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RESEARCH AND TESTING LABORATORIES

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Report No. 30536

June 17, 2011

Client: Jensen Swing Products, Inc.  
9327 Weatlands Rd.  
Santee, CA 92071

Reference: Charvet Vecchio

Subject: Torque Resistance of Metal Pendulums.

**Sample Description:**

Two cast metal parts were submitted by the Client and identified as pendulums. Each part consisted of a center body with two parallel legs approximately 0.5" apart. On the open end one leg was smooth bored and the other was threaded for a 3/8"-16 bolt. The two holes were concentric.

**Request:**

Determine the torque required to bend the legs together.

**Method:**

The center body of each of the submitted parts was mounted in a vise and a 3/8"-16 grade 8 hex head bolt inserted through the smooth bore into the threaded bore. The bolt was tightened with a dial gage torque wrench.

**Results:**

The maximum torque for one part was 45 ft-lb's. and the other part was 40 ft. lbs. In both cases the bolts broke at the interface of the threads and the shank.

The legs bent together to about 0.17" at which point the non concentricity of the bolt holes in the two legs caused the threads to jam. The metal exhibited evidence of cracking at the base of the legs where the leg meets the body of the part. However no separation occurred.

**Conclusion:**

The degree of ductility of the submitted metal is such that the legs on the submitted part could not be tightened to the point of metallic failure.

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A handwritten signature in black ink that reads "Lewis F. West".

by Lewis F. West



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Report No. 30518-1

May 27, 2011

Client: Jensen Swing Products, Inc.  
 9327 Weatlands Rd.  
 Santee, CA 92071

Reference: Charvet Vecchio  
 Letter of 05/17/11

Subject: Chemical Analysis of Metal Pendulums.

**Sample Description:**

Two cast metal parts were submitted by the Client and identified as pendulums, one round and one square.

**Request:**

Quantitatively analyze each of the submitted samples for elemental content.

**Method:**

An aliquot from each sample was separately analyzed in accordance with the procedures set forth in ASTM E-357 which is referenced in ASTM A-439.

**Results:**

<u>Element</u>	<u>Round</u>	<u>Square</u>	<u>Required (%)</u>
Total Carbon	2.49	2.53	3.0 max.
Silicon	2.15	2.30	1.5-3.0
Manganese	0.75	0.69	1.0 max.
Phosphorous	0	0	0.08 max.
Nickel	21.7	20.9	18-22
Chromium	2.32	2.49	1.75-2.75

**Comments:**

Both of the submitted samples meet the general chemical requirements for a general ductile iron.

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 by Lewis F. West