

# Standard Practice for the Selection and Application of Marine Deck Coverings

U. S. DEPARTMENT OF THE NAVY  
CARDEROCK DIVISION, NAVAL SURFACE  
WARFARE CENTER

in cooperation with  
Peterson Builders, Inc.

# Report Documentation Page

Form Approved  
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>JUL 1992</b>		2. REPORT TYPE <b>N/A</b>		3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>Standard Practice for the Selection and Application of Marine Deck Coverings</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Naval Surface Warfare Center CD Code 2230-Design Integration Tools Bldg 192, Room 128 9500 MacArthur Blvd, Bethesda, MD 20817-5700</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>	18. NUMBER OF PAGES <b>354</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

This report / manual was prepared as an account of U.S. government sponsored work. Neither the United States, nor the Carderock Division, Naval Surface Warfare Center (CDNSW) - formerly The David Taylor Research Center-DTRC, nor any person acting on behalf of the CDNSW (a) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report / manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (b) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report / manual. As used in the above, "persons acting on behalf of the CDNSW" includes any employee, contractor, or subcontractor to the contractor of the CDNSW to the extent that such employee, contractor or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the CDNSW. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND / OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.

# THE NSRP NEEDS YOUR EVALUATION OF THIS REPORT!

PLEASE RETURN A RESPONSE CARD AFTER READING REPORT.

## NSRP READER RESPONSE CARD

We would appreciate your comments on this report. Please take a few minutes to complete and return this postage-paid card. Thank you.

Name \_\_\_\_\_

Organization \_\_\_\_\_

Phone \_\_\_\_\_

Overall Quality of Report

Excellent  Good  Fair  Poor

useful to **You/Your** Organization

Very Useful  Moderately Useful  N/A

Did/will your organization implement the results of this project?  Yes  NO

If not why? \_\_\_\_\_

How Did You Receive Report?

Mailed directly to you

Referred to you by someone else

Did/Will You Pass Report On To

Someone Else?  Yes  No

In Your Opinion, is Anything Missing That Would Make This Report Better?

\* \* \* \_\_\_\_\_

General Comments

NSRP 0354

## NSRP READER RESPONSE CARD

We would appreciate your comments on this report. Please take a few minutes to complete and return this postage-paid card. Thank you.

Name \_\_\_\_\_

Organization \_\_\_\_\_

Phone \_\_\_\_\_

Overall Quality of Report

Excellent  Good  Fair  Poor

Useful to **You/Your** Organization

Very Useful  Moderately Useful  N/A

Did/Will your organization implement the results of this project?  Yes  No

If not, why? \_\_\_\_\_

How Did You Receive Report?

Mailed directly to you

Referred to you by someone else

Did/Will You Pass Report On To

Someone Else?  Yes  No

In Your Opinion, is Anything Missing That Would Make This Report Better?

\* \* \* \_\_\_\_\_

General Comments

NSRP 0354

NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS MAIL PERMIT NO. 1 NEWPORT NEWS, VA

NSRP PROGRAM MANAGER  
W. G. BECKER  
NEWPORT NEWS SHIPBUILDING  
NEWPORT NEWS, VA 23607

ND POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS MAIL PERMIT NO. 1 NEWPORT NEWS, VA

NSRP PROGRAM MANAGER  
W. G. BECKER  
NEWPORT NEWS SHIPBUILDING  
NEWPORT NEWS, VA 23607

STANDARD PRACTICE  
FOR THE  
SELECTION AND APPLICATION  
OF  
MARINE DECK COVERINGS

PUBLISHED UNDER THE AUSPICES OF  
THE NATIONAL SHIPBUILDING RESEARCH PROGRAM  
IN COOPERATION-WITH  
THE UNITED STATES MARITIME ADMINISTRATION  
THE UNITED STATES NAVY  
THE UNITED STATES SHIPYARDS

AUTHORED BY  
JOSEPH F. O'DONNELL  
SENIOR VICE PRESIDENT (RETIRED)  
SELBY, BATTERSBY & CO., INC.

J U L Y 1 9 9 2

Introduction

STANDARD PRACTICE FOR THE SELECTION AND APPLICATION  
OF MARINE DECK COVERINGS

INDEX

GENERAL INFORMATION

	Page
INTRODUCTION	
Preface	5
Acknowledgments	6
Bibliography	7
Use of this Publication	9
MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR	
Effective Use of Chart and Selector	11.
Cost Coefficient Chart and Product Selector	12
SPECIFICATIONS	
Use of the Deck/Spec Specifications	36
Deck/Spec Format	37
MARINE BODIES OF INFLUENCE	
Introduction	43
American Bureau of Shipping	44
International Maritime Organization	45
Maritime Administration	47
Society of Naval Architects and Marine Engineers	49
Shipbuilders Council of America	50
United States Coast Guard	51
United States Navy	55
United States Department of Health and Human Services	58
DECK PREPARATION	
1. General Information	62
2. Tools used in Deck Preparation	62
3. Cleaning the Deck Surface	63
4. Primer Protective Coatings	65
5. Removal of Existing Deck Covering for Rehabilitation Work	67
6. Other Deck Preparation Procedures	69
7. Safety Procedures	70

## PRIMARY DECKING, INSULATION AND SPECIALTY SYSTEMS

## UNDERLAYMENT MATERIALS

Latex Mastic, Type I - Lightweight System	72
Latex Mastic, Type II	76
Magnesium Oxychloride Cement (Magnesite)	80
Polymeric Resin Underlayment	84

## INSULATION DECKING

Deck Top Insulation Type I	88
Deck Top Insulation Type II	92

## DECKING FOR AMMUNITION HOLDS

Ammunition Magnesite	96
Latex Concrete	100

## BONDING AGENT

Bonding Agents for Magnesium Oxychloride Cement Systems	104
---	-----

## FLOATING DECK SYSTEMS. . . .FOR SOUND DEADENING

Metal Clad System	107
Marine Floor Panel and Spine System	112

## FINISHED DECKING - RESIN TYPES

## SOLID COLOR MONOLITHIC SYSTEMS

Latex Mastic and Neoprene Deck Covering	117
Two Component Resin System	122
Magnesium Oxychloride Cement (Magnesite)	126

## DECORATIVE SYSTEMS

Polymeric Decorative Quartz Decking - Epoxy Broadcast Type	131
Polymeric Decorative Quartz Decking - Epoxy Trowel Type	135
Polymeric Decorative Flake Decking - Epoxy Type	139
Polymeric Decorative Terrazzo Decking -Epoxy with Marble Chips	144
Polymeric Decorative Flake Decking - Elastomeric Urethane Type	148
Polymeric Resin, One Step Decking - Epoxy with Marble Chips	153

	Page
TERRAZZO DECKING. . . MACHINE GROUND SYSTEMS	
Latex Mastic and Resin Emulsion - Ground Terrazzo Decking	157
Catalyst Cured Resin - Ground Terrazzo Decking	162
WATERPROOF MEMBRANE SYSTEM	
Neoprene System, with Reinforcement	167
WEATHERDECK SYSTEMS	
Neoprene Resin Decking	170
Elastomeric Urethane Decking	174
WEIGHT CRITICAL DECKING SYSTEMS	
Polymeric - Epoxy Resin with Colored Flakes	178
Polymeric - Elastomeric Urethane Resin with Colored Flakes	182
RECREATIONAL AND EXERCISE -DECKING SYSTEMS	
Neoprene Resin Decking	186
NON-SKID DECKING	
General Purpose, Non-Landing Area, High Durability	190
General Purpose, Non-Landing Area, Standard Durability	195
Landing Area, High Durability	200
Landing Area, Standard Durability	205
Type III General Purpose, Non-Landing Area	210
Type IV Landing Area	215
Type I Spray Applied, Lightweight, Non-Landing Area	220
REEFER BOX SYSTEM	
Latex Mastic Deck Covering	225
FINISHED DECKING - HARD SURFACE TYPES	
VITREOUS TILE DECKING	
Ceramic Tile	230
Quarry Tile	234

