



RECORD OF
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(6) ANALYSIS TITLE <u>TYPE "A" CASK LUGS</u>		
(7) AUTHOR <u>J.A. NEMES</u>		
(8) PURPOSE OF ANALYSIS <u>TO DEMONSTRATE THE ACCEPTABILITY</u> <u>OF AN ALTERNATE MATERIAL FOR THE TYPE "A" CASK</u> <u>LUGS</u>		
(9) SUMMARY OF ANALYSIS PROCEDURE AND RESULTS <u>CALCULATIONS IN REF 1</u> <u>ARE PERFORMED WITH THE PROPERTIES OF THE</u> <u>ALTERNATE MATERIAL SUBSTITUTED. BASED ON THESE</u> <u>CALCULATIONS THE ALTERNATE MATERIAL IS</u> <u>ACCEPTABLE</u>		
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CLIENT NUS PROC SERV FILE NO. 5025.05-01 BY JAM
SUBJECT TYPE "A" CASK Checked By m. 2

CLIENT: NUS PROCESS SERVICES

ANALYSIS FILE NUMBER: 5025.05-01

ANALYSIS TITLE: TYPE "A" CASK LUGS

AUTHOR: J.A. NEMES

PURPOSE OF ANALYSIS: TO DEMONSTRATE
ACCEPTABILITY OF ALTERNATE LUG MATERIAL

METHOD OF ANALYSIS: PROPERTIES OF THE
ALTERNATE MATERIAL ARE SUBSTITUTED
INTO THE CALCULATIONS OF REF 1

INPUT INFORMATION: INPUTS ALONG WITH
THEIR SOURCE ARE IDENTIFIED IN THE
DETAILED CALCULATIONS

MAJOR ASSUMPTIONS: NO MAJOR ASSUMPTIONS
WERE MADE FOR THIS ANALYSIS

CLIENT NUS PROC SERV FILE NO. 5025.05-01BY amSUBJECT TYPE "A" CASKChecked By M. Z.REFERENCES:

- 1) "SAFETY ANALYSIS REPORT FOR THE NUPAC SERIES A CASKS TO 10CFR71 TYPE "A" PACKAGING REQUIREMENTS", REVISION 2, FEB 17, 1983, DOCKET No 71-9159
- 2) CODE OF FEDERAL REGULATIONS, 10CFR PART 71, LATEST EDITION
- 3) ASTM STANDARD A240-82C, "SPECIFICATION FOR HEAT-RESISTING CHROMIUM-NICKEL STAINLESS STEEL PLATE, SHEET, AND STRIP FOR PRESSURE VESSELS"
- 4) NUS DRAWINGS No 5025-M-2005 SH No 1 AND 2, REV A, "CASK GENERAL ARRANGEMENT"

COMPUTER CODES: NONE USED

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 SUBJECT TYPE "A" CASE Checked By ML

DETAILED CALCULATIONS

CHANGE MATERIAL FOR ITEMS 15 AND 16
 FROM A517 TO A-240-UNS S32550

$$F_y = 80 \text{ KSI (REF 3)}$$

$$F_u = 110 \text{ KSI "}$$

SHEAR YIELD, USING VON MISES YIELD
 CONDITION IS COMPUTED BELOW

$$F_{ys} = F_y / \sqrt{3} \quad (\text{REF 1 CONSIDERS } F_{ys} = .6 * F_y \therefore \text{CONS.})$$

$$= 80 / \sqrt{3} = 46.2 \text{ KSI}$$

LIFTING : (REF 1 pg 2-6)

SHEAR CAPACITY OF LUG:

$$P_{yld} = 2 F_{sy} t (2d - d/2 \cos 40^\circ)$$

$$= (2)(46200)(2)(2.5 - 2.5/2 \cos 40^\circ)$$

$$= 285000 \text{ LBS}$$

$$M.S. = P_{yld} / P_u - 1$$

$$= 285,000 / 97,800 - 1 = +1.91$$

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 SUBJECT "TYPE A" CASK Checked By M. Z

TIEDOWN (REF 1 pg 2-14)

$$P_t = 2F_{sy} t (e_d - d/2 \cos 40^\circ)$$

$$t = 2$$

$$e_d = 2.5$$

$$d = 2.5$$

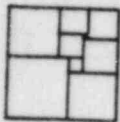
$$\therefore P_t = (2)(46,200)(2)(2.5 - 2.5/2 \cos 40^\circ)$$

$$= 285043$$

$$M.S. = \frac{285043}{276,800} - 1 = \underline{+0.03}$$

WELDING

WELD CALCULATIONS OF REF 1 ARE BASED ON THE ULTIMATE STRENGTH OF THE FILLER METAL WHICH IS 70 KSI. WITH THE A240 UNS S32550 MATERIAL, WELD MATERIAL IS SPECIFIED TO BE COMPATIBLE WITH THE LUG, THEREFORE HAVING AN ULTIMATE STRENGTH OF 110 KSI. WELDS ARE CONSIDERED ACCEPTABLE WITH NO FURTHER CALCULATIONS.



NUS
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CONCLUSION: THE A240 UNS 532550
IS ACCEPTABLE FOR THE TIEDOWN/LIFTING
LUG.