

DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES

Office of Structural Materials

Quality Assurance and Source Inspection



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Contract #: 04-0120F4Cty: SF/ALA Rte: 80 PM: 13.2/13.9File #: xx.25B**MATERIAL SUITABILITY DOCUMENTATION REPORT****Prime Contractor:** American Bridge/Fluor Enterprises, a JV**Report No:** MSD-000326**Contractor:** Dyson Corp. & Subs**Date:** 22-Sep-2008**Location:** Dyson Corporation, Painesville, OH**BTL Mat Des.:****BTL Item No.:****Initiated By/Why:** DYSN-0005 Nonconforming Material**BTL Summary:**

Per Trans Lab QA testing, Dyson Corporation has provided nonconforming material (3rd time since November, 2007):

1) Anchor rods: 2 of 7 heats failed ASTM A 354 Grade BD elongation (14% in 2 inches); Heat Treatment Lots MJF 26 and MJF 30 both had 13.45%.

2) Nuts: Low hardness; Rockwell C 24 to 38 (C24 to C38) required; lot average C20.4.

METS Comments**METS Discussion:**

Anchor rods had more variation than the results might suggest. Two samples for each lot were averaged for elongation in two inches. Lot MJF 26 elongation for two different samples was 13.3 and 13.6 percent; for MJF 30, 12.5 and 14.4 percent.

The individual nuts had the following hardness readings on the Rockwell C scale: C18.1, C20.5, C22.1. One nut had variances between C16 and C37. Of note, Dyson's own stated standard tolerance is $\pm C2$, and only one of these nuts would have met the C24 minimum, and only barely. The average, C20.4, is nowhere near Dyson's own tolerance or ASTM standards.

For QA testing, Dyson provided a 1200 mm rod, threaded on one end, per Department instructions. Nuts underwent tensile testing by being threaded onto the rods, which were "pulled" in a 2 million pound test machine. Three (3) nuts were tested with seven (7) rods, meaning that each nut was "pulled" at least twice. In all seven tests, the 3-inch bar ruptured without the nuts failing.

Dyson provided nonconforming material on two previous occasions:

November, 2007: ASTM A 563 2-inch nuts with insufficient hardness; barely-conforming A 722 threads ("rod deformations"). The nuts were returned by ABF and new nuts fabricated with adequate hardness. The rejected nuts could not be tensile tested properly because a) 2 inch nuts require special apparatus for individual tensile testing, and Trans Lab does not have this expensive specialty item; b) when tensile tested along with A 722 rods, the rod and nut threads appeared to fail simultaneously, negating the results: the nuts should fail later.

July, 2008: ASTM A 563M nuts with excessive thread thickness; barely-conforming A 354 BD "M30" threads. Since the over-thick nuts were able to thread onto the almost-too-thin bolt threads, the material was accepted as "fit for purpose."

Proposed Resolution:

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Accept all material "as is." Rods pass yield and tensile testing, making them acceptable to Design; nuts passed tensile testing, overriding hardness testing.

Date discussed with the Construction Engineer: 16-Sep-2008 **Time:** 1400 **Various:**

Construction Comments

Name of the Construction Engineer involved: Brian Boal

Construction agrees with METS recommendation: Yes No

Recommendation from Construction (If NO is checked above):

ABF-NPR-000169R00; NCT-0170 (23-Sep-2008)

Contract Change Order required: Yes No **If Yes, CCO number:**

Designer Comments

Name of Design Engineer involved (if applicable): James Duxbury

Recommendation from the Design Engineer (if applicable):

Material is acceptable, since yield and tensile strengths are satisfactory.

Screening Team involvement: Yes No

Issue requires FAST Involvement: Yes No

Decision by FAST (if YES is checked above):

N/A

METS Summary of Final Decision:

N/A

Comments:

This report is for the purpose of determining conformance with the contract documents and is not for the purpose of making repair or fit for purpose recommendations. Should you require recommendations concerning repairs or remedial efforts please contact Venkatesh Iyer, (858) 967-6363, who represents the Office of Structural Materials for your project.

Inspected By:	Iyer, Venkatesh	Quality Assurance Inspector
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Reviewed By:	Iyer, Venkatesh	QA Reviewer
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