## FINISHED DECKING - RESILIENT MATERIALS

## RESILIENT DECKING

Vinyl Composition Tile	238
Homogeneous Vinyl Tile	243.
Vinyl Sheet Decking	247
Rubber Tile	251

## HIGH DIELECTRIC STRENGTH MATTING - FOR ELECTRONIC SPACES

Rubber Sheet Decking - Type I	255
Vinyl Sheet Decking - Type I	259
Portable Mats, Types II and III	263

## ACID AND OIL RESISTANT DECKING

Synthetic Rubber and/or Elastomeric Urethane Decking	<b>268</b>
--	------------

## FINISHED DECKING - CARPET

## CARPET

Wool, Velvet, woven through the back Class 1, 2 and 4	273
Nylon, Wool, Acrylic and other fibres	278

## FINISHED DECKING - WOOD

## WOOD DECKING

Wood Decking	283
--------------	-----

## FINISHED DECKING - ACCESSORIES

## SHIPS INCLINED LADDER SAFETY TREADS

Extruded Aluminum, Compound Filled Treads	287
Extruded and Cast Metal, Skid Resistant Treads	287
Resilient, Skid Resistant Treads	287

## WALKWAY, NON-SLIP, STICK-DOWN TREADS

Flexible, Non-Slip Treads	293
---------------------------	-----

## PREFACE

This project encompasses the review and rewriting of the Society of Naval Architects and Marine Engineers Technical and Research Bulletin, "Marine and Deck Covering Guide," originally published in 1969. It includes producing a document entitled "Standard Practice for the Selection and Application of Marine Deck Coverings" which will be a guide to assist in product selection, writing specification, determining budgetary costs, purchasing and installation of marine deck covering.

This effort is conducted under the auspices of the National Shipbuilding Research Program, a cooperative research and development program involving the U. S. Maritime Administration, U. S. Navy and U. S. Shipyards, which seek to reduce shipbuilding costs and construction times through the implementation of state-of-the-art technology in United States shipyards.

The National Shipbuilding Research Program functions through eleven technical panels of the Ship Production Committee of the Society of Naval Architects and Marine Engineers. These panels identify and undertake programs which lead to productivity improvements within the entire marine industry. This project is sponsored by SNAME Panel SP-6 on Marine Industry Standards.

The completed document contains individual data sheets on decking products currently in use on both commercial and military ships. The data sheets include:

- Description of the product
- Features of the deck material
- Specification references
- Trade names and manufacturers
- Areas of use as well as limitations
- Budgetary cost coefficient
- Physycal properties
- Application methods
- Cautionary notes
- Warranty information, and a
- Construction detail, where applicable.

An entire section is included on Standard Practice of Deck Preparation, a standard form for specifications called "Deck/Spec," a selector guide to suggest specific deck products for various compartment areas and a "Cost Coefficient Chart" that provides budget prices for all products in the document for each geographic area of the United States.

A section of the various Marine Bodies of Influence in the United States, as well as the International Maritime Organization, briefly describing their activities in the marine industry, has also been included.

## ACKNOWLEDGMENTS

The Marine Industry remains indebted to the late Dean S. Champlin, Vice President of Selby, Battersby & Co., and the late Abe Chasnoff of the Naval Ship Engineering Center of the Department of the Navy, for their having pioneered the first issue of the Marine Deck Covering Guide published in 1969 by the Society of Naval Architects and Marine Engineers.

A sincere debt of thanks to the National Shipbuilding Research Program, the Society of Naval Architects and Marine Engineers, the U. S. Maritime Administration, the U. S. Navy and the Shipyards of the United States for their foresight and action taken to update and publish the "Standard Practice for the Selection and Application of Marine Deck Coverings.

A special note of appreciation to the many industry leaders who so willingly shared their knowledge of marine decking material so this Manual can provide the current "State-of-the-Art," and in particular our thanks goes to:

Fred Berry	United States Navy	Washington, DC
Arti Crisp, Jr.	Professional Carpet	Charleston, SC
Larry Clopton	Professional Carpet	Charleston, SC
Bruno DiPaulo	Metro Floors & Deck Covering	Springfield, PA
Tom Gibney	Consultant	Mountainside, NJ
Jake Giardina	Petrochemical Services, Ltd.	New Orleans, LA
Norman Lemley	United States Coast Guard	Washington, DC
R. L. Markle	United States Coast Guard	Washington, DC
Dick Martine	Wooster Products, Inc.	Wooster, OH
Brannon Murray	Murray Tile Company	Charleston, SC
Virgil Rinehart	Maritime Administration	Washington, DC
Tony Rogers	Jacksonville Decking Co.	Jacksonville, FL
Shelly Rovner	American Safety Tread Co.	Helena, AL
George Selfridge	Maritime Services Corporation	Hood River, OR
Tom Soik	Peterson Builders, Inc.	Sturgeon Bay, WI
Mike Tusa	Petrochemical Services, Ltd.	New Orleans, LA
Klaus Wahle	United States Coast Guard	Washington, DC
Tom Zambetti	Zambetti Associates	Malvern, PA

A heartfelt thanks to Mary A. O'Donnell whose patience, outstanding secretarial skills and organizational efficiency brought all these technical facts into a readable and producible manuscript.

Joseph F. O'Donnell, Editor  
Senior Vice President (Retired)  
Selby, Battersby & Co., Inc.

## BIBLIOGRAPHY

### AMERICAN BUREAU OF SHIPPING PUBLICATION

Rules for Building and Classing Steel Vessels

### MARITIME ADMINISTRATION PUBLICATIONS

- 59-MA-1b Deck Covering; Cleaning and Preparation, in Way of Magnesite
- 59-MA-2b Deck Covering; Non-Slip, Magnesia Oxychloride Cement (Magnesite) and its Application
- 59-MA-4b Tile; Ceramic, Deck and Bulkhead
- 59-MA-6a Underlayment; Deck Covering, Rubber Latex or Resin Emulsion
- 59-MA-7a Deck Covering; Latex Mastic and Resin Emulsion
- 59-MA-8 Deck Covering; Latex Mastic and/or Resin Emulsion

### INTERNATIONAL MARITIME ORGANIZATION PUBLICATION

Fire Test Procedures for Ignitability of Primary Deck Coverings

### NATIONAL FIRE AND PROTECTION ASSOCIATION PUBLICATION

Use of Inhalation Anesthetics (Flammable and Non-Flammable) of NFPA, 99-1984, Health Care Facilities, Chapter 3

### NATIONAL TERRAZZO AND MOSAIC ASSOCIATION PUBLICATION

National Terrazzo and Mosaic Association Design and Specification Manual on Terrazzo Systems

### SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS PUBLICATIONS

Technical and Research Bulletins

No. 2-21 Deck Preparation

No. 4-11 Marine Deck Covering Guide, 1969

### TILE COUNCIL OF AMERICA, INC., PUBLICATIONS

American National Standard Specifications for Ceramic Tile and Quarry Tile, ANSI A 137.1

### UNITED STATES COAST GUARD PUBLICATIONS

Rules and Regulations for Passenger Vessels  
Title 46 CFR 70-89 Subchapter H

Equipment Lists COMDTINST M 16714, 3C

Navigation and Vessel Inspection Circular

- Guide to Structural Fire Protection Aboard Merchant Vessels 6-80

- Recommendations on Control of Excessive Noise

Tests of Carpet, Non-Flammability and Flammability with Fire Retardant and Non-Fire Retardant, DOC TEST FF 1-70 (Standard Test ASTM E-84)

## UNITED STATES DEPARTMENT OF DEFENSE PUBLICATIONS

Provisions Governing the Qualified Products List SD-6

Code of Federal Regulations

Ship Compartment Nomenclature, MIL-STD-1624 A (SH)

