

4/4/2005

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Sentry Protection Products
16927 Detroit Avenue #3
Lakewood, OH 44107

TEST REPORT

Date Received: 3/9/2005

Test Report No.: SEN046-05-03-92636-1

P.O. No.: 2005012605

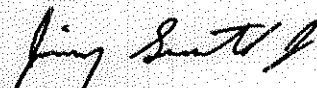
Sample Description: One (1) Lot (18 Pcs.) Rack Sentry RS75

The purpose of this testing was to determine the ability of the Sentry Protection Products Column Protector to absorb energy from impact. The testing was setup to simulate the impact of industrial warehouse type equipment against a storage rack assembly that has a load on the shelves.

Stork-Herron Testing Labs fabricated a fixture that could put the sample columns in compression to simulate a loaded storage rack assembly. The column member was compressed to 2,500 pounds for each impact; according to the Rack Manufacturers Institute a rack that has columns that are 3" x 3" square should not experience loads above 10,000 pounds total. Once the column sample was compressed the Sentry Protection Column Protector was installed. Then the fabricated fixture was placed inside and clamped to the impact equipment. All samples were impacted with a semi circle metal anvil that was to simulate the profile of the back of a Tow Motor.

Below is a chart that has the energy that the samples were impacted with, and the resulting deflection in the sample beams. There are three columns in the chart, the first represents the metal anvil impacting the column sample covered by a Column Protector. The second represents

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Jimmy Smith Jr.
Manager of Product
Evaluation

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the metal anvil impacting the metal column sample. The third represents the ratio that is the comparison for metal-to-metal contact versus metal-to-column protector contact.

Metal to Column Protector	Metal to Metal (Column Sample)	Less damage ratio
0" deflection @ 287 ft-lbs		
.196" deflection @ 500 ft-lbs	.400" deflection @ 500 ft-lbs	51%
.458" deflection @ 750 ft-lbs	.834" deflection @ 750 ft-lbs	46%
.760" deflection @ 1000 ft-lbs	1.24" deflection @ 1000 ft-lbs	39%

There is a video of the test that Stork-Herron Testing Labs has supplied to Sentry Protection Products. It is important to note in the videos of the impact testing the carriage that hold the anvil and the weights did not rebound beyond 1.5 feet in any of the impact trials. This is an indication that energy was absorbed by the column protector and not transmitted back to the carriage in the form of a high rebound. Looking at the chart above at 500 foot pounds there was 51% less deflection of the column sample for a column sample that was covered with a column protector versus anvil to column sample (metal-to-metal). At 750 foot pounds there was 46% less deflection of the column sample for a column sample that was covered with a column protector versus anvil to column sample (metal-to-metal). At 1000 foot pounds there was 39% less deflection of the column sample for a column sample that was covered with a column protector versus anvil to column sample (metal-to-metal).

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Manager of Product
Evaluation



*Rack Sentry
Technical*

Project:	Rack Sentry Mechanical Tests
Subject:	Rack Sentry Mechanical Tests Result rev2
Date:	July 16 th , 2003
Recipients:	James P. Ryan
Author:	AplusB, Inc

Background

- Test Results performed on Rack Sentry Products
- Location: Warehouse, North Olmsted, USA
- Personnel : James P. Ryan; Pierre M. van Hauwaert Ing. A.I.Br

Test Infrastructure Configuration

Two identical steel frames (uprights from a pallet racking assembly), braced diagonally, fitted with base plates, anchored to concrete floor.
Frames are made of cold rolled "U" profiles 75 X 75 mm.
Frames linked with 2 horizontal beams; beams loaded with a pallet holding 2270kg or 5000 lbs of dead weight.

Recording devices

- Video camera
- Digital camera
- Radar Speed gun

Note: the Radar Speed Gun was tested and proved to be inaccurate at low speeds, forklift truck speeds were visually recorded from the speedometer installed on the forklift truck.

Moving object

Forklift truck of dead weight 3400 kg or 7500 lbs

Protective Device

Standard Rack Sentry

Destructive Test methodology

The fork lift truck was driven into the end "uprights" of the frames at increasing speeds under 2 situations: "upright" being unprotected and "upright" protected with Rack Sentry.

Deflection of "uprights" after impact were measured with a straight edge fitted with levels allowing out-of-plumb measurements. Measurements of deflections were made using a caliper accurate to 0,254mm or 0.01".

Observations

The "uprights" proved to be very rigid and showed no measurable deflection along their length at low speed. However, at higher impact speed, the "uprights" were pushed out of their original vertical position. The anchor plates having been deformed. The bracings also were severely deformed. Measurements of "out of plumb" conditions were made at the upper tip of the "uprights" which are approximately 100 cm long

Measurements

Speed			Kinetic Energy	Deflection			
mph	km/h	m/s		Unprotected		Protected	
			Joules	inches	mm	inches	mm
1.00	1.609	0.447	340	0.00	0.00	0.00	0.00
2.00	3.389	0.894	1359	1.30	33.02	0.00	0.00
3.00	4.828	1.341	3057	See Note		0.48	12.19

Note : "upright" unsafe to submit to another collision

Conclusions

Practical difficulties have reduced the number of measurements possible. With the available results, we can nevertheless assess as follows:

- The upright equipped with the Sentry device has sustained a shock of 1359 Joules and remained without deflection, the protection device staying intact in the process. That 1359 Joules amount of energy is three times greater than the minimum requirement of 400Joules as describes in the FEM code of good practice.
- The Rack Sentry device can withstand a shock of at least 3057 Joules without being damaged.
- The upright equipped with the Sentry device has sustained a deflection that is three times smaller (12.19mm in lieu of 33.02mm) for a shock that was three times as important (3057 Joules in lieu of 1359), at least in that range of shock.
- The video seems to confirm that some kind of deflection was already obtained at 1.609km/h on the unprotected upright; we can therefore assume that the Sentry device absorbs at least 1000 Joules.

*Rock
Sentry*

New Rack Sentry Hedstrom Pallet shipping

12 cartons per pallet: 3 rows of 4 cartons - overall size of pallet is 42"x52"x57" (w/o pallet) or 42"x52"x61" (w/pallet)

It is possible to stack 4 high for container shipping, taking it to 16 cartons/pallet

128 Cartons per 20' container

288 Cartons per 40' container

CARTON SIZE:

66cm x 53cm x 48 cm 25kg.

26"x21"x19" 56lbs.

Fits: 18 units RS75, RS75CO, RS80; 14 units RS90, RS100, RS100CO; 16 units RS75END; 10 units RS120

Single box: 18x6x6 3 lbs.

20"x8"x8" 4lbs.

Dimensional weight of one carton of R.S.: 28kg or 63 lbs.

Dissaco Boxes: 40cm x 40cm x 50cm containing 6(?) units

Pallet size: 57"x45"x83" (without pallet height) 20 Cartons per pallet
145cm x 114cm x 212cm high (without pallet height)

20' container = 8 pallets; 160 cartons; 2240 large units or 2880 small units

40' container = 16 pallets; 320 cartons; 4480 large units or 5760 small units

*UPS: Ships dimensionally as 28kg, in Europe

LTL: Ship as Class 150, add 50lbs. for pallett