



# NEBRASKA TESTING LABORATORIES, INC.

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April 24, 1986

*Omaha, Nebraska 68106-0075*

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Mr. Al Nacin  
Nacin Mats Inc.  
Post Office Box 1003  
ISV Station  
Ames, Iowa 50010

RE: Load Test of System 1000 - Mat Storage System  
NTL Job No. 5-046-NAC (86), Lab No. R-473

Dear Mr. Nacin:

This report involves the load test of a System 1000 - Mat Storage System. The work was done per your request of March 31, 1986 as agreed upon in our proposal of March 5, 1986. The unit was shipped to, mounted, and tested in our Omaha laboratory. The testing was done on April 4, 1986, with preparations made in the preceding week. It was our understanding that the intention of the tests was to verify your estimated design factor of safety of as much of a completely assembled unit as our facilities would permit.

The unit tested is briefly described as a vertical transport and storage system for wrestling/gymnastics mats. Your literature indicates that the complete system is capable of lifting and storing up to a 44' X 44' three section mat. It works by placing the rolled mat(s) into a one piece sling which is attached to the load (distribution) bar which can be raised or lowered by an electric key switch control. The load bar is moved by means of an electric hoist system which features the following.

1. Direct Drive, 20 foot long lift/lower unit consisting of a two inch diameter by 20 foot solid drive shaft, three drums of 3 inch diameter directly coupled to the shaft (1/2" keyways).
2. Factory lubricated and sealed 1 1/2 H.P., 230 V., 3 phase brake motor with direct coupled helical gear reducer (177 to 1) with an output of about 9.6 rpm and a torque of about 9352 lb-in.
3. Three steel cables 5/16" by 35 foot which connect to the cable drums and load bar.
4. Electrical controls including starter, heaters, limit switch, and remote key switch.
5. Frame structure consisting of a W6 X 20 - 20 foot beam to which the Motor-Drive, shaft, and bearings are attached.





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6. Hanger brackets, grade 8 fastener, and 3/4 inch by 18 inch grade 8 all thread for supporting system to existing joists or beams.

A copy of the installation instructions, parts list, parts drawings, and electrical wiring schematic were submitted for our file and permanent record. These pages are not included as part of this report.

The initial step in testing the unit was to install the unit in accordance with the manufacturer's instructions. Photograph 1 shows the unit installed in our test facility. Six adjustable beam hanger and clamps were attached at 9 foot center per pair to two existing beams in our facility. The mat hoist storage system was then attached to the six all thread rods by means of adjustable brackets which were attached to the top flange of the hoist beam. The unit was leveled and all bolts tightened. The two piece load bar was connected to form the forty foot section. Due to space limitations, four foot had to be removed from one end of the load bar. The cable length was adjusted during connection to the load bar to provide nearly uniform tension on each cable. Electrical wiring was connected for power and control. Operation was checked by representatives of Nacin Mats Inc. and found to be acceptable.

It was decided by Mr. Nacin not to test the unit with an actual sling or connection of the load to the bottom sling hook holes in the angles (1/4" X 1 1/4" X 1 1/4") which are part of the bottom of the load bar. Instead a 22 foot long beam was chained around the top of the load bar at three locations. A calibrated load cell was anchored to the floor and attached to the 22 foot reaction beam. The calibrated load cell was used to measure the load applied to the system by the system, less the weight of the 22 foot long reaction beam, chains, and load cell. A correction of 600 pounds was added to the observed reading. The testing was video taped (copy enclosed) and witnessed by Mr. Nacin.

The load tests were conducted several times. The total load applied was increased each time. The following table shows the loads, and duration for each test. Each loading was marked by an initial maximum load which was reduced slightly by the stabilization of the load and stretching of the cables. The load was applied until the maximum was reached.

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LOAD TESTS

<u>No.</u>	<u>Initial Max. Load, lbs.</u>	<u>Stabilized Load, lbs.</u>	<u>Duration Held, min.</u>	<u>Notes</u>
1	7,450	7,410	10	None
2	9,400	7,650	10	None Wind cable directly on 2" shaft for greater force
3	14,300	13,800 13,380	15	
4	17,500	15,640 14,620	4	15 second to high temperature cut off

There was no audible or visual signs of failure observed during or after the load test. The unit was operated several times after the load tests with no noticeable difference in operation. Although there was a deflection of 11/16 inch as at the end of the load bar (20' end) during the end of test Number 3, the immediate residual deflection after the load was removed (to the 600 pound beam reaction load) was less than 1/8 inch.

At the conclusion the travel speed of the lift with the cable around the drum was measured at 11.5 foot per minute and with the cable around the shaft at 6.125 foot per minute.

In summary it has been shown that the unmodified unit submitted for test was able to lift and maintain a load of at least 7,400 lbs. which is well above the rated 2,000 pounds. Although not intended nor recommended for repeated extra high loadings, the unit as modified did lift and maintain a load in excess of 13,300 pounds.

The foregoing is based on our tests of only the one unit submitted. Changes in parts, dimensions, workmanship, quality of manufacturing procedures or materials all have a bearing on the test results. Nebraska Testing Laboratories, Inc., by providing this report, does not necessarily constitute an approval by us of the source, materials, or product from which the sample was taken. Reproduction of this report or sections thereof for the purpose of advertisement is unauthorized, unless prior written approval is obtained from the proper authority.

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If there should be any questions concerning this report, we shall be pleased to respond.

Respectfully submitted,

NEBRASKA TESTING LABORATORIES, INC.

Reviewed by:

Donald F. Stevens  
Director Industrial Division

Daniel E. McCarthy  
President

DFS:edw

ENCL: Photographs and Video Tape

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