MIL-D-3134	Deck Covering Materials
MIL-D-3135	Deck Covering Underlay Materials
MIL-D-16680	Deck Covering Magnesia Aggregate Mixture
MIL-D-17951	Deck Covering, Lightweight, Non-Slip, Abrasive Particle Coated Fabric
MIL-D-21631	Deck Covering, Latex Concrete
MIL-D-23003	Deck Covering Compound, Non-Slip, Rollable
MIL-D-23134	Deck Underlay and Covering, Insulating, Magnesia Aggregate Mixture
MIL-D-24483	Deck Covering, Spray-On, Non-Slip
MIL-D-24613	Deck Covering Materials, Interior, Cosmetic Polymeric
MIL-M-15562	Matting or Sheet, Floor Covering, Insulated for High Voltage Application
MIL-S-2912	Synthetic Rubber Compound, Acid and Oil Resistant
MIL-T-18830	Tile, Plastic, Fire Retardant
MIL-T-24634	Treads, Extruded Aluminum, Compound Filled, Cast Metal, Skid Resistant and Resilient Treads
DOD-C-24667	Coating System, Non-Skid, for Roll or Spray Application

## UNITED STATES FEDERAL SPECIFICATIONS

DDD-C-95 Carpets and Rugs, Wool, Nylon, Acrylic, Modacrylic

L-F-47 5 Floor Covering Vinyl, Surface (Tile and Roll) with Backing

SS-T-312 Tile, Floor: Rubber and Vinyl

## UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLICATION

Vessel Sanitation Program Operation Manual

## UNITED STATES DEPARTMENT OF NAVAL PUBLICATIONS

The United States Government Manual

Strategic Concepts of the United States Navy

Naval Ships' Technical Manual

Chapter 634, Deck Coverings

Fire Performance Requirements and Approved Specifications for Interior Finish Materials and Furnishings, MIL-STD-1623

## WORLD HEALTH ORGANIZATION PUBLICATIONS

International Health Regulations

Guidelines for Inspection of Ships for Rodent Control

## USE OF THIS PUBLICATION

The “Standard Practice for the Selection and Application of Marine Deck Covering” has been designed to easily direct those who use it to the proper decking system for the various spaces in all types of commercial and military ships. Each individual will determine the best and most comprehensive way to obtain the facts they need to best answer each decking requirement. In this section the contents are briefly reviewed and two general procedures are suggested.

### Selection by Area

Determine the areas involved and review the “Selector Guide” to find the suggested systems for those areas. Review the “Product Sheets” for the suggested systems and select the system that most closely meets the majority of needs for that area.

Space constraints prohibited listing the over 2000 possible areas in various ships so a representative cross-section was selected. If specific area is not listed, find an area with similar use conditions and evaluate the products recommended for that area.

### Selection by Product

If a particular type of product has performed satisfactorily, turn to the “Product Sheets” for that type material and evaluate its characteristics and properties in light of the decking needs for the areas currently being considered. Consult the “Selector Guide” to find the product desired and review the spaces where the product is recommended. If product is not listed, review the products that are recommended and determine if they meet the use/needs of that area. If the recommended products are not as satisfactory as the original selection, contact the manufacturer of the original product and obtain their recommendations.

## Review of Contents

Cost Coefficient - A simplistic method to obtain budget prices for all the decking materials listed.

Selector - A guide with product recommendations for various ship spaces.

Specifications - The DECK/SPEC provides a model format for writing marine decking specifications.

Marine Bodies of Influence - Provides a brief insight of the activities and responsibilities of the main marine bodies of influence in the United States.

Deck Preparation - An excellent guide to deck preparation which should be thoroughly understood by the Superintendent of the Habitability Section and followed by contractors’ installing the decking materials.

Product Sheets - A separate set of sheets are included for all of the most widely used marine decking materials, as of this time. Each set provides a description of Product, its features, technical data and application information.

A general cross-section of product names and manufacturers are listed as well as physical properties and specification references. Over time these listings change and users of this publication should keep their product files current.

The Product Sheets are set up in the following categories:

- Primary Decking, Insulation and Specialty Systems
- Finished Decking, Resin Types
- Finished Decking, Hard Surface Types
- Finished Decking, Resilient Materials
- Finished Decking, Carpet
- Finished Decking, Wood
- Finished Decking, Accessories

The INDEX provides the headings of each system included in each category and it is recommended that the user become thoroughly familiar with the contents of the INDEX.

There are a number of decking systems that are relevantly recent in their use as marine decking and it is suggested that the reader become familiar with these systems.

Polymeric Resin Underlayment - An epoxy underlayment, with no water content, used in conjunction with epoxy and urethane resin products.

Sound Deadening Systems - Listed under "Floating Deck System" they reduce sound and vibration transmittal.

Decorative Systems - Known as Polymeric Resins they consist of epoxy, urethane or polyester resins, generally unpigmented, into which marble, color quartz or color flakes are encapsulated.

Ground Terrazzo - An acrylic, neoprene or epoxy resin with 70% marble chips ground smooth to provide a decorative, long wearing decking system.

Weatherdeck Systems - Include a neoprene mastic or a polyurethane waterproof traffic surface.

Weight Critical Decking Systems - Designed for weight critical ships and generally consist of urethane clear resin and flakes or an elastomeric polyurethane with flakes.

Reefer Boxes - A latex decking system adaptable to walk-in or fork-lift reefer box traffic.

Vinyl Composition Tile - An asbestos free resilient tile widely used in ship construction.

The proper use of this "Marine Deck Covering Guide" will assist immeasurably those responsible for the selecting, specifying, purchasing and supervising the installation of all deck covering materials.

Cost Coefficients & Deck'  
Covering Selector

## MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR

### EFFECTIVE USE OF CHART AND SELECTOR

The Cost Coefficient Chart and Deck Covering Selector is an effective tool for Marine architects, engineers, designers and ship owners when selecting decking material for shipboard spaces and in developing projected budgetary costs.

#### Cost Coefficient Chart

The Cost Coefficient Chart allows the user to determine budget prices for each decking material included on this list for locations throughout the United States.

A composite of installed costs was obtained from decking contractors in major shipbuilding regions of the United States. The average cost of each material was obtained by dividing the composite by the number of participants.

Vinyl composition tile, being the most widely used decking material, was assigned a coefficient of 1.00. By dividing the average price of each decking material by the average price of the vinyl composition tile, a cost coefficient was obtained for each decking material in relation to the vinyl composition tile price.

By obtaining the local price for installing vinyl composition tile on a ship and then multiplying with the cost coefficient of any decking material, a local budget price is easily developed for any material in any region and for any time period.

The cost coefficients were developed from installed contractor budget prices at the thickness shown. Companion items such as deck preparation, underlayments, waterproof membrane and cove base are not included in the budget price. To obtain a more complete budget cost, figure the price of each component and add them together.

Cost coefficients, including Carpet and "Stick-Down, Non-Slip" Treads, are based on a price per square foot. Inched deck treads are priced per lineal foot according to width of tread. Prices are based on average quantity of 1,000 square feet. Larger quantities can reduce costs somewhat.

#### Deck Covering Selector

The Deck Covering Selector is a guide used in the determination of specific decking products for various shipboard spaces.

A representative group of shipboard spaces was chosen to provide a good cross section. If a specific space of interest is not included, relate the service conditions of that space to a similar space on the list and follow that suggested recommendation.

Deck covering on all types of commercial and naval vessels, offshore rigs and supply vessels are subject to much tough use and abuse. No one deck covering material can solve the decking problems of every area of the ship. Some decking materials can be used in a number of ship spaces and in general more than one material is available to provide a successful decking system in most spaces. The Selector provides a number of choices for most spaces and the design personnel need evaluate individual product features and liabilities as set forth in the product data sheets.











**MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR**

**SHIP SPACES**

**from D to L**

SECTION II DECK COVERING SYSTEMS	Cost Coefficient	Dining Room	Electronic Equipment	Exercise Areas	Food Preparation	Galley	Gym/Recreation Areas	Habitability Areas	Hanger Decks	Heads	Helo/Vertical Planes	Insulated Decks	Laboratories - of all types	Ladders - Head/Foot	Laundry	Library	Lob.
<b>FLOATING DECK SYSTEMS ... FOR SOUND DEADENING</b>																	
Metal Clad System	7.51																
Marine Floor Panel and Spine System	7.98																
<b>SOLID COLOR MONOLITHIC SYSTEMS</b>																	
Latex Mastic Deck Covering 1/4"	2.40			X	X	X	X	X	X			X		X			
Neoprene Deck Covering 1/4"	2.63			X	X	X	X	X	X			X					
Two Component Resin System 1/4"	3.00				X	X			X			X		X			
Magnesium Oxychloride Cement (Magnesite) 3/4"	4.20				X	X		X				X					
<b>DECORATIVE SYSTEMS</b>																	
Polymeric Decorative Quartz Epoxy Broadcast Type 1/4"	3.33				X	X		X		X		X		X			
Polymeric Decorative Quartz Epoxy Trowel Type 1/4"	4.74	X			X	X		X		X		X					X
Polymeric Decorative Flake Decking - Epoxy Type 1/8"	2.18							X				X				X	
Polymeric Decorative Terrazzo Epoxy with Marble 1/4"	5.05	X			X	X		X		X		X					X
Polymeric Decorative Flake Elastomeric Urethane Type 1/8"	5.24							X				X				X	
Polymeric Finish, One Step Epoxy 1/4"	35				X	X		X				X					



**MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR**

**SHIP SPACES**

from Sh to W

SECTION II DECK COVERING SYSTEMS	Cost Coefficient	Ship Stores	Showers	Sick Bay	Sonar Room	Stairway	State Rooms	Swim Pool - Beach Area	Switchboard Spaces	Theater	Toilet Room	Treads, Vertical Ladder	Weatherdecks	Weight Critical Areas	Wet Spaces	Wheel Houses	Work Spaces
<b>FLOATING DECK SYSTEMS ... FOR SOUND DEADENING</b>																	
Metal Clad System	7.51																
Marine Floor Panel and Spine System	7.98																
<b>SOLID COLOR MONOLITHIC SYSTEMS</b>																	
Latex Mastic Deck Covering 1/4"	2.40	X	X	X	X	X	X	X		X	X	X		X	X	X	
Neoprene Deck Covering 1/4"	2.63		X	X	X	X	X	X		X	X	X		X	X		
Two Component Resin System 1/4"	3.00	X			X	X				X				X	X	X	
Magnesium Oxychloride Cement (Magnesite) 3/4"	4.20	X				X				X	X				X	X	
<b>DECORATIVE SYSTEMS</b>																	
Polymeric Decorative Quartz Epoxy Broadcast Type 1/4"	3.33	X	X	X		X		X		X	X				X		
Polymeric Decorative Quartz Epoxy Trowel Type 1/4"	4.74		X	X		X				X	X				X		
Polymeric Decorative Flake Decking - Epoxy Type 1/8"	2.18			X	X		X			X				X			
Polymeric Decorative Terrazzo Epoxy with Marble 1/4"	5.05		X	X		X	X			X	X				X	X	
Polymeric Decorative Flake Elastomeric Urethane Type 1/8"	5.24			X	X		X			X				X			
Polymeric Epoxy with Marble Chips 1/4"	5.35	X									X						













**MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR**

**SHIP SPACES**

from A to C

SECTION V DECK COVERING SYSTEMS		Cost Coefficient	Aircraft Elevators	Ammunition Holds	Auto Deck of Ferry	Ballroom	Barber and Beauty Shop	Battery Room	Bridge Wings	Briefing Room	Bulk Fuel Oil (Deck Above)	Carrier Flight Decks	Chapel	Chart Room	Chemical Storage	Clean Room (Nuclear)	Commissary Spaces	Computer Areas
<b>RESILIENT DECKING</b>																		
Vinyl Composition Tile	1/8"	1.00			X	X			X			X	X				X	X
Homogeneous Vinyl Tile	1/8"	1.95			X	X						X	X					
Vinyl Sheet Decking	.080"	1.75			X	X							X					X
Rubber Tile	1/8"	3.05			X	X						X	X					
<b>HIGH DIELECTRIC STRENGTH MATTING - ELECTRONIC SPACES</b>																		
Rubber Sheet Decking - Type I	1/8"	4.12																
Vinyl Sheet Decking - Type I	1/8"	2.15																
Portable Mats - Type II Vinyl 1/8"		1.49																
Portable Mats - Type III Vinyl 3/16" Rubber 3/16"		2.07 2.72																
<b>ACID AND OIL RESISTANT DECKING</b>																		
Synthetic Rubber	1/8"	5.13							X						X			
Elastomeric Urethane	1/8"	5.15							X						X			









**MARINE COST COEFFICIENT CHART AND DECK COVERING SELECTOR**

**SHIP SPACES**

from D to L

SECTION VI DECK COVERING SYSTEMS	Cost Coefficient	Dining Room	Electronic Equipment	Exercise Areas	Food Preparation	Galley	Gym/Recreation Areas	Habitability Areas	Hanger Decks	Heads	Helo/Vertical Planes	Insulated Decks	Laboratories - of all types	Ladders - Head/Foot	Laundry	Library	Lobby
Wool Velvet Woven through Back - Class I	2.87	X					X								X	X	
" " " Class II	2.35	X					X								X	X	
" " " Class IV	2.53	X					X								X	X	
Nylon, Wool, Acrylic and Other Fibres	1.50	X					X								X	X	
<b>WOOD</b>																	
Wood Decking    Teak	10.3																
White Pine	4.7																
<b>SHIPS INCLINED LADDER SAFETY TREADS</b>																	
Extruded Aluminum    6" depth	7.65																
Compound Filled    9" depth	8.53																
Extruded and Cast Metal 6" depth	14.08																
Skid Resistant Treads 9" depth	18.30																
Resilient, Skid Resistant Treads 12" depth	3.12																
<b>WALKWAY, NON-SLIP, STICK DOWN TREADS</b>																	
Flexible, N Slip Treads	2.0												X				

SHIP SPACES

from M to Sc

SECTION VI DECK COVERING SYSTEMS		Cost Coefficient	Medical Facilities	Mess Room	Noise Abating Spaces	Officers' Quarters	Passageways	Pharmacy	Photo Processing	Power Equip- ment Spaces	Promenade Dk. Closed Deck	Promenade Dk. Open Deck	Radar/Radio Room	Ready Area	Reefer Boxes	Repair Shops	Rooms over Hot Spaces	Scullery Ro.
<b>CARPET</b>																		
Wool Velvet Woven through Back - Class I		2.87		X	X	X												
" " " Class II		2.35		X	X	X												
" " " Class IV		2.53		X	X	X												
Nylon, Wool, Acrylic and Other Fibres		1.50		X	X	X												
<b>WOOD</b>																		
Wood Decking	Teak White Pine	10.3 4.7									X							
<b>SHIPS INCLINED LADDER SAFETY TREADS</b>																		
Extruded Aluminum Compound Filled	6" depth	7.65																
	9" depth	8.53																
Extruded and Cast Metal Skid Resistant Treads	6" depth	14.08																
	9" depth	18.30																
Resilient, Skid Resistant Treads 12" depth		3.12																
<b>WALKWAY, NON-SLIP, STICK DOWN TREADS</b>																		
Flexible, Non-Slip Treads 6" x 24"		2.0									X							



## Specifications

## USE OF THE DECK/SPEC SPECIFICATION

The DECK/SPEC Specification provides a format that can be used by the marine specification writer for the **various decking materials** used in the shipbuilding industry.

It is set up in two categories:

Standard Specifications, which includes various items used in all decking specifications; and

Variable Portion of Specifications, which includes the various types of decking systems that can be used on all types of Ships and/or Off-Shore Rigs.

In addition to the wording that can be used in the specification writing is a series of comments to the writer called "SPECIFIER NOTES" which provides information as to the reason for each item suggested.

The DECK/SPEC Specification does not attempt to be "all inclusive" for all specifications but is designed as a "guide" in writing decking specifications. Individual Naval Architects, Marine Engineers, Shipbuilders and Ship Owners will have established their own specification format and conditions and the DECK/SPEC format can be used as a supplement to their standard format.

