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STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION TITLE PAGE

CLIENT & PROJECT TEXAS UTILITIES GENERATING CO./COMANCHE PEAK SES - UNIT NO. 1&2	PAGE 1 TOTAL NO. OF PAGES= 6
CALCULATION TITLE (Indicative of the Objective): DOCUMENTATION OF USE OF LOW STRENGTH A563 GR A DOUBLE NUTS ON HIGH STRENGTH SA193 GR B-7 TH'D ROD FOR RICHMOND INSERT BOLT CONNECTION.	☒ I - NUCLEAR SAFETY RELATED ☐ II - NON-NUCLEAR SAFETY RELATED

CALCULATION IDENTIFICATION NUMBER

J.O. OR W.O NO.	DIVISION & GROUP	CURRENT CALC. NO.	OPTIONAL WORK PACKAGE NO
15454.05	NZ(c)-	GENX-008	

PREPARER(S)/DATE(S)	REVIEWER(S)/DATE(S)	INDEPENDENT REVIEWER(S)/DATE(S)	REV. NO. OR NEW CALC NO.	SUPERSEDES CALC. NO OR REV. NO.	CONFIRMATION REQUIRED (✓) YES	NO
M. Gizanani 10-29-85	Gregory G. Dine 10/29/85	Gregory G. Dine 10/29/85	0	—		✓
APPROVAL: James J. Meraglia 11-7-85						
M. Simi 8/15/86	D.M. Parikh (DM PARIKH) 8/19/86	F.L. Ogden (F.L. OGDEN) 8/19/86	1	0		✓
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APPROVAL: D.M. Parikh 9-10-86						
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RECORDS MGMT. NYOC	B. EXCELL	✓✓			

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CALCULATION SHEET

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REVISION STATUS TABLE

REV NO.	PAGE NO.	DESCRIPTION/REASON
1	1 to 6	Revised
	7	deleted
		Reason for Revision; To modify the approach towards the use of low strength nuts on high strength threaded rods.
2	6	REVISED REASON FOR REVISION; TO REVISE ALLOWABLES IN TABLE TO BE CONSISTANT WITH ROD ALLOWABLES BASED UPON AISC RATIO AS SHOWN IN CALC. 15454. NZ(c)-GENX-037. DELETE NOTE 2.

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OBJECTIVE OF CALCULATION

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To Develop a position on the use of low strength double nuts (A563 Grade A) on high strength threaded rod (A193 Grade B7) for use with a Richmond Insert.

CALCULATION METHOD

The compatible nut to be used in conjunction with A193 Gr. B7 high strength threaded rod is A194 Grades 2H and 7. However in some applications A563 Grade A nuts were used in lieu of the A194 nut which is needed to assure full capacity of the high strength threaded rod. It is then necessary to perform a comparison of the proof loads between A194 Grade 2H, 7 nuts and ASTM A563 Grade A nuts.

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SOURCES OF DATA

1980 ASTM STARDARDS, part IV
CPPP-7 REV. 2 4/25/86

CONCLUSIONS

The proof load for the A194 Grades 2H, 7 nut is significantly higher than that of the A563 Grade A nut.
Using 2 A563 nuts will not necessarily increase the total proof load because it cannot be readily shown that the nuts will work concurrently.
It is therefore required to conservatively reduce the tension allowables for the A193 Grade B7 threaded rods as specified in CPPP-7 attachment 4-5 by the ratio equal to the

$$\frac{\text{PROOF (LOAD) STRESS OF A563 Grade A}}{\text{PROOF (LOAD) STRESS OF A194 Grades 2H, 7}}$$

when A563 Grade A nuts are used in place of A194 Grades 2H, 7 nuts.

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ANALYSIS

From ASTM 1980 Part IV ;

Mat'L A194 Grades 2H, 7

① PROOF (LOAD) STRESS = 150. ksi

Mat'L A563 Grade A

① PROOF (LOAD) STRESS = 90. ksi

$$\text{REDUCTION FACTOR} = \frac{90}{150} = 0.6$$

NUT TYPE	BOLT SIZE	NORMAL ALLOWABLE (kips)	REDUCED ALLOWABLE (kips)	FAULTED ALLOWABLE (kips)	REDUCED ALLOWABLE (kips)
HEX	1" ϕ	32.7	19.6	43.5	26.1
	1½" ϕ	84.1	50.4	111.8	67.0

2

NOTES: ① NON-GALVANIZED NUTS

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