LIFTING DEVICE

DEVICE NAME: Shown Calorimeter Spreader Bar

ENGINEERING NOTE NUMBER: #64

DRAWING NUMBER: 9228.310-MD-211497

APPLICABLE STANDARD: ASME B30.20-1993

RATED LOAD: 1000 #

TEST LOAD: 1250 #

TEST LOAD PERCENT: 125 %

LAST LOAD TEST DATE:

COLOR: Yellow

STRESS CALCULATIONS:

Done by: E. G. [illegible]

Date: 6/7/94

Reviewed by: R. H. [illegible]

Date: 6/8/94

REMARKS:

IDENTIFICATION:

Engineering Note Number & Rated Load Must be Clearly Marked On a Conspicuous Surface.

----------HADRON CALORIMETER TILTING/LIFTING SPREADER BAR----------

Drawing #----9228.310-MD-211447

Loads---------Detector Panel (300# as per Ken Gray), pick points on 72" ctrs.
Tilt Table Wt. (400# as per Ken Gray), pick points on 90" ctrs.
Combined Tilting load 300#+400#/2 = 350# @ 90"

Note---------Because of the need of a light load spreader bar at wide band lab,
I am increasing the load capacity to 1,000# @ 90".

Material-----3/4"x4" M-1018 Cold Drawn Fy=70ksi, I=4
Fb=70ksi/3=23.333ksi (ASME B30.20-1993)

-------Fiber Stress @ Own Weight (10.2x8/96=.85# per.in.) as noted below.-------

Variables

St Input----	Name---	Output---	Unit-----	Comment----------
				Both ends simple support
				Table 3 Case 2 -Roark & Young (6 ed)
				Partial Distributed Load - Page 98
	case	'CASE_2e		End Restraints Reference Number
	matnum			Material Number (See Material Table)
	matl			
'n	plot			Generate plots ? 'n=no (Default=yes)
96	L		in	Length of beam
0	a		in	Load distance from left end
.85	wa		lbf/in	Unit Load - Left End of Load
.85	wl		lbf/in	Unit Load - Right End of Load
2.9E7	E		psi	Young's Modulus
	I	4	in^4	Area moment of inertia, I
2	z		in	Neutral axis to stress point
				AT SECTION:
48	x		in	Distance from left end
	V	0	lbf	Transverse shear
	M	979.2	lbf-in	Bending moment
	theta	5.421E-20	rad	Slope Angle
	y	-.0081037	in	Deflection
	st	489.6	psi	Fiber stress at stress point
	sty	489.6	psi	Max Fiber stress at extremity y
				AT LEFT END:
	RA	40.8	lbf	Vertical reaction
	MA	0	lbf-in	Bending moment
	thetaA	-.0002701	rad	Slope Angle
	yA	0	in	Deflection
				AT RIGHT END:
	RB	40.8	lbf	Vertical reaction
	MB	0	lbf-in	Bending moment
	thetaB	2.7012E-4	rad	Slope Angle
	yB	0	in	Deflection
				Table 1 Roark & Young Handbook (Ed 6)
				Properties of Sections (Page 62)
				Section 2: Rectangle
	DIAGRAM	'y		Generate section diagram? ('n = no)
1	axis			Neutral Axis (1,2)
.75	t1b		in	Side b
4	t1d		in	Side d
	A	3	in^2	Area, A
	t1y	2	in	Centroid to Extremity, y
	I%c	2	in^3	Elastic Section Modulus, I/c
	t1r	1.1548	in	Radius of Gyration, r
	Z	3	in^3	Plastic Section Modulus, Z
	SF	1.5		Shape Factor, SF