The Variable Portion lists all the different type decking systems that are currently available and in use in the shipbuilding industry. The categories listed are the same as in the STANDARD PRACTICE FOR THE SELECTION AND APPLICATION OF MARINE DECK COVERING MANUAL, and by using the information in each product sheet, the specification writer has all the technical and application information required for inclusion in the specifications.

## MARINE DECK/SPEC SPECIFICATIONS

### STANDARD SPECIFICATIONS

#### Specifier Notes

#### 1. DESCRIPTION

##### A. Scope of Work

Furnish material, labor and equipment to install decking system and cove base, where stated, as described in this specification, shown in the habitability compartment schedule and included in ships construction drawings.

List type material for each compartment in habitability compartment schedule

##### B. Site Conditions

Shipyard is to supply to contractor installer, at no charge:

Power, light, heat, ventilation, water, timely hoisting of tools and materials, compartments free of debris and equipment so installation work schedule can be maintained.

Include conditions in contract

Deck temperature to be maintained at 60° F. 24 hours before, all during and 24 hours after installation is completed.

Sufficient storage area, heated to a minimum of 50° F. and capable of being securely locked.

##### C. Work Coordination

The decking contractor, all other contractors and personnel of the ship builder must coordinate their work functions to provide integrated productivity and on-time delivery.

Important to meet milestone in schedule

##### D. Qualification of Products

Materials approved for installation must be from a manufacturer who has been compounding and supplying approved decking materials that have been installed on commercial and naval ships and/or off shore drill rigs, for a minimum of 5 years.

Require qualified supplier to marine industry

The manufacturer's published material safety data sheet must be furnished by the decking contractor to the ship builder prior to starting the installation.

product safety is mandatory

Material to be installed must meet all the physical properties and approvals set forth in this specification. Alternate products will only be considered if samples and full technical data are submitted to specifier a minimum of two weeks prior to published bid date.

E. Qualification of Installer

Installer must work regularly installing marine decking materials having a minimum of 3 years experience and must be an approved installer certified by the manufacturer of the decking materials.

Important to have a qualified installer

F. Scope of Bid

Products installed must be the brand and quality stated in specifications.

Selected contractor must submit 2 sets of published documents supplied by manufacturer for each product, manufacturer's current published application instructions, samples measuring 4" x 4" in size and a color selector, showing range of available colors.

Submittals required

G. Delivery, Storage and Mixing Materials

Materials must be stored in a protected area with temperatures maintained between 50° and 90° F.

Materials must be delivered in factory sealed containers with manufacturer's labels intact.

Materials must be opened and mixed in designated areas.

Protected and heated storage important to success of decking installation

H. Protection of Work

As each compartment is completed, the installer and authorized representative of the ship builder shall inspect and accept or reject completed work.

All accepted compartments shall be protected from abuse and/or damage by the ship builder.

Protection responsibility of completed work

I. warranty

Contractor guarantees for one year that product supplied meets published specifications, subject to standard tolerances and variations, and is installed in accordance with manufacturer's instructions.

Contractor responsible for guarantee of installation and materials

2. DECK PREPARATION

Installer is responsible for preparation of decks to receive finished decking material as set forth herein.

Specifier to select the preparation method preferred Refer to Deck Preparation Section in this Manual.

A. Preparation Procedure

- (1) Sand blasting
- (2) Power shot blasting
- (3) Power sanding
- (4) Power wire brushing

Specifier may defer to decking contractor and/or ship builder for selection of deck preparation method, unless method is mandated by specification requirements or material manufacture & installation procedures

B. Cleaning Deck Surface

- (1) Steel
- (2) Aluminum and stainless steel

C. Primer Protective Coatings

- (1) Inorganic zinc
- (2) Zinc chromate
- (3) Navy 150 primer
- (4) Epoxy primer
- (5) Preparation for aluminum and stainless steel

D. Removal of Existing Deck Covering

- (1) Resilient deck covering
- (2) Composition decking
- (3) Terrazzo and hard surface decking
- (4) Non-skid decking
- (5) Carpeting

E. Other Deck Preparation

- (1) Treatment of welds
- (2) Solvent cleaning of decks
- (3) Priming newly prepared decks
- (4) Overlaying existing decking

F. Safety Procedures

# MARINE DECK/SPEC SPECIFICATIONS

## VARIABLE SPECIFICATIONS

3. PRODUCTS SPECIFIED	Specifier Notes	
A. Description		
Products listed are approved for installation, by a qualified installer, on the decks of the vessel or drill rig being bid.		
(Sample)		
Decking Category	(Latex Mastic)	Obtain from category list in this section.
Sub-Heading	(Underlayment)	List all products and categories specified
Product Type	<b>(Type I)</b>	
Description	(Mixture of inorganic powders and binder to produce a lightweight flexible underlayment)	Obtain from individual product data sheets. Include specification number where applicable
B. Trade Name and Manufacturer		
	(Foranaft Selby, Battersby & Co.)	Obtain from individual product data sheet
	(Subkote #1 Crossfield Products)	
C. Physical Properties		
All decking materials proposed for installation on this job must meet, or exceed, the physical properties listed when tested in accordance with referenced standards.		Insert physical properties listed on individual product data sheet
4. APPLICATION METHODS		
A. Mixing		Insist application instructions be followed
When mixing powders and liquids always mix the liquid portion first then slowly add the powder to the liquid until uniform mixture is obtained.		
B. Application Steps		Refer to application methods on individual product data sheets
Installer must submit the manufacturer's current published application instructions when samples, physical properties and technical data sheets are submitted for approval.		
C. curing		Follow recommended time for each system
Traffic should be excluded from area until decking material cures or dries, which varies from product to product, but normally is from overnight to 5 days.		

MARINE DECK/SPEC SPECIFICATION

PRODUCTS FOR VARIABLE PORTION OF SPECIFICATIONS

PRIMARY DECKING, INSULATION AND SPECIALTY SYSTEMS

Underlayments	Latex Mastic, Types I and II Magnesite Polymeric Resin
Insulation Decking	Decktop Insulation, Types I and II
Ammunition Holds	Ammunition Magnesite Latex Concrete
Floating/Sound Deadening	Metal Clad System Floor Panel and Spine System

FINISHED DECKING - RESIN TYPE

Solid Color	Latex and Neoprene Decking Polymeric Resin Magnesite
Decorative	Epoxy-Quartz Broadcast Epoxy-Quartz Trowel Epoxy-Flake Type Epoxy-Marble Chip Urethane-Flake Type One Step, Epoxy-Marble Chip
Ground Terrazzo	Latex and Neoprene Terrazzo Catalyst Cured Terrazzo
Weatherdeck, Recreational and Weatherproof Membrane	Neoprene Membrane Neoprene Resin Elastomeric Urethane
Weight Critical Decking	Epoxy-Flake Type Urethane-Flake Type
Non-Skid Decking	Non-Landing, High or Standard Durability Landing, High or Standard Durability General Purpose, Non-Landing and Landing Spray Applied, Non-Landing and Landing
Reefer Boxes	Latex Mastic

Deck/Spec (continued)

FINISHED DECKING - HARD SURFACE TYPES

Vitreous Tile

Ceramic Tile

Quarry Tile

FINISHED DECKING - RESILIENT MATERIALS

Resilient

Vinyl Composition

Homogenous Vinyl

Vinyl Sheet

Rubber Tile

High Dielectric -  
Electronic Spaces

Rubber Sheet

Vinyl Sheet

Portable Mats, Types II and III

Acid and Oil Resistant

Synthetic Rubber

Urethane Decking

FINISHED DECKING - CARPET

Carpet

Wool, Velvet, Class 1, 2 and 4

Nylon, Wool, Acrylic

FINISHED DECKING - WOOD

Wood

Wood Parquet and Planks

FINISHED DECKING - ACCESSORIES - TREADS

Inclined Ladder Safety Treads

Extruded Aluminum, Compound Filled

Extruded and Cast Metal

Resilient, Skid Resistant

Walkway, Stick-Down Treads

Flexible, Adhesive Backing



## INTRODUCTION TO MARINE BODIES OF INFLUENCE

The Marine Industry contains a number of bodies of influence that are directly or indirectly involved in the activities and operating functions of the industry.

