



U.S. Department
of Transportation

**Pipeline and
Hazardous Materials Safety
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

AUG 24 2006

Mr. H. Perry Hock
President and Technical Director
gh Package & Product Testing
Consulting, Inc.
4090 Thunderbird Lane
Fairfield, OH 45014

Ref. No.: 05-0204

Dear Mr. Hock:

This responds to your letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) pertaining to the stack test prescribed in § 178.606. Specifically, you asked when is it permissible to use a “guided load” stack test, and how a guided load stack test should be set up and performed. You enclosed illustrations and photographs of the tests.

You provided a scenario as follows:

When the gh Testing laboratory performs an “unguided” stack test, using steel plates as dead load on each individual packaging or container, the packaging may fail. Frequently, the failure results in one side of the specimen collapsing and not being able to keep the weight centered above it; however, the packaging remains intact without rupture or loss of contents. Several of your clients assert that this is not a failure since the packaging is still intact and no loss of contents has occurred. You asked the following questions:

Q1. Is my client correct that this is not a failure of the stack test since the packaging is still intact and no loss of contents has occurred?

A1. All packaging design types other than bags must be subjected to a stacking test. The test sample must be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during transport.

In a guided load stack test, a load is directed vertically onto the test sample and then maintained for a specific amount of time. Actual weights do not have to be applied. The apparatus shown in your illustrations may be used to conduct the stacking test prescribed in § 178.606, provided a constant load is applied for the



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178.606

24-hour duration of the test. If this equipment is used, a stack stability assessment must be made for one hour at the conclusion of the test.

The stacking test is conducted to ensure that the inner receptacles or inner packagings do not leak any of the contents. The stability test ensures that the stacked packages are stable during transportation. There must be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation. Thus, the scenario you describe constitutes a failure of the packaging to pass the prescribed test.

Q2. When a Testing laboratory places three of the same, unmodified "packs" into the guided load stack test fixtures, and they pass the test, as well as the stability test that follows, are the packs considered to have passed the test?

A2. The answer is yes.

Q3. Are the two tests supposed to give the same results?

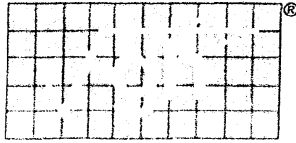
A3. It's our expectation that the two stack tests (guided or unguided load) give the same or similar results.

I hope this satisfies your inquiry. If we can be of further assistance, please contact us.

Sincerely,



John A. Gale
Chief, Standards Development
Office of Hazardous Materials Standards



**gh Package
& Product
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August 1, 2005

To: Mr. Edward T. Mazzullo
Director, Office of Hazardous Materials Standards
U.S. DOT/RSPA (DHM-10)
400 7th Street S.W.
Washington, DC 20590-0001

Engrum
§178.606
Testing
05-0204

From: Mr. H. Perry Hock
President and Technical Director
gh Package & Product Testing and Company
4090 Thunderbird Lane
Fairfield, OH 45014

Subject: Performance testing of non-bulk packagings pursuant to CFR 49, §178.606

Dear Mr. Mazzullo,

I am in need of a clarification on the regulations pertaining to the stack test as detailed in §178.606. Specifically when it is permissible to use a guided load stack test, and how a guided load stack test should be set up and performed.

