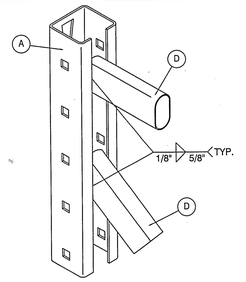
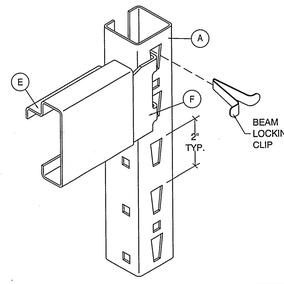
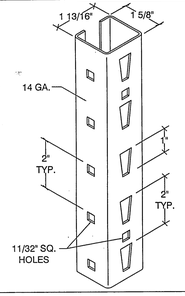


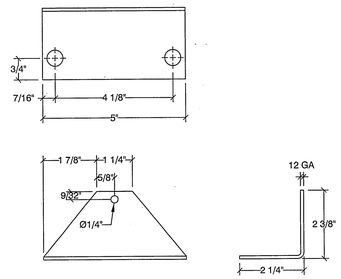
V-A TYPICAL BRACE TO COLUMN CONNECTION



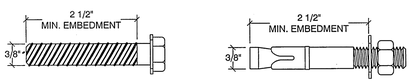
V-B TYPICAL BEAM TO COLUMN CONNECTION



A COLUMN



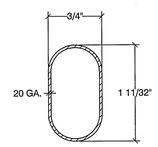
B FOOT PLATE



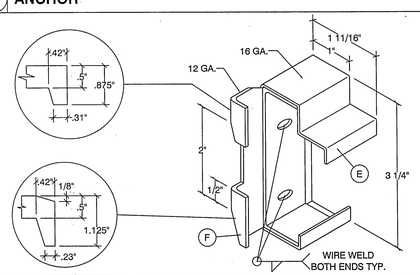
OPTION 1: HILTI KWIK HUS-EZ (KH-EZ)
(ICC #ESR-3027)
(2) REQ'D PER FOOT PLATE

OPTION 2: POWERS STUD SD2
(ICC #ESR-2502)
(2) REQ'D PER FOOT PLATE

C ANCHOR

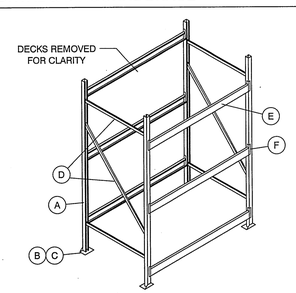


D HORIZONTAL & DIAGONAL BRACE



F CONNECTOR

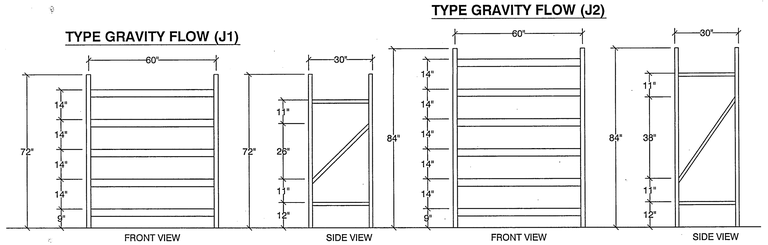
E BEAM



H GENERAL CONFIGURATION

TYPE GRAVITY FLOW (J1)

TYPE GRAVITY FLOW (J2)



J GRAVITY RACK FIXTURE ELEVATIONS

GRAVITY RACK ANALYSIS

SCOPE:
THE PURPOSE OF THIS ANALYSIS IS TO SHOW THAT THE FOLLOWING GRAVITY RACK COMPLIES WITH REQUIREMENTS SET FORTH IN SECTION 1613 OF THE 2010 OSSC WHERE THE LATERAL FORCES ARE DETERMINED IN ACCORDANCE WITH SECTION 15.5 OF THE ASCE 7-05.

PARAMETERS:

LATERAL FORCE:

$V = C_s * Wtotal$ WHERE $C_s = S_{DS}/(R/I)$
$= [(2/3) * F_a * S_s * I/R]*W$

NOTE: ANALYSIS WILL CHECK FOR OVERTURNING ONLY SINCE UNITS ARE UNDER 8 FT.

SPECIFICATIONS:

- MAIN STEEL — Fy = 50000 PSI
- ANCHORS — 3/8"Ø x 2-1/2" MIN. EMBED. HILTI KH-EZ SCREW ANCHOR (ICC ESR-3027) OR 3/8"Ø x 2-1/2" MIN. EMBED. POWERS POWER STUD SD2 (ICC ESR-2502)
  PERIODIC SPECIAL INSPECTION REQUIRED FOR ANCHOR INSTALLATIONS.
- SLAB — 4 IN (minimum required) x 2500 PSI (minimum required)
- SOIL — 500 PSF

1

OVERTURNING ANALYSIS: TYPE GRAVITY FLOW (84"H x 60"W x 30"D) (SEE DETAIL B & C)

DEPTH OF UNIT = 30 IN
TOP SHELF HEIGHT = 79 IN

(A) FULLY LOADED:
V = 403 LB

Mot = Σ(Fi * Hi)*0.75
= 17,238 IN-LB

Mst = Σ[(0.6-0.11S_{DS})wDL +0.75*(0.6-0.14S_{DS})*0.67wPL] x Depth / 2
= 13,833 IN-LB

Puplift = (Mot - Mst)/D
= 114 LB <= UPLIFT

(B) TOP SHELF LOADED:

Vtop = 140 LB

Mot = Σ(Fi * Hi)*0.75
= 7,698 IN-LB

Mst = Σ[(0.6-0.11S_{DS})wDL + 0.75*(0.6-0.14S_{DS})wPL] x Depth / 2
= 5,222 IN-LB