The various organizations control marine regulations, the construction and classification of vessels, the operation of ships and the training of maritime personnel, construction materials, safety of life at sea and the marine environment and the health and sanitation codes of seagoing vessels.

This document addresses the general functions of a number of these important bodies and provides a brief insight of their functions and responsibilities. Full details of the governing rules and regulations of these organizations can be obtained directly from the organization.

The groups discussed in this Decking Manual (in alphabetical order) are:

American Bureau of Shipping

International Maritime Organization (IMO)

Maritime Administration (MARAD)

Shipbuilders Council of America

Society of Naval Architects and Marine Engineers (SNAME)

United States Coast Guard

United States Department of Health and Human Services

United States Navy.

Information on the various groups have come from published mission statements and articles received from the individual organizations and published in this Manual with their approval.

## MARINE BODIES OF INFLUENCE

### THE AMERICAN BUREAU OF SHIPPING

The American Bureau of Shipping is a Classification Society that “Classes vessels and maintains a Register of Shipping.”

Classification means that a vessel is built and maintained in accordance with a set of “Rules of a Classification Society,” and when found in compliance with these rules through examination by the Society, it is entered upon its Rolls as being designed and constructed for seaworthiness.

The major mission of Classification is to be certain that the ship encompasses the requirements which experience and technology show necessary for the ship to withstand the rigors of the sea when in the responsible command of people skilled in the art of seamanship and dedicated to their art.

Classification is an important function which is done internationally and vessels and rigs which receive an approval seal by a recognized Classification Society are accorded lower insurance rates than vessels that do not have an approval seal.

The American Bureau of Shipping is a non-profit organization organized under the laws of the State of New York. Income is received for the fees charged for services rendered. No revenue is received from the United States Government except for services performed for the government.

The American Bureau of Shipping performs Classification work worldwide. Approximately two-thirds of the vessels they Classify are of foreign registry and they Classify over 25% of the free world’s shipping tonnage. They are represented in 80 countries and have over 500 exclusive surveyors.

In the United States a number of the inspection responsibilities overlapped both the American Bureau of Shipping and the United States Coast Guard organizations. In the early 1970’s both groups instigated a study to reduce the duplication and develop a close relationship on inspections and accreditations. An excellent working relationship has developed that has produced beneficial results to both the shipbuilding and Merchant Marine Industries.

The American Bureau of Shipping generally is not directly involved with approvals of decking materials. Their main interest is to be assured that any deck covering used would not cause corrosion of the steel deck or structural members. If any decking system is likely to be corrosive, the steel must be insulated from the deck material by a non-corrosive protective prime coat or underlayment. The Surveyors for The American Bureau of Shipping are privileged to take samples of the material being installed and to obtain an independent analysis at the manufacturer’s expense.

## MARINE BODIES OF INFLUENCE

### INTERNATIONAL MARITIME ORGANIZATION (IMO)

In 1948 the United Nations recognized the need to establish a specialized agency whose 'main concern was to improve safety at sea. Because of the international nature of the shipping industry any **real** improvement would only come if all countries acted together rather than as individuals. This prompted the establishment of the International Maritime Organization (IMO)\* as the first international body devoted exclusively to maritime matters.

The primary objectives of IMO are the improvement of maritime safety and the prevention of marine pollution. The governing body meets every two years and consists of representation of 128 member countries and one associate member. Every member government participates on an equal basis. In the first twenty-five years thirty conventions and over 500 codes concerning maritime safety, the prevention of pollution and related matters have been adopted. Implementation is mandatory on all countries which are parties to it.

The first Conference in 1960, concerned with safety matters, adopted the International Convention of Safety of Life at Sea (SOLAS). In 1974 an improved International Convention was adopted to introduce necessary improvements. This new SOLAS Convention was put into force in 1980. Like **most** seafaring nations, the United States is a signatory to that treaty and the United States Coast Guard represents the State Department in the International Maritime Organization and is responsible for the implementation of SOLAS.

The SOLAS treaty is an international treaty dealing with maritime safety matters, including fire protection. Vessels on international voyages between countries which are signatories to the SOLAS treaty must carry a "SOLAS CERTIFICATE" issued by the country whose flag the vessel is flying, to verify that the vessel complies with its provisions. For United States flag vessels, the United States Coast Guard issues SOLAS certificates after the vessels demonstrate compliance with the provisions of SOLAS.

IMO's main concern is to ensure that all Conventions, Codes and other adopted instruments are effectively enforced and implemented. It is the member governments' ultimate responsibility for putting into effect and to control the measures adopted by IMO.

With regard to decking materials IMO has approved resolutions covering the procedures for the approval of deck coverings or primary deck coverings regarding fire resistance, as discussed in Chapter II of the International Convention for the Safety of Life at Sea (SOLAS) in 1960. Tables show where decks meeting A-60, A-30 and A-15 fire resistance ratings are required. The responsible marine authority for the country whose flag the vessel is flying will approve the decking materials.

Until May 22, 1982 the Organization was called the Inter-Governmental Maritime Consultative Organization (IMCO).

IMO (continued)

For certain areas where a fire resistance rating is not needed, SOLAS still requires approved materials. The SOLAS treaty does not usually stipulate a specific approval test, but instead references a recommended test method published in the form of an IMO Resolution. These Resolutions are not mandatory, but often adopted by countries into their own codes.

The Resolution A.214 (VII) Improved Provisions Guidelines on Test Procedures for Primary Deck Coverings is in force at the time of publication of this Decking Manual. Test is required for materials applied directly to steel plate and equals or exceeds 5 mm thickness (approximately 3/16 inch thick). The test determines if the decking material readily ignites, releases excessive smoke and/or exudes gases which are toxic and/or combustible.

The test procedures set forth in IMO Resolution A. 214 (VII), which includes tests for the ignitability of the deck covering and the smoke given off when the deck covering is heated from below, has not been used by many countries. IMO, after much consideration and evaluation, has developed a new test method, Resolution A. 687 (17), for primary deck coverings which is intended to replace Resolution A. 214 (VII) during the next revision of SOLAS.

## MARINE BODIES OF INFLUENCE

### UNITED STATES MARITIME ADMINISTRATION

#### MERCHANT MARINE ACT 1936

The purpose of this Act was to further the development and maintenance of an adequate and well-balanced American merchant marine, to promote the commerce of the United States, to aid in the national defense, to repeal certain former legislation, and for other purposes.

It is necessary for the national defense and development of its foreign and domestic commerce that the United States shall have a merchant marine

- (a) sufficient to carry its domestic water-borne commerce and a substantial portion of the water-borne export and import foreign commerce of the United States and to provide shipping service essential for maintaining the flow of such domestic and foreign water-borne commerce at all times,
- (b) capable of serving as a naval and military auxiliary in time of war or national emergency,
- (c) owned and operated under the United States flag by citizens of the United States insofar as may be practicable,
- (d) composed of the best equipped, safest and most suitable types of vessels, constructed in the United States and manned with a trained and efficient citizen personnel, and
- (e) supplemented by efficient facilities for shipbuilding and ship repair.

It is hereby declared to be the policy of the United States to foster the development and encourage the maintenance of such a merchant marine.

The Maritime Administration was created in 1950 as an Agency of the Department of Commerce to administer the Merchant Marine Act of 1936 and reaffirmed by the Act of 1970. In 1981 it became an Agency of the U. S. Department of Transportation and acts as the principal adviser to the Secretary of Transportation on developing, promoting and maintaining an American merchant marine.

The mission of MARAD is to promote and develop an efficient American merchant marine capable of serving the nation's shipping needs for domestic and international water-borne commerce and national defense.

The Maritime Administration administers various programs designed to assist and strengthen the nations maritime industry, including:

Financial assistance to U. S. flag vessel operators.

