



## TECHNICAL INFORMATION *WHITE PAPER*

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### FATIGUE TEST - STAY SILV<sup>®</sup>15 VS DYNAFLOW<sup>®</sup>

The recent silver market price rise has dramatically influenced prices of silver bearing braze alloys. Historically, the 15% silver braze rod has been the most popular choice for brazing copper tube. A 6% silver alloy, Dynaflow, was formulated to emulate the melting characteristics of Stay Silv 15, but at a lower cost.

Despite Dynaflow's long use history in the HVAC/R industry there was interest in conducting tests to measure brazed properties of the two products. These tests were designed to replicate certain conditions present in HVAC operation.

A fatigue test protocol with an applied constant load and vibration was developed to evaluate brazed copper tube connections. The tests were conducted at room temperature and 300°F.

The image shows samples of brazed  $\frac{3}{4}$ " swaged tube connections. Twelve samples were brazed; six with Stay Silv 15 and six with Dynaflow. For each evaluated filler metal, three samples were tested at room temperature and three at 300°F. The center tube sample is the tube section prior to brazing.



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Additional information available at our web site: [www.harrisproductsgroup.com](http://www.harrisproductsgroup.com)

## Fatigue Test Data Summary Sheet

**Project No.:** 11322CSL-01

**Customer:** J.W. Harris

**Test Method:** Customer specified

**Address:** The Harris Product Group  
4501 Quality Place  
Mason, OH 45040

**Specification:** Customer Specified

**Job No.:** 2012-164963

**Technician:** Rich Minshall

**R-Ratio:** 0.1

**Run-Out:** ----

	Specimen	Load Ratio	Applied Load				Load Range		Date Tested	Cycles	Comments
			Maximum (lb)	Minimum (lb)	Amplitude (lb)	Mean (lb)	(lb)	(N)			
1	15-1	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/17/12	123,212	30 hz at 300°F
2	15-2	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/17/12	84,856	30 hz at 300°F
3	15-3	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/17/12	85,063	30 hz at 300°F
4	15-4	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/13/12	122,123	20 hz
5	15-5	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	171,720	30 hz
6	15-6	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	125,838	30 hz
7	D-1	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	95,738	30 hz at 300°F
8	D-2	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	87,882	30 hz at 300°F
9	D-3	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	88,653	30 hz at 300°F
10	D-4	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	104,991	30 hz
11	D-5	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	88,453	30 hz
12	D-6	0.1	1,500.0	150.0	675.0	825.0	1,350	6,005	07/16/12	121,247	30 hz

Samples Tested at 300°F

Test Conducted By

Title: Lead Technician

Reviewed By

Title: Applications Engineer

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## RESULTS

Failure of all Stay Silv 15 and Dynaflo brazed samples was in the tube. The results indicate both alloys provide comparable strength results which exceeded the copper tube strength. This occurred at ambient and elevated temperature. These results are predicated on uniform clearance of approximately 0.002" – 0.005" and adequate braze alloy penetration into the capillary.

## BRAZING SAFETY

**WARNING: PROTECT yourself and others. Read and understand this information.**

**FUMES AND GASES can be hazardous to your health.**

**HEAT RAYS, (infrared radiation) from flame or hot metal can injure eyes.**

- Before use, read and understand the manufacturer's instructions, Material Safety Data Sheets (MSDS), and your employer's safety practices.
- Keep your head out of fumes.
- Use enough ventilation, exhaust at the flame, or heat source, to keep fumes and gases from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.
- See American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA Safety and Health Standards, available from the U.S. Government Office, Washington, DC 20402.

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