

Seal-Lok™ O-Ring Face Seal Vibration Test

Test Description (NFPA T.3.8.3 section 6.5):

Samples of SAE sizes 4 through 20 and ISO sizes 6 through 16 were vibration-tested on a rotary vibrator and larger sizes were tested on a planar (single plane) vibrator. A strain gage is installed at the fixed end of the sample, and the free end is deflected to produce 20,000 psi fiber stress. The sample is then cycled at a +20,000 through -20,000 psi fiber stress at the gage for one million cycles. After one million cycles at

this initial stress, the stress level is increased to $\pm 38,000$ psi to force a failure.

A small amount of internal pressure is applied to the sample to monitor for leakage and shut down the test upon failure. Any sample failing before reaching one million cycles at 20,000 psi stress level or the failure at 38,000 psi occurring inside the fitting envelope is considered failing the test.

TABLE 1 – TYPICAL VIBRATION TEST RESULTS FOR PARFLANGE ASSEMBLIES (INCH TUBING)

SAE Fitting Size	Tube Dimensions, Inch	Cycles @ Initial Stress of 20,000 lbs./in. 2	Additional Cycles @ Stress Increased to 38,000 lbs./in. 2	Comments
4	1/4 x .035	Over one million cycles	5,400 to 450,050	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
6	3/8 x .035	Over one million cycles	77,625 to 450,050	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
6	3/8 x .049	Over one million cycles	97,200 to 189,900	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
6	3/8 x .065	Over one million cycles	31,050 to 82,800	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
8	1/2 x .035	Over one million cycles	134,500 to 196,650	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
8	1/2 x .049	Over one million cycles	82,800 to 113,850	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
8	1/2 x .065	Over one million cycles	43,150 to 657,225	No failure at initial stress; tube cracked at or near back of sleeve at increased stress, within range of cycles shown
10	5/8 x .049	Over one million cycles	31,050 to 82,800	No failure at initial stress; tube cracked at or near back of sleeve at increased stress, within range of cycles shown
10	5/8 x .065	Over one million cycles	10,350 to 165,600	No failure at initial stress; tube cracked at back of sleeve at increased stress, within range of cycles shown
12	3/4 x .049	Over one million cycles	10,350 to 20,700	No failure at initial stress; tube cracked at back of sleeve at increased stress, within range of cycles shown
12	3/4 x .065	Over one million cycles	20,700 to 72,450	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown
12	3/4 x .095	Over one million cycles	37,800 to 183,600	No failure at initial stress; tube rotated and/or cracked behind sleeve at increased stress, within the range of cycles shown

TABLE 2 – TYPICAL VIBRATION TEST RESULTS FOR PARFLANGE ASSEMBLIES (METRIC TUBING)

SAE Fitting Size	Tube Dimensions, mm	Cycles @ Initial Stress of 20,000 lbs./in. 2	Additional Cycles @ Stress Increased to 38,000 lbs./in. 2	Comments
4	6 x 1	Over one million cycles	307,800	No failure at initial stress; tube cracked behind sleeves at increased stress, within range of cycles shown
4	6 x 1.5	Over one million cycles	583,200 to 1,684,800	No failure at initial stress; tube cracked at back of sleeve at increased stress, within range of cycles shown
8	12 x 1.5	Over one million cycles	156,600 to 486,000	No failure at initial stress; tube cracked at back of sleeve at increased stress, within range of cycles shown
10	16 x 1.5	Over one million cycles	48,600 to 156,600	No failure at initial stress; tube cracked behind sleeve at increased stress, within range of cycles shown



TABLE 3 – TYPICAL VIBRATION TEST RESULTS FOR BRAZE ASSEMBLIES

SAE Fitting Size	Cycles @ Initial Stress of 20,000 lbs./in. 2	Additional Cycles @ Stress Increased to 38,000 lbs./in. 2	Comments
4	Over one million cycles	63,000 to 209,000	No failure at initial stress; failure was due to tube reaching its fatigue limit and cracking circumferentially at location outside of fitting
6	Over one million cycles	21,000 to 63,000	No failure at initial stress; failure was due to tube reaching its fatigue limit and cracking circumferentially at location outside of fitting
8	Over one million cycles	100,000 to 170,000	No failure at initial stress; failure was due to tube reaching its fatigue limit and cracking circumferentially at location outside of fitting
12	Over one million cycles	32,000 to 65,000	No failure at initial stress; failure was due to tube reaching its fatigue limit and cracking circumferentially at location outside of fitting
20	Over one million cycles	72,000	No failure at initial stress; failure was due to tube reaching its fatigue limit and cracking circumferentially at location outside of fitting

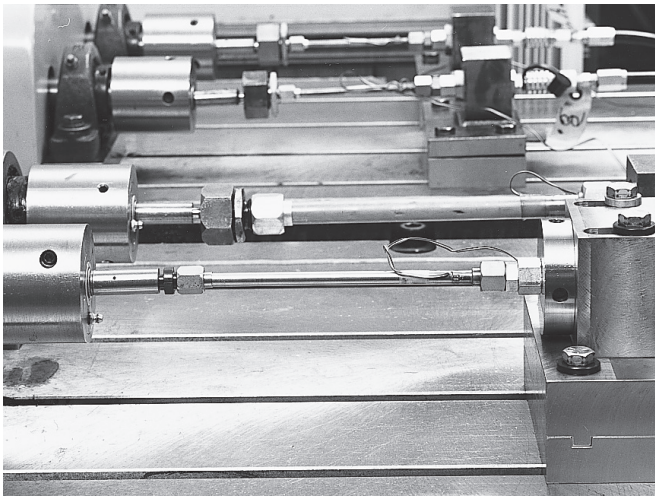


Figure 1 – Vibration Test

Analysis

Vibration is not a requirement of SAE J1453 and ISO 8434-3. However, it is considered a good “acid” test, particularly in the setting of a comparative benchmark against other fitting types.

Based on field experience along with the test results shown in Tables 1, 2 and 3, Seal-Lok is recommended for earthmoving, agricultural and railroad equipment that experiences severe vibration in service.

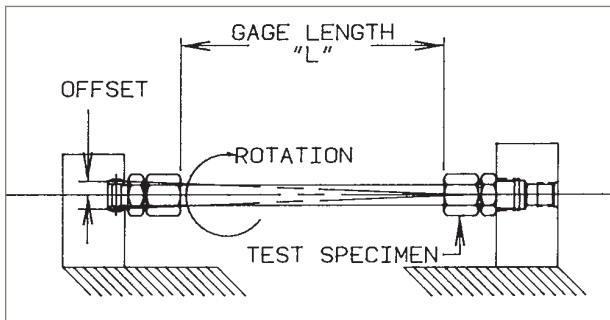


Figure 2 – Vibration Test Schematic

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