Marketing programs to help U. S. flag vessels carry more foreign trade.

MARAD (continued)

Promotion of efficient U. S. ports and advance intermodal transportation systems.

Training of skilled officers and crews to man American ships.

Participate in international activities which affect American flag shipping.

Maintenance of the National Defense Reserve Fleet and its component Ready Reserve Force (RRF) as a source of emergency shipping for the nation.

MARAD administers a War Risk Insurance program which insures operators and seamen against losses caused by hostile action if domestic commercial insurance is not available.

The agency administers programs to aid in the development, promotion and operation of the U. S. Merchant Marine. It also organizes and directs emergency merchant ship operations and administers a subsidy program through the Maritime Subsidy Board. Additionally, it provides financing guarantees for the construction, reconstruction and reconditioning of ships and enters into capital construction fund agreements which grant tax deferrals to owners of vessels on moneys to be used for the acquisition, construction or reconstruction of merchant ships.

The Maritime Administration administers subsidy programs, through the Maritime Subsidy Board, under which the Federal Government, subject to statutory limitations, pays the difference between certain costs of operating ships under the U. S. flag and foreign competitive flags on essential services, and the difference between the costs of constructing ships in the United States and foreign shipyards.

Under emergency conditions it charters Government-owned ships to U. S. operators. If additional military sealift is required, MARAD is empowered to requisition or procure ships owned by U. S. citizens and allocate them to meet defense needs.

It regulates sales to aliens and transfers to foreign registry of ships that are fully or partially owned by U. S. citizens. It also disposes of Government-owned ships found nonessential for national defense.

The American Merchant Marine and MARAD actively supported U. S. military operations in the Persian Gulf following Iraq's invasion of Kuwait on August 2, 1990. Significantly, 95% of all military equipment and supplies to support American and coalition forces in Operations Desert Shield and Desert Storm went by sea. U. S. flag vessels accounted for 80% of this cargo lift, one-fourth of which was transported by 78 Ready Reserve Force Ships activated by MARAD, and operated by 3000 experienced marine personnel assembled by U. S. seafaring unions, many who came out of retirement to provide their experience to this important operation.

The Administration operates the U.S. Merchant Marine Academy, Kings Point, New York, where young men and women are trained to become merchant marine officers, and provides training in shipboard firefighting at Earle, New Jersey, San Francisco, California, and Toledo, Ohio. It also administers a Federal assistance program for state maritime academies operated in California, Maine, Massachusetts, Michigan, New York and Texas.

## MARINE BODIES OF INFLUENCE

### THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS

The Society of Naval Architects and Marine Engineers (SNAME) is a non-profit technical and professional organization, composed of individual members, to exchange information and ideas, to disseminate the results of research and experience, to further the education in naval architecture, marine and ocean engineering important to the advancement of the art.

The Society was founded in 1893 and is incorporated in the State of New York. Its current headquarters are located in Jersey City, New Jersey. Its membership exceeds 10,000, including over 1000 student members.

In addition to the Officers, Executive and Standing Committees and Administrative Staff, the organization has seventeen very active geographic Sections with fourteen in the United States and three in Canada. These Sections hold over 100 technical meetings annually for the presentation of papers on all phases of the marine industry.

The Society of Naval Architects and Marine Engineers is very active in the publication "Transactions", "Marine Technology" Journal, Ship Research and Production Journals, Books on all aspects of the industry, Technical Bulletins and bound copies of Marine Symposiums. the Society has awarded over 800 Undergraduate and Graduate Scholarships to deserving students and actively supports Naval Education.

A major contribution to the industry is the extensive Technical and Research Programs in all phases of architectural, marine and ocean engineering actively involving over 1300 members. All of these programs are performed in cooperation with government and regulatory agencies, scientific and research laboratories, academic institutions and all phases of the marine industry.

## MARINE BODIES OF INFLUENCE

### SHIPBUILDINGS COUNCIL OF AMERICA

The Shipbuilders Council of America is an organization established in 1920 to represent America's shipbuilding and ship repair industry. This organization represents 28 shipbuilding and repair companies that employ 95% of private shipyard workers in the United States. In addition, there are 4 major naval architect firms, 15 allied industries represented and numerous associate members of this important marine group.

The Shipbuilders Council of America represents the industry to the legislative, executive and judicial branches of the United States government. It also provides economic and legal research, technical and environmental coordination, public education and export promotion.

The United States shipbuilding industry has always been a leader in naval warfare and commercial vessel technology. Safe use of nuclear power, noise attenuation silencing, streamline submarine hulls, missile system technology, the first nuclear powered warship and the NIMITZ class carrier, the most powerful weapon system in the world, are but some of the naval warfare advances pioneered in the United States.

In the commercial vessel technology the United States shipbuilding industry pioneered the containership concept, transportation of cryogenic liquids like LNG and LPG, truck trailer carrying RO/RO ships, self unloading bulk ships, barge carrying ships and deep-notch tug barges have proven their value worldwide.

American shipbuilders continue to respond to the challenges of the industry as their market shifts from building ships for the U.S. Navy to building commercial ships for the world market. These responses include special ship designs for low cost production, improved customer responsiveness and industry sharing of technological advances.

## MARINE BODIES OF INFLUENCE

### UNITED STATES COAST GUARD

The United States Coast Guard, a part of the Department of Transportation, is the agency of the Federal Government charged with regulating commercial shipping and drilling rigs. Among the missions assigned to the U. S. Coast Guard are maritime law enforcement, aids to navigation, search and rescue, maritime environmental protection, port safety and security, recreational boating safety and commercial vessel safety.

This document is mainly concerned with commercial vessel safety and the regulations for these vessels are contained in Title 46 of the Code of Federal Regulations (CFR) which is the building code for ships. United States flag vessels must demonstrate compliance with the applicable sections of Title 46 of the CFR before being issued a "Certificate of Inspection" by the Coast Guard to operate as a commercial vessel. No American vessel may depart on a voyage without having "on-board" a valid "Certificate of Inspection." The only exceptions are ships owned by the United States Government or those so small as to not be governed by U. S. Coast Guard regulations.

The USCG is involved in the approval of the design and construction of virtually every U. S. flag vessel and inspects most foreign ships entering our ports with potentially hazardous cargoes. The USCG has 12 District Offices throughout the United States and ship designers and shipyards work with these branch offices on matters concerning approval of designs and plans.

The USCG prefers to adopt industry standards wherever possible and is represented on every regular and special committee which develops these standards or rules affecting U. S. flag vessels.

### MEMBERSHIP IN INTERNATIONAL MARITIME ORGANIZATION (IMO)

The United Nations Organization established a specialized agency known as the International Maritime Organization (IMO) whose main concern was to improve maritime safety. This group adopted an International Convention of Safety of Life at Sea (SOLAS). Like most seafaring nations, the United States is a signatory to that treaty and the United States Coast Guard represents the State Department in IMO and is responsible for the implementation of SOLAS in the United States.

### SAFETY OF LIFE AT SEA (SOLAS) TREATY

The SOLAS Convention has approved resolutions covering the procedures for the approval of deck covering and/or primary deck coverings as far as fire resistance is concerned. For U. S. flag vessels and for vessels engaged in international trade "SOLAS" certificates are issued by the U. S. Coast Guard after the vessel demonstrates compliance with the provisions of SOLAS.

USCG (continued)

### CODE OF FEDERAL REGULATIONS (CFRs)

The requirements for decks to meet certain fire resistance criteria, and for deck covering materials to be Coast Guard approved are contained in the Code of Federal Regulations. Title 46 of the CFRs is divided into several subchapters, each dealing with a specific type of vessel. These Subchapters may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402 (telephone 202-783-3238) as follows:

Uninspected Vessels (Subchapter C)	46 CFR Parts	24- 26
Commercial Fishing Industry Vessels	46 CFR Part	28
Passenger Vessels (Subchapter H)	46 CFR Parts	70- 89
Tank Vessels (Subchapter D)	46 CFR Parts	30- 40
Cargo and Miscellaneous Vessels (Subchapter I)	46 CFR Parts	90- 106
Mobile Offshore Drilling Units (Subchapter I-A)	46 CFR Parts	107- 109
Nautical Schools (Subchapter R)	46 CFR Parts	166- 174
Small Passenger Vessels (Subchapter T)	46 CFR Parts	175- 187
Oceanographic Vessels (Subchapter U)	46 CFR Parts	188- 196
Equipment, Construction and Materials (Subchapter Q)	46 CFR Parts	159- 165

These regulations must be consulted to determine which decks on a specific type of vessel must have approved deck covering materials, whether the decks must meet A-60, A-30, A-15, A-O criteria, etc. Decks in some areas such as outside the accommodation areas may not need any approved structural fire protection materials.

