Technical Note N-612

REVIEW OF FURNISHINGS FOR POLAR CAMPS

BY

G. E. Sherwood

29 June 1964

U. S. NAVAL CIVIL ENGINEERING LABORATORY
Port Hueneme, California

REVIEW OF FURNISHINGS FOR POLAR CAMPS

Y-F015-11-01-001

Type C

by

G. E. Sherwood

ABSTRACT

A survey was conducted to determine availability of suitable furniture and floor covering for outfitting polar camps. It was determined that lightweight, compact, durable furniture which is both comfortable and attractive is available through commercial sources. Interlocking floor tile which requires no mastic for installation and yet is quite serviceable, is also commercially available.

It was concluded that commercially available furnishings have many desirable features which cannot be obtained from standard Navy sources; therefore, outfitting for polar camps should not be limited to standard Navy sources.

INTRODUCTION

Experience in outfitting polar buildings and camps has shown that furnishings which are readily available from standard Navy sources are often not particularly suitable. Much of the furniture is heavy and bulky, and floor coverings buckle and curl at the edges in polar service. Available furnishings may be quite practical for most shore establishments; however, polar camps have unique requirements. Weight is a major consideration as the furnishings must often be air-shipped to the site. Assembly or installation time is critical as labor is quite expensive. Appearance is very important as personnel must live with the furnishings constantly with little opportunity for outside diversion.

In an effort to improve living conditions, a survey of commercially available furnishings was conducted. This technical note contains the information obtained from the survey.

BACKGROUND

Recent outfitting studies for polar buildings have included specially designed furniture, commercially available furniture, and commercial floor covering. In all cases, there was none available from standard Navy sources which would satisfy the requirement.

In 1961, a Jamesway was outfitted as a prototype quarters building[1] for a packaged pioneer polar camp[2] which was being developed by the laboratory. The prototype was shipped to McMurdo, Antarctica, and has been in use since that time. The criteria specified that outfitting should be standard Navy stock items, so standard Navy bunks were used. Curtain partitions were used to provide individual rooms approximately 6-1/2 by 8 feet in size. With one double bunk in a room, there was space for only one 2- by 3-foot locker. Additional storage was provided by a specially designed collapsible drawer which was easily assembled and suspended from the frame under the lower bunk, thus utilizing space that would otherwise be wasted. Two of these drawers could be placed under a bunk. Collapsible shelves which could be hung on the end of each bunk were provided for convenience of personnel. This was a handy place for reading material, stationery, clock,

cigarettes, and other personal items. Both the drawers and shelves have received very favorable comment from personnel using them during the past 3 years.

In developing the pioneer polar camp,[2] commercial metal folding tables and benches were selected for the mess hall as all standard Navy messing tables were too heavy and bulky. These tables and benches were used in the prototype mess hall at the NCEL camp near McMurdo, Antarctica, during the FY-64 summer season. They were lightweight and could be folded for a compact package, and yet there was no field assembly required. They proved to be very comfortable and held up quite well under the rough treatment typical of field camps.

Outfitting for the prototype quarters building[1] also included a throw rug beside each bed and area rugs in each lounge. These washable cotton rugs were very well received by personnel using the building. The only difficulty encountered was in the light-colored rugs showing soil very fast.

COMMERCIAL FURNITURE

In conducting the furniture survey, the effort was directed toward determining availability of commercial furniture with features which cannot be obtained in standard Navy furniture. This survey was not exhaustive, but does indicate some of the useful features available when procurement is not limited to standard Navy sources. The furniture is discussed under five areas of usage.

Bedroom

Beds are available with shelves built as an integral part of the headboard and, in some cases, a small writing desk may be built into one end of the bed. Experience has shown that if a desk is not provided, men will often field-fabricate one from packing crates or other available materials. The cost of beds with headboard shelves is about 4 percent higher than standard Navy bunks with specially built shelves. Shipping weight is 10 percent less. Beds are also available with an enclosed base containing drawers. If a bedroom must double as an office or other work area, beds which fold against the wall are available to provide additional work space during the day.

Wardrobes of easily assembled knock-down construction are available with a variety of drawer units and hanging space. These units

not only provide more flexibility than standard lockers, but also come in attractive finishes or colors.

Desks for personal use can be ordered to fit any space by using a pedestal containing drawers and ordering the top in the required length. This eliminates waste space which might occur with standard sizes.