-------Maximum Load @ (Fb/3-490 =22.843ksi Fiber stress) as noted below.-------

Variables

St	Input----	Name---	Output---	Unit-----	Comment----------
					Both ends simply supported
					Table 3 Case 1 - Roark & Young (6 ed)
					Concentrated Intermediate Load
					Page 100
		case	'CASE_1e		End Restraints Reference Number
		matnum			Material Number (See Material Table)
		matl			
	'n	plot			Generate plots ? 'n=no (Default=yes)
	90	L		in	Length of beam
	45	a		in	Load distance from left end
		W	2030.489	lbf	Load
	2.9E7	E		psi	Young's Modulus
		I	4	in^4	Area moment of inertia, I
	2	z		in	Neutral axis to stress point
					AT SECTION:
	45	x		in	Distance from left end
		V	1015.244	lbf	Transverse shear
		M	45686	lbf-in	Bending moment
		theta	0	rad	Slope Angle
		y	-.2658453	in	Deflection
		st	22843	psi	Fiber stress at stress point
	22843	sty		psi	Max Fiber stress at extremity y
					AT LEFT END:
		RA	1015.244	lbf	Vertical reaction
		MA	0	lbf-in	Bending moment
		thetaA	-.0088615	rad	Slope Angle
		yA	0	in	Deflection
					AT RIGHT END:
		RB	1015.244	lbf	Vertical reaction
		MB	0	lbf-in	Bending moment
		thetaB	.0088615	rad	Slope Angle
		yB	0	in	Deflection
					Table 1 Roark & Young Handbook (Ed 6)
					Properties of Sections (Page 62)
					Section 2: Rectangle
		DIAGRAM	'y		Generate section diagram? ('n = no)
	1	axis			Neutral Axis (1,2)
	.75	t1b		in	Side b
	4	t1d		in	Side d
		A	3	in^2	Area, A
		t1y	2	in	Centroid to Extremity, y
		I%c	2	in^3	Elastic Section Modulus, I/c
		t1r	1.1548	in	Radius of Gyration, r
		Z	3	in^3	Plastic Section Modulus, Z
		SF	1.5		Shape Factor, SF

-------Shear Stress @ Lifting Holes = F/A = 1000/.375*.75 = 3556 psi-------
--5/8" Anchor Shakles (13/16" throat opening) must be used to center pick--

Received: from fnalnb.fnal.gov by rdmd08.fnal.gov via SMTP (920330.SGI/911001.SG◆
for lavallie id AA03664; Mon, 20 Jun 94 10:05:05 -0500
Date: Mon, 20 Jun 1994 10:05:03 -0500 (CDT)
From: BUILDING A SAFE WORKPLACE <JHESS@FNALV>
To: lavallie
Cc: JODY@FNALV, JHESS@FNALV
Message-Id: <940620100503.20443062@FNALV.FNAL.GOV>
Subject: RE: Spreader Bar Load Test
Status: RO