Explanatory background information concerning the Coast Guard's structural fire protection requirements is contained in Navigation and Vessel Inspection Circular No. 6-80, which may be obtained from the Coast Guard's Marine Safety Center (telephone 202-366-6483).

#### EXEMPTION FOR FINISHING AND LEVELING MATERIALS

Coast Guard regulations permit the use of an average of 3/8 inch of unapproved materials for leveling and finishing purposes. This means that the top 3/8 inch of deck covering material need not be approved, but will also not count toward any fire resistance rating. All deck covering material, i.e., any material provided below the top 3/8 inch, such as an underlayment or insulated decking material, must be of an approved type.

#### U. S. COAST GUARD APPROVAL CATEGORIES FOR DECK COVERING

Structural fire protection materials which can be used for deck coverings are approved in one of the following approval categories:

##### DECK COVERINGS (46 CFR 164.006)

This is the traditional approval category for deck coverings which are used on decks where a fire resistance rating is required, such as A-15, A-30 or A-60. Materials which are tested to this specification are individually applied to a deck with either welded steel clips or adhesive. This test does not require non combustibility. Instead, limits on the maximum permissible heat transfer, smoke development and organic carbon

USCG (continued)

content have been established. The materials are tested in a manner representative of the actual shipboard installation, including the use of clips, mastic or other means of bonding the material to the steel deck. To date, the materials approved under this category have been oxychloride cements (magnesite).

Tests are normally conducted on a sample thick enough to provide an A-60 rating. If the deck on which the material is to be installed needs only a lesser rating such as A-15 or A-30, obviously less material is needed. Rather than conducting additional tests to determine the minimum thickness of material needed for an A-15 or A-30 rating, manufacturers make use of the following Coast Guard acceptance criteria:

For an A-30 deck the Coast Guard will accept material which is at least 3/4 times as thick as the same material which met A-60 criteria.

For an A-15 deck the Coast Guard will accept material which is at least 1/2 times as thick as the same material which met A-60 criteria.

#### A-60 FLOATING FLOOR DECK ASSEMBLES (46 CFR 164.005)

Another, relatively new trend in ship deck construction is to use modular systems such as floating floors to reduce the transmission of noise and vibrations. These typically consist of layers of mineral wool or mineral wool panel sections with a hard top such as steel or calcium silicate panels. The Coast Guard has established a new approval category under 46 CFR 164.005, although the corresponding test has not yet been incorporated into the CFRs. Approval requirements include noncombustibility, and a fire test in accordance with IMO Resolution A-517(13). The deck assembly must meet temperature limitation and smoke and flame penetration requirements.

Because of the uniqueness of each design there are no comparable reduction factors for determining the thicknesses of A-15 and A-30 deck assemblies. Fire tests are necessary if an A-15 or A-30 deck assembly of lesser thickness than that tested for an A-60 rating is desired.

#### NONCOMBUSTIBLE MATERIALS (46 CFR 164.009)

Although not necessarily intended for decks, noncombustible materials may be used on a deck where approved deck covering materials are required, but where the decks do not need to meet A-15, A-30 or A-60 fire resistance criteria.

#### RUGS AND CARPETS

Although sometimes called "deck coverings," rugs and carpets are considered furnishing (like drapes and furniture) by the CFRs rather than structural fire protection materials. They are, therefore, not counted as part of the deck covering, and cannot be used to make decks fire resistant. In specific locations aboard passenger vessels, they must meet separate flame spread and smoke development limitations.

#### CERTIFICATES OF APPROVAL AND EQUIPMENT LISTS

Manufacturers of deck covering materials which meet Coast Guard requirements for a particular category of material are issued a certificate, valid for five years, as proof that the material meets Coast Guard requirements. This information is also published in the next edition of the Coast Guard's Equipment Lists (COMDTINST M16714.3).

USCG (continued)

## FOREIGN FLAG VESSELS

Foreign flag vessels visiting U. S. ports do not need to have U.S. Coast Guard approved deck covering materials. Instead, the vessel must have a SOLAS certificate; issued by the country whose flag it is flying. This certificate is intended to show that the vessel meets the provisions of the SOLAS treaty.

The SOLAS treaty contains tables which show where decks meeting A-60, A-30 and A-15 fire resistance ratings are required. The responsible marine authority for the country whose flag the vessel is flying will approve the decking materials.

For certain areas where a fire resistance rating is not needed, SOLAS still requires approved materials. The SOLAS treaty does not usually stipulate a specific approval test, but instead references a recommended test method published in the form of an IMO Resolution. These Resolutions are not mandatory, but are often adopted by various countries into their own national codes.

For primary deck coverings SOLAS recommends IMO Resolution A.214(VII) as an approval test method. This test, which tests for the ignitability of the deck covering and smoke given off when the deck covering is heated from below, has not been used by many countries. IMO has, therefore, developed a new test method (Resolution A. 687(17) for primary deck coverings which is intended to replace Resolution A.214(VII) during the next revision of SOLAS.

## MARINE BODIES OF INFLUENCE

### THE UNITED STATES NAVY

#### Founding of the United States Navy

The United States Navy was founded on October 13, 1775, when Congress enacted the first legislation creating the Continental Navy of the American Revolution. The Department of the Navy and the Office of Secretary of the Navy were established by the Act of April 30, 1798.

The National Security Act Amendments of 1949 established the Department of Defense as an executive department of the Federal Government, and provided that the Department of the Navy be a military department within the Department of Defense.

#### Secretary of the Navy

The Secretary of the Navy is appointed by the President as the head of the Department of the Navy. Under the direction, authority and control of the Secretary of Defense, the Secretary of the Navy is responsible for the policies and control of the Department of the Navy, including its organization, administration, functioning and efficiency. The members of the Secretary's executive administration assist in the discharge of the responsibilities of the Secretary of the Navy.

#### Mission of the United States Navy

The primary mission of the Department of the Navy is to protect the United States as directed by the President or the Secretary of Defense, by the effective prosecution of war at sea including, with its Marine Corps component, the seizure or defense of advanced naval bases; to support, as required, the forces of all military departments of the United States; and to maintain freedom of the seas.

The U.S. Navy is to be prepared to conduct prompt and sustained combat operations at sea in support of U.S. national interests; in effect, to assure continued maritime superiority for the United States. This means that the U.S. Navy must be able to defeat, in the aggregate, potential threats to continued free use of the high seas by the United States. In its simplest terms, defeating the maritime threat means destruction of hostile aircraft, surface ships and submarines which threaten the seaborne forces of the United States and its allies.

#### Implementation

The Navy carries out its mission within the framework of a national strategy, in joint coordination with the other Services and in combined planning with U.S. allies. U.S. naval force requirements cannot be regarded in isolation from U.S. foreign policy, domestic considerations and the force requirements and capabilities of the other Services and selected allies.

USN (continued)

## Functions of the United States Navy

In order to achieve the basic military objectives of the United States, the respective Services are tasked with specific primary and collateral functions by Department of Defense Directive 5100.1. The Department of the Navy is tasked:

To organize, train and equip Navy forces for the conduct of prompt and sustained combat operations at sea, including operations of sea-based aircraft and land-based naval air components - specifically, forces to seek out and destroy enemy naval forces, and to suppress enemy sea commerce, to gain and maintain general naval supremacy, to control vital sea areas and to protect vital sea lines of