Dormitory-type furniture with matching beds, wardrobes, desks, and chairs is available in a variety of pleasing colors, which is worth consideration for morale purposes as well as convenience. Personnel must live with this furniture for long periods without relief, and the usual olive drab or battleship gray is depressing. Bright, warm colors should be used for relief from the all-over whiteness of most polar regions.

Lounge

The lounge chairs and settees or sofas available from standard Navy sources are constructed of tubular aluminum frame with metal armrests and vinyl upholstered seat and back. These are quite practical; however, commercially available furniture with aluminum frame and vinyl upholstery has more pleasing lines, the warmth of wooden armrests, and upholstery in a variety of attractive colors. This commercial lounge furniture costs no more and has about the same shipping weight.

There is also available modular lounge furniture with a basic seat 2 feet wide and expansion sections 1 or 2 feet wide which can be assembled together to form a single unit. These units can be any combination of chairs, benches, or tables and include corner units. With this type of furniture, maximum use of space is possible as it can be made any length. The table tops, as an integral part of the seating, occupy less space than separate tables. The entire system is of knock-down construction.

Mess Hall

An example of lightweight folding tables and benches available for mess hall use was given under BACKGROUND. This furniture is particularly practical as it can be folded for shipment and for getting it out of the way when the mess hall is to be used for some other purpose. The cost of these tables and benches is about 15 percent less than standard tables with swivel seats, and the weight is 50 percent less. Tables which are hinged at the center for

folding and have integral seats are also available. These can be very easily folded and rolled out of the way for cleaning or for multiple use of the mess hall.

Recreation

The main furniture required for a recreation area is game tables. The standard 30-inch-square bridge table is not large enough for the usual card games. Round tables with folding legs have been used very successfully as this provides adequate space for six men. The cost is about 14 percent higher and the weight is slightly more as the table is larger. Folding pool tables and ping pong tables are also commercially available. The cost of these tables is 4 percent higher than standard Navy stock; however, the weight is 10 percent less.

Office

The main item of office furniture is desks. In addition, filing cabinets, bookshelves, and other types of storage units are required. The standard Navy desks are much too heavy for air-shipment and too bulky to be used in small spaces. The field desks are small and collapsible, but have no drawers. Lightweight, compact desks are commercially available in knock-down construction. The cost of a lightweight desk of comparable size to standard Navy desks is about 20 percent higher. The weight is 30 percent less.

Office furniture consisting of modular units which can be attached to poles is also available. These poles are easily installed with a spring device. Mounting brackets and hardware are used for attaching the modular units to the poles. These units include desks, cabinets, shelves, and drawers. Partition panels are also available in this system for mounting between two poles. This type of furniture provides all of the necessary work space and storage in a compact, convenient unit. The variety of units provides flexibility to fit most situations.

COMMERCIAL FLOOR COVERING

In surveying available floor covering, the effort was directed toward finding a durable, easily installed covering which does not buckle under conditions prevalent in polar buildings. Most floor covering is installed with a mastic which breaks loose as the covering expands and contracts due to the extreme temperature changes.

After the mastic breaks loose, floor tile curls around the edges and linoleum buckles.

Rubber tile is available with interlocking joints which eliminate the need of mastic. The tile is merely locked together and laid flat on the floor. It has the advantage of being fast and easy to install. It could also be removed for reuse if a building is dismantled or abandoned. It is attractive in appearance, noiseless, durable, and easily cleaned. The cost is about 38 percent higher than battleship linoleum.

This interlocking tile was tested under simulated conditions in the laboratory cold chamber. The properties tested included flexibility, warping, and thermal expansion. The results of the tests, which are described in the Appendix, indicate that the interlocking tile is suitable for buildings in polar regions; however, it should be tested under actual conditions to determine if it will retain these qualities under usage for a long period of time. The test for thermal expansion shows that the tile should be warmed to room temperature before installation.

Throw rugs have proven quite useful in quarters to provide a warm floor surface beside the beds. These can be obtained in a variety of materials, colors, and sizes. Previous use of rugs shows that light colors should not be used as they soil badly.

FINDINGS

1. Furniture available from standard Navy sources is often heavy, bulky, and not particularly suitable for polar camps.

2. Furniture which is lightweight, compact, durable, and comfortable is available commercially.

3. Suitable furniture is commercially available in attractive designs and colors.

4. The cost of commercially available furniture can be as much as 20 percent higher than comparable furniture from standard Navy sources; however, the additional expense appears justified by savings in shipping weight, assembly time, multiple use of the furniture, and floor space required by the furniture.