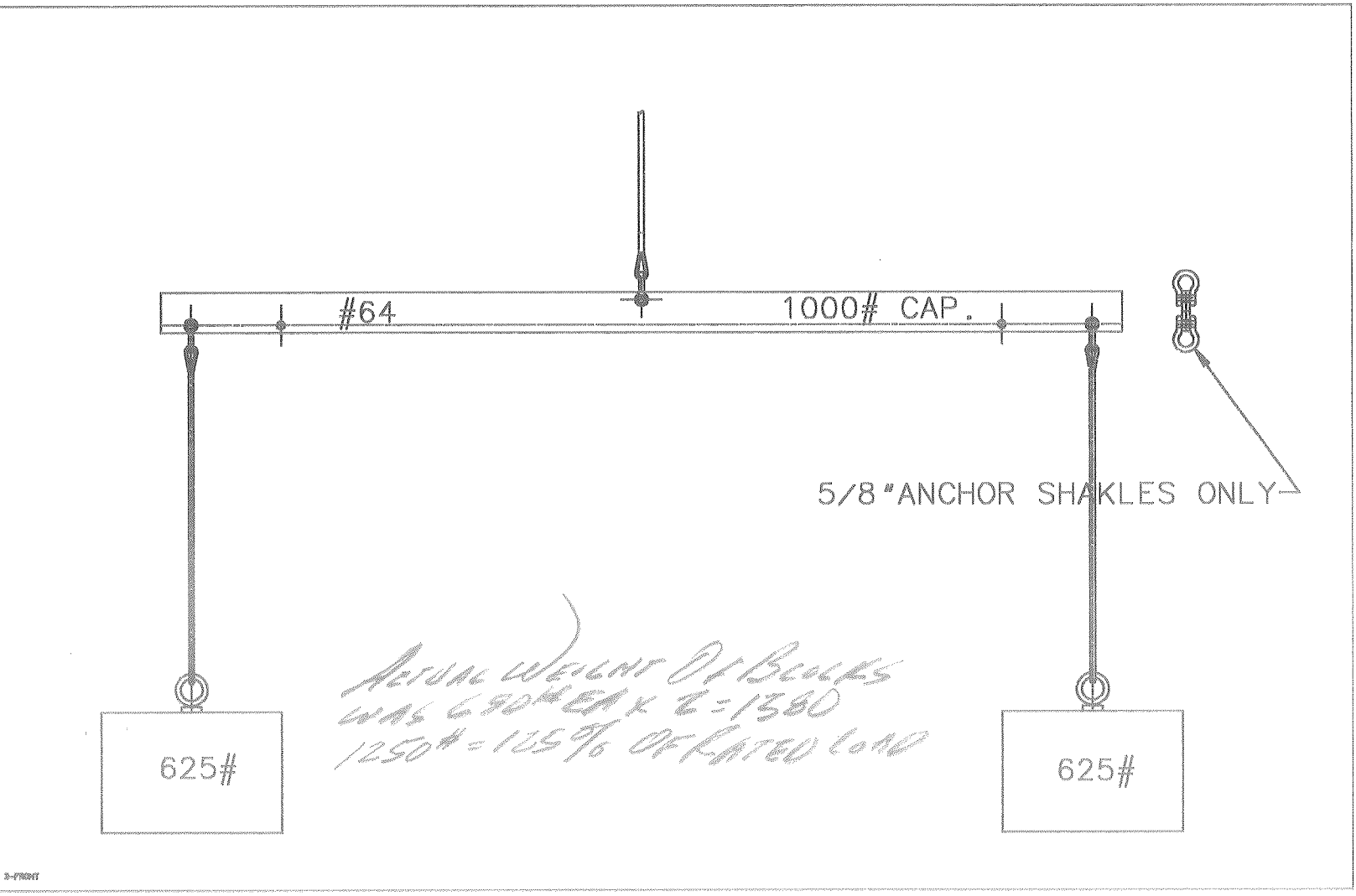
Ed,

This is written confirmation that the "Hadron Calorimeter Spreader Bar", engineering note #64, passed a rated load test on June 10,1994.

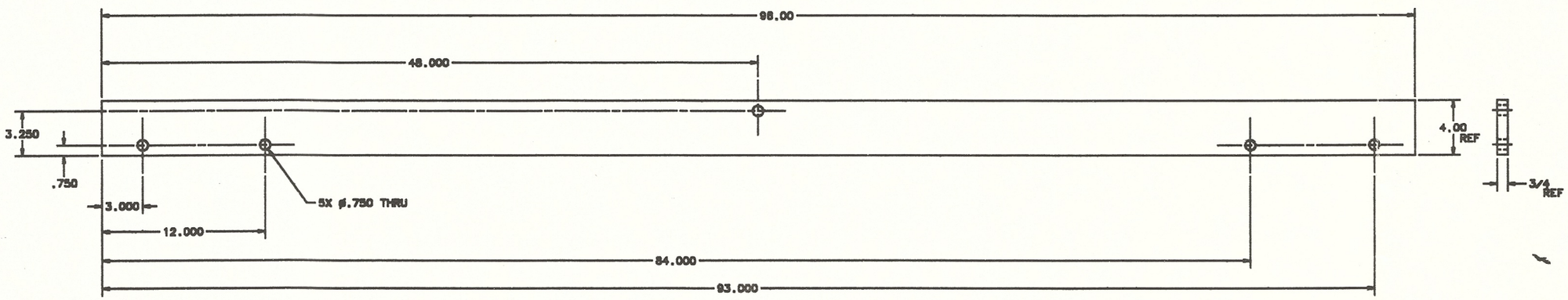
The rated load test was performed in accordance with:

ANSI/ASME B30.20-1.4.2
DOE Hoisting and Rigging Manual 9.2.7(b)(1)(a&b)

Jennifer Hess
RD/ES&H


#64
1000# CAP.
5/8"ANCHOR SHAKLES ONLY
625#
625#
ACTUAL WEIGHT OF BLOCKS
WAS 690# EA x 2 = 1380
1250# = 125% OF RATED LOAD

REV.	DESCRIP	DRAWN	DATE
		APPROVED	DATE



APPROX WT.-81 LBS

ITEM NO.	PART NO.	DESCRIPTION OR SIZE	QTY. REQ.
		PARTS LIST	

UNLESS OTHERWISE SPECIFIED	ENGINEER	E.LAVALLIE	8/1994
.XX .XXX ANGLES	DRAWN	R.L.SMITH	6/07/94
±.06 ±.015 ± XX	CHECKED	REEDER	6/07/94
1. BREAK ALL SHARP EDGES	APPROVED	E.LAVALLIE	6/07/94
2. [illegible]	USED ON	~	
4. ALL DIMENSIONS ARE IN INCHES.			
250 ✓ MAX. ALL MACHINED SURFACES	MATERIAL	3/4 THK x 4 RECTANGLE 1018 C.R.STEEL -FERMI #1530-2060	

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

RD/MECHANICAL SUPPORT DEPT.
EXP. 831
HADRON CALORIMETER SPREADER BAR

SCALE	DRAWING NUMBER	SHEET NO.	REV.
1/4	9228.310-MD-211447	1 OF 1	