Puplift = (Mot - Mst)/D
= 83 LB <= UPLIFT

ANCHOR:
QUANTITY= 1 PULLOUT = 750 LB SHEAR = 800 LB

$P_s/P_t + V_s/V_t \le 1.2$
COMBINED STRESS(A) = (114 LB/(1*750 LB)) + (202 LB/(1*800 LB))
= **0.40** **< 1.2 OK**

COMBINED STRESS(B) = (83 LB/(1*750 LB)) + (70 LB/(1*800 LB))
= **0.20** **< 1.2 OK**

USE (1) 3/8"Ø x 2-1/2" MIN. EMBED. HILTI KH-EZ SCREW ANCHOR (ICC ESR-3027) PER FOOT PLATE
OR
USE 3/8"Ø x 2-1/2" MIN. EMBED. POWERS POWER STUD SD2 (ICC ESR-2502) AS AN OPTION.
(PULLOUT CAPACITY=750 LB, SHEAR CAPACITY=900 LB, OK BY SIMPLE REVIEW)

4

CONFIGURATIONS:

TYPE GRAVITY FLOW (84"H x 60"W x 30"D)

NUMBER OF LEVELS = 6 LVL

LOAD PER FLOW SHELF = 500 LB

TOTAL LOAD ON BULK RACK SYSTEM = 3000 LB

TYPE GRAVITY FLOW (72"H x 60"W x 30"D)

NUMBER OF LEVELS = 5 LVL

LOAD PER FLOW SHELF = 500 LB

TOTAL LOAD ON BULK RACK SYSTEM = 2500 LB

2

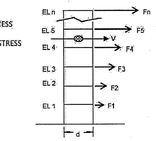
5

LOADS & DISTRIBUTION: TYPE GRAVITY FLOW (84"H x 60"W x 30"D) (SEE DETAIL J)

ANALYZE PER SECTION 1613 OF THE 2010 OSSC WHERE LATERAL FORCES ARE DETERMINED IN ACCORDANCE WITH SECTION 15.5 OF THE ASCE 7-05:

SITE CLASS = D
$V = C_s * Wtotal$ WHERE $C_s = S_{DS}/(R/I)$
AND Wtotal = (0.67wPL + wDL)
S_{DS} = 2/3*Fa*Ss AND Fa = 1.16 & Ss = 0.86
= 0.67

I = 1.50 <==== PUBLIC ACCESS
R = 4
REDUCTION = 0.7 <==== WORKING STRESS
PRODUCT LOAD PER LEVEL, wPL= 500 LB
DEAD LOAD PER LEVEL, wDL= 50 LB
NO. OF LEVELS = 6 LVL
DEPTH= 30 IN



LATERAL FORCE

FULLY LOADED
V = 0.7*[0.665*1.5*(0.67*3000 LB+300 LB)/4]
= 403 LB

LATERAL FORCE DISTRIBUTION

h	LEVEL	WEIGHT	HEIGHT	W X H	Fi	Mot
9 IN	1	550 LB	9 IN	4,950 IN-LB	13.7 LB	124 IN-LB
14 IN	2	550 LB	23 IN	12,650 IN-LB	35.1 LB	808 IN-LB
14 IN	3	550 LB	37 IN	20,350 IN-LB	56.5 LB	2,091 IN-LB
14 IN	4	550 LB	51 IN	28,050 IN-LB	77.9 LB	3,973 IN-LB
14 IN	5	550 LB	65 IN	35,750 IN-LB	99.3 LB	6,454 IN-LB
14 IN	6	550 LB	79 IN	43,450 IN-LB	120.7 LB	9,534 IN-LB
79 IN			ΣWH =	145,200 IN-LB	403.3 LB	22,984 IN-LB

TOP SHELF LOADED ONLY
Vtop = 0.7*[0.665*1.5*(500 LB+300 LB)/4]
= 140 LB

LATERAL FORCE DISTRIBUTION

h	LEVEL	WEIGHT	HEIGHT	W X H	Fi	Mot
9 IN	1	50 LB	9 IN	450 IN-LB	1.2 LB	11 IN-LB
14 IN	2	50 LB	23 IN	1,150 IN-LB	3.0 LB	70 IN-LB
14 IN	3	50 LB	37 IN	1,850 IN-LB	4.9 LB	181 IN-LB
14 IN	4	50 LB	51 IN	2,550 IN-LB	6.8 LB	345 IN-LB
14 IN	5	50 LB	65 IN	3,250 IN-LB	8.6 LB	560 IN-LB
14 IN	6	550 LB	79 IN	43,450 IN-LB	115.1 LB	9,097 IN-LB
79 IN			ΣWH =	52,700 IN-LB	139.7 LB	10,264 IN-LB

3

6

ADDRESS:
OREILLY AUTO
489 WEST 5TH AVENUE
JUNCTION CITY, OR

REV.	DATE	BY	DESCRIPTION

SEIZMIC
EST. 1985
SEIZMIC
ENGINEERING, INC.
161 Atlantic Street
Pomona, California
91768
Tel.(909)869-0989
Fax (909)869-0981

DRAWN BY:	A.N./T.C.
DATE:	08/27/13
LAST REV. BY:	
REV. DATE:	
TYPE:	LOZ.
SCALE:	N.T.S.
APRVD BY:	SAL E. FATEEN

REGISTERED PROFESSIONAL ENGINEER 12303 OREGON JULY 15, 1986 MICHAEL M. OBI

EXPIRATION DATE: JUL 3 1 2014

DESCRIPTION:
GRAVITY RACK (FIXTURE #3A)

DRAWING NUMBER:
13-1274-C