5. Floor coverings that must be installed with mastic usually

buckle when used in polar regions. Interlocking floor tile eliminates the need of mastic, but its cost is about 38 percent greater than battleship linoleum.

6. Area rugs provide added comfort in quarters buildings.

CONCLUSIONS

1. Use of commercially available furniture permits better space utilization, more economical shipment, and more attractive designs and colors than standard Navy furniture.

2. Use of commercially available floor coverings permits easier installation, better serviceability, and greater comfort than standard Navy floor coverings.

3. Furnishings for outfitting polar camps should not be limited to standard Navy sources.

4. The use of commercially available furniture should be considered in revisions to the existing polar camp designs.

REFERENCES

1. U. S. Naval Civil Engineering Laboratory. Technical Note N-422: Erection of quarters building for pioneer polar camp, by R. W. Hansen, C. R. Hoffman, and E. H. Moser. Port Hueneme, Calif., 26 September 1961.

2. U. S. Naval Civil Engineering Laboratory. Technical Report R-267: A pioneer polar camp, by G. E. Sherwood. Port Hueneme, Calif., 16 October 1963.

BLANK PAGE

Appendix

INTERLOCKING RUBBER TILE STUDY

Interlocking rubber tile was tested under simulated conditions for buildings in polar regions. The tile tested was 9 by 9 by 1/4 inch thick. Tests were conducted for flexibility, warping, and thermal expansion.

FLEXIBILITY

Tile samples were placed in a cold chamber at a temperature of -10 F. After cold-soaking overnight, they still remained quite pliable. When the tile was released after flexing, it immediately returned to its original shape.

WARPING

A frame was constructed to test 16 tile in a confined area with one warm and one cold surface. A mat-type heater was placed on a plywood panel. A frame of 2 by 2's was placed on the plywood around the heater. The frame enclosed an area 35 inches square. Sixteen tile were then placed together and trimmed to fit in the enclosed area. Thermocouples were secured to the warm surface, the center of the tile, and the cold surface. A thermocouple was also provided in the air 2 inches above the cold surface of the tile. A 2 by 4 was placed on top of the frame so that it could be moved across the frame and serve as a reference to determine deflection of the tile at any point.

When this test frame was placed in the cold box at -10 F, the maximum temperature that could be achieved on the warm surface of the tile was 49 F. The temperature difference between the two tile surfaces was consistently about 20 F regardless of the temperature of the warm surface of the tile (Table I).

During initial warming of the tile, a very slight deflection was observed. This was attributed to flattening of the heater mat on which the tile were placed. After the tile was completely cooled and rewarmed, no deflection was observed.

THERMAL EXPANSION

The thermal expansion of the tile was tested by placing eight tile together in series on a board for a total length of 6 feet. One end was secured to the board. The length of tile was measured at 70 F. Then it was placed in the cold box at -10 F. The length of tile decreased 1/8 inch. When the temperature of the tile was brought back to 70 F, the tile resumed its original length.

FINDINGS

It was found from the floor tile tests that rubber interlocking tile:

1. Remains flexible at temperatures down to -10 F.

2. Does not warp when the temperature difference between the two tile surfaces is 20 F.

3. Expands 1/8 inch in 6 feet with a temperature rise of 80 F.

Table I. Temperature Readings During Warpage Test on Interlocking Rubber Tile

Time	Warm Surface (F)	Center of Tile (F)	Cold Surface (F)	Air 2 in. Above Tile (F)	Remarks
5 May 64					
0849	39	31	26	0	No heat
0905	30	24	20	-4	
0921	24	18	16	-4	
0930	20	15	13	-6	
0946	28	18	14	-6	Heat on
0953	35	22	18	2	
1018	42	28	24	1	
1030	45	32	27	2	
1110	49	32	26	-4	
1134	49	33	28	-9	
1145	49	32	27	-4	Heat off
1342	9	3	3	0	Heat on
1355	22	12	9	-3	
1415	32	20	15	-13	Cold box reset for -20 F
1442	35	21	16	-8	Cold box reset for -10 F
1502	36	22	17	-8	
1530	38	22	17	-12	
6 May 1964					
0835	-2	-2	0	-10	Tile in chamber overnight at -10 F
0856					Heat on
0915	21	12	10	-3	
1015	42	28	24	0	
1055	44	29	24	-4	
1230	46	31	27	-2	
1255	46	31	27	-4	
1455	46	31	27	-6	
1655	47	32	27	0	