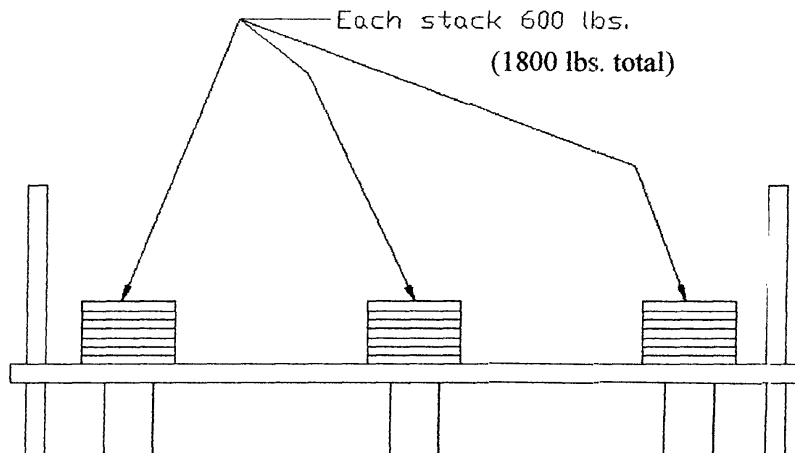
This question has been arising more often, as companies try to reduce cost by minimizing packaging. What gh Testing has been running into is that when the laboratory performs an unguided stack test, using steel plates as dead load, on each individual pack or container, in certain instances they fail. Most often the failure results in one side of the specimen collapsing and not being able to keep the weight centered above it, but the packaging remains intact without rupture or loss of contents. Once this happens, the weight falls.

A debate has begun over the regulations and their intentions. An interpretation most often given to gh Testing, from several of our clients, claims that this is not a failure since the packaging is still intact and no loss of contents has occurred. Is our client correct with their interpretation of the regulations since the pack did not rupture or lose contents? The debate is that the stack test is to ensure the pack does not rupture under the load – not that it is a stability test. The debate then continues that the stability portion of the testing is ensured via the hour long stability test following the stack portion of the test.

When gh Testing places three of the same, unmodified, packs into the guided load stack test fixtures, they pass the test, as well as the stability test that follows. Are the pack considered to pass the test? What if the pack was never tested using the unguided method and only resulted in the passing of the test? Are the two tests supposed to give the same results?

I have seen illustrations and pictures from other institutions on how they perform a guided load stack test. I would like to know which is permissible pursuant to the regulations.

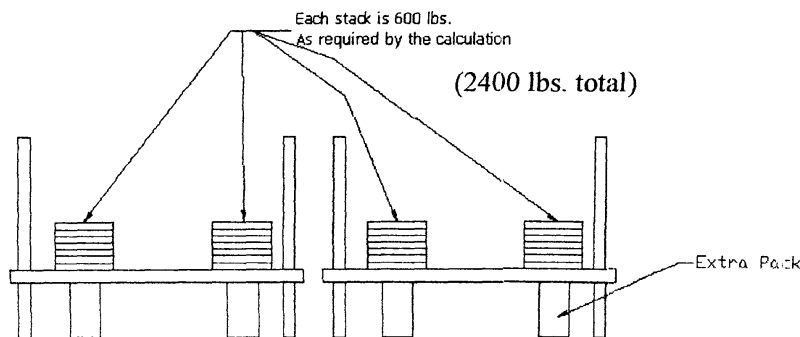
The first illustration is where all three required packs are placed into the same guided load fixture, each with the required weight above it. Following this test, the stability is assessed pursuant to the regulations.



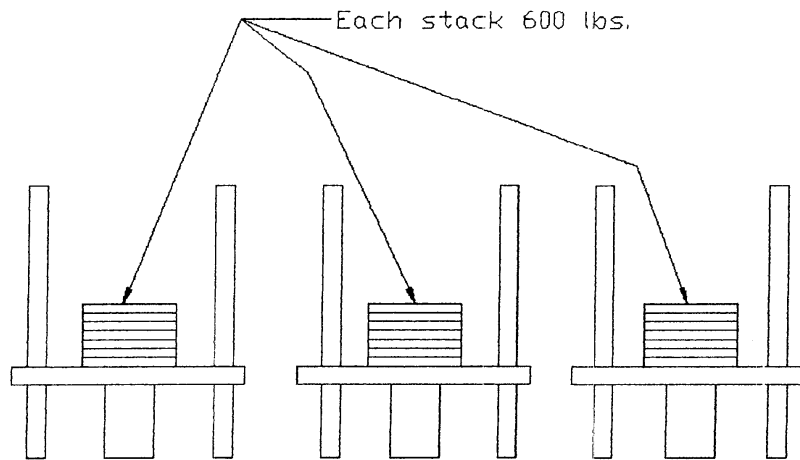
I can understand performing the testing in this manor if the pack by itself cannot balance any load and is not meant to be stacked on as a single unit. A good example might be a 5 gallon bottle with a tapered neck.



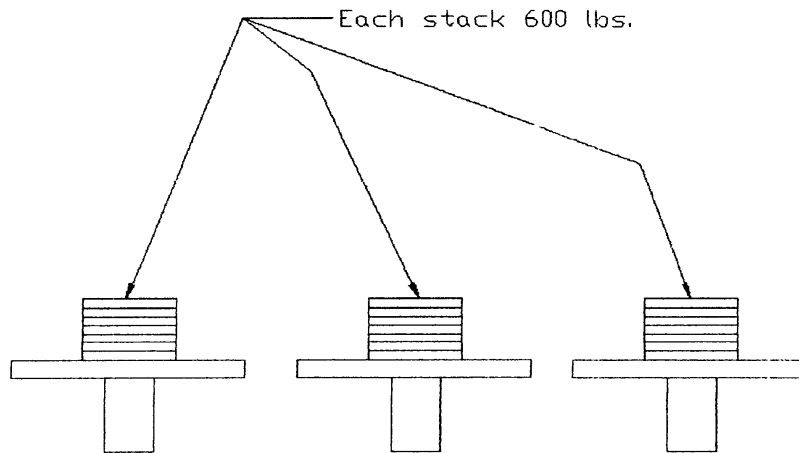
The second illustration is one where an additional pack is "tested", using the guided load method as above. This is done since three packs cannot fit into or under the guided load fixture. Again, the stability would be assessed following the required stack test period.



The third illustration is one where each pack is tested individually in a guided load stack test fixture. Again, the stability would be assessed following the required stack test period.



And the fourth illustration is an unguided load stack test.

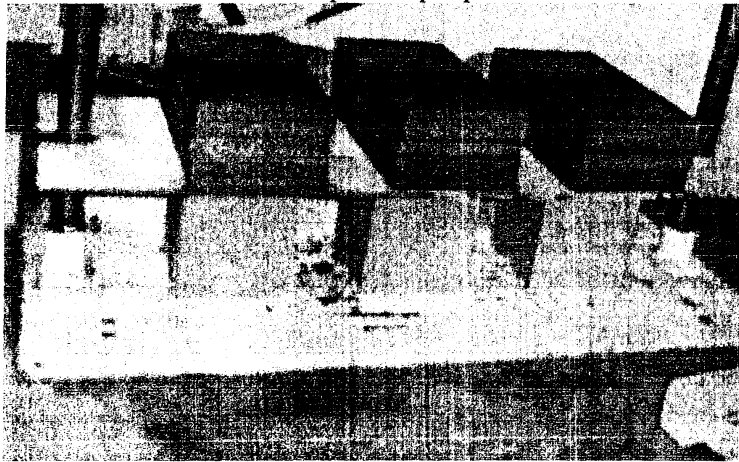


Below are photos of actual testing conducted at gh Testing.



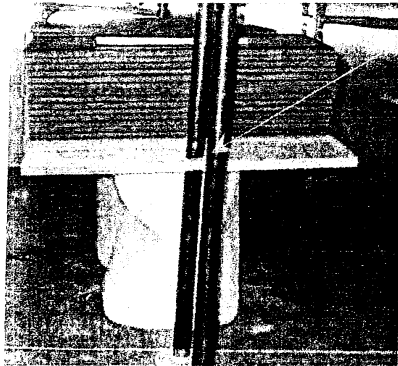
Results of unguided load test – pack was unable to maintain the load of 583 lbs. and the pack collapsed.

Guided Load Stack – with 17 additional pounds per pack for a total of 600 lbs. per stack:

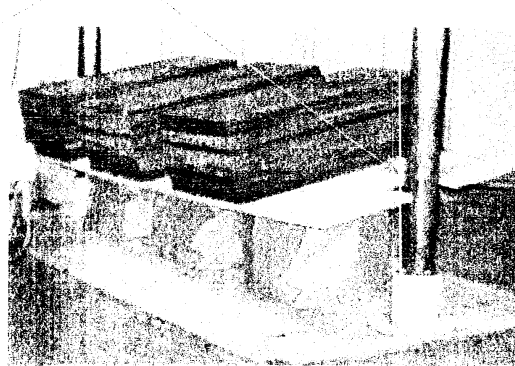


Start of the test – the packs are supporting the entire weight, and the load spreader (plywood) is not touching any of the safety guides.

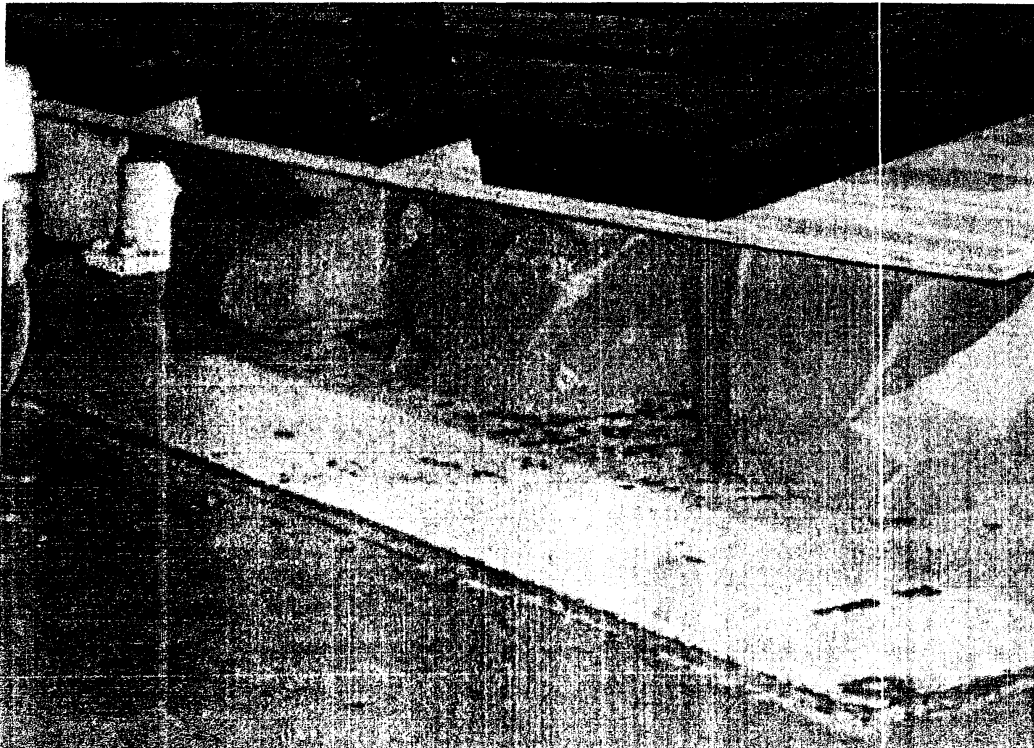
After 24 hours, the load has shifted to the back side of the packagings, and the load spreader is now touching both the far and near guides.



Single pack, 104°, after 28 days

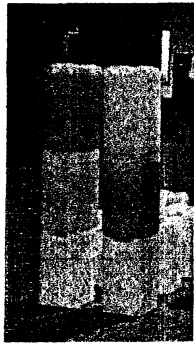


Combination pack, after 24 hours



Note the “uniform crush”. We typically see the same results whether a single pack is used in a guided load, or all three are placed in a straight line across, such as the photo above. The exception is when the packs are staggered in a triangular pattern, we do not typically see same results as above. The packs tend to perform better in the triangular stack test pattern since the weight shift seen above is very unlikely to occur in a staggered stack.

Stability test on the above packs (only photos of two stacks of the single unit and one stack of the combination pack are included, but all six stacks passed):



Stability tests after one hour

If you have any further questions, please do not hesitate to call me at 513.870.0080 x 103.
I look forward to your prompt response.

Yours Truly,

H. Perry Hock
President and Technical Director
gh Package & Product Testing and Consulting, Inc.