17	1.33	1.67	2.00	2.67
-14	0.875				0.36	0.43	0.57	0.71	0.86	1.00	1.14	1.43	1.71	2.29
-16	1.000				0.31	0.38	0.50	0.63	0.75	0.88	1.00	1.25	1.50	2.00
-20	1.250					0.30	0.40	0.50	0.60	0.70	0.80	1.00	1.20	1.60
-24	1.500						0.33	0.42	0.50	0.58	0.67	0.83	1.00	1.33
-32	2.000							0.31	0.38	0.44	0.50	0.63	0.75	1.00

FIGURE 1 - Tube OD Ratios - Inch Series