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Subject : Flexure Test of Thin
Wall Tubing

ASTRONUCLEAR LABORATORY

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MASTER

Several samples of thin wall (0.010 in. and 0.005 in.) tubing were tested in flexure to determine the buckling strength of the tubing. The specimens were cut from Inconel 625 tubes supplied by Superior Tube Company, and furnished by Advanced Reactor Design.

The specimens were tested in the E. M. L. Wiedemann U. T. M., subjected to a third-point flexural loading. Figure 1 shows the loading fixture; the distance between the support points is 15 inches, the spread between the loading points is 5 inches and is centered between the support. Teflon loading saddles were used between the loading points and the specimens to distribute the load.

Dimensional checks of the specimens showed variations in the O. D. and wall thickness along the length of the specimens. In calculating the section properties, the most frequently measured O. D. of 0.339 in. was used with the nominal 0.010 in. wall, and 0.329 in. with the 0.005 in. wall. Based on these dimensions, and using the flexure formula, the average buckling stress for the 0.010 in. wall tubes was 119,600 psi, for the 0.005 in. wall was 117,700 psi. For both size tubes, tensile yielding occurred before compressive crippling; however, the 0.010 in. wall tube specimens sustained deflection before crippling actually occurred. Figures 2 & 3 are typical head travel vs. load curves for 0.010 in. and 0.005 in. wall specimens. Figures 4, 5 & 6 show the specimens after test.

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FIGURE #1

FIGURE #2

FIGURE 2

Head Travel vs. Load,
0.010 in. Wall Tube

Extensometer stopped at this point.
Total Head Travel at crippling: 1.3 in.

FIGURE #3

Figure 3. Head Travel vs. Load,
0.005 in. wall tube.

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TEST NO _____ RUN NO _____

SPECIMEN .010 WALL TUBE (A)

TEST FLEXURE TEST

0 2 4

FIGURE #4

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TEST NO _____ RUN NO _____

SPECIMEN .010 WALL TUBE (B)

TEST FLEXURE TEST

0 2 4

FIGURE #5

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TEST NO _____ RUN NO _____
SPECIMEN .005 WALL TUBE (C)
TEST FLEXURE TEST

FIGURE #6