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technical note:

SUPPLEMENTARY DATA ON MARK II
LIGHTWEIGHT PREFABRICATED
PORTABLE WANIGAN

R. C. Towne and H. R. Harrison, BUC, USN

U.S. Naval Civil Engineering Research and Evaluation Laboratory
Port Hueneme, California
INTRODUCTION

This technical note includes (1) supplementary data on the manner and method of sealing the panel joints in the Mark II, lightweight, prefabricated, portable wanigan, (2) additional information on movement between the panels when the wanigan is underway and (3) various methods of securing the wanigan to the carrier sled.

The prototype wanigan, as originally constructed and tested, is described in a report entitled "Construction and Test of a Lightweight, Prefabricated, Portable Wanigan". In order to determine the structural adequacy of the individual wanigan parts, additional tests were made and evaluated in a supplementary report entitled "Mark II Lightweight, Prefabricated, Portable Wanigan, Trail Tests Over Simulated Arctic Terrain". To augment the data contained in the supplementary report, additional tests were authorized under Project NY-013 02B-2 by the Bureau of Yards and Docks.

The tests performed included determination of the compressive strength of the rubber-gasket joint sealer, measurement of tension in the wanigan tie-rods when under load, and rain tests to ascertain the extent of leakage with the transverse inter-panel joint spacing compressed to the 1/4-in. clearance shown on Bureau of Yards and Docks Drawing No. 468,608.

JOINT SEALING

The first supplementary report states that, in compression tests of strips of the rubber-gasket joint sealer, a unit force of 20.8 lbs was required to compress each lineal inch of gasket to a thickness of 1/4-in. A review of the original data shows that this unit force, 20.8 lbs, was required to compress a lineal inch of panel joint or, since there are two gaskets in a joint, two lineal inches of gasket. Additional compression tests made in October 1950 found that in 33 tests an average unit force of 17.6 lbs per lineal inch of panel joint was required to compress the joints to 1/4-in. Results of the individual tests are given in Table 1.

Compression tests on the panel joints in the assembled wanigan were made using the assembly harness modified by replacing for test purposes the four 3/8-in. diameter longitudinal rods used in the original harness with 1-in. diameter rods. Further, these 1-in. rods were equipped with SR-4 electrical strain gages in order to observe the tension in
each rod when the transverse panel joints were clinched to 1/4-in.
as shown in Figure 1. Buckling of the lightweight plywood panel
skins permitted irregularities in the joints, and a uniform
1/4-in. joint width was not obtained. This lack of uniformity
in the panel joints resulted in a variance in the tension in
the four longitudinal tie-rods. The recorded tensions with an
average joint width of 1/4-in. were 2223 lbs, 2340 lbs, 1989 lbs,
and 3483 lbs giving an average tension for each rod of 2504 lbs.

In the simulated rain test with the joints compressed to
an average width of 1/4-in., leakage was observed in the ceiling
around the knee braces. This leakage was attributed in part to
the buckling of the plywood panel skins resulting in
distortion of the panel frames and in part to the presence of
the knee braces in the joints.

PANEL MOVEMENT

Shifting between panels when the wanigan is underway was
measured in simulated Arctic trail tests, and the results are
in the first supplementary report\textsuperscript{2}. To augment the information included in that report Figure 2 has been included to
show the location of the match lines used to measure the movement. Further, the maximum amount of movement at each location is shown and, as indicated by the plus and minus signs, the movement between the match lines can be in either direction.

TIE DOWN METHODS

Three methods of securing the wanigan to the sled deck
have been considered in these tests, namely, steel strap tie-
downs, leg screws through the wanigan floor to the sled deck,
and a 12-in. high guard rail fitted into the stake pockets
on the sled. In the tests conducted on the Mark II wanigan, the steel strap tie-down method was used exclusively with
satisfactory results\textsuperscript{2}. Tests of the other methods under
simulated Arctic trail conditions were not considered warranted; however, all three methods have been incorporated in
testing the Mark III wanigan, as authorized under Project
NY-013 C2B-3, at Pr. Barrow, Alaska during the 1950-51 sea-
son. Results of these tests will be included in reports on
that project.

CONCLUSIONS

Compression of the transverse panel joints to 1/4-in.
by means of the tie-rod harness did not entirely stop leakage of water into a wanigan subjected to a simulated rain;
however, this leakage was materially reduced over that ob-
served in previous tests\textsuperscript{2}, where the panel joints were not
cinched up to 1/4-in. Stiffening of the panels to prevent buckling when sufficient compression is applied to cinch up the joints should eliminate the leakage.

In a prefabricated panel-type wanigan employing the gasket material, with a unit compressive force of 27.6 lbs per lineal inch of joint, computations indicate that a tie-rod harness employing four 5/8-in. diameter longitudinal steel tie-rods would prove satisfactory for cinching the panel joints and holding them in place.

Further development and testing of lightweight, portable wanigans and component parts will be processed under Project NY-013 02B-3. This supplementary report, therefore, concludes work on this project.

REFERENCES


Table 1. Compressive Tests on Strips of Rubber Gasket Material Used as Sealer between Panel Joints.

Unit force shown is amount required to compress gasket to 1/4-in. thickness.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Unit Force</th>
<th>Test No.</th>
<th>Unit Force</th>
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<tbody>
<tr>
<td></td>
<td>lbs/lin-in.</td>
<td></td>
<td>lbs/lin-in.</td>
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<tr>
<td>One strip of gasket</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>12.5</td>
<td>14</td>
<td>13.5</td>
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<td>2</td>
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</tr>
<tr>
<td>4</td>
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<td>17</td>
<td>15.5</td>
</tr>
<tr>
<td>5</td>
<td>13.5</td>
<td>18</td>
<td>15.0</td>
</tr>
<tr>
<td>6</td>
<td>13.0</td>
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<td>7</td>
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</tr>
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</tr>
<tr>
<td>11</td>
<td>14.0</td>
<td>24</td>
<td>16.0</td>
</tr>
<tr>
<td>12</td>
<td>12.5</td>
<td>25</td>
<td>15.5</td>
</tr>
<tr>
<td>Two strips of gasket (normal panel joint)</td>
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<td></td>
<td></td>
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<tr>
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<td>5</td>
<td>26.5</td>
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<tr>
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<td>26.5</td>
<td>8</td>
<td>30.0</td>
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</table>
Figure 1. Panel joint compressed to a $\frac{1}{4}$-in. in width. Lower end of one knee brace can be seen immediately above the ruler.
Figure 2. Location of match lines on Wanigan panels. Maximum amount of vertical shifting at each lettered location is shown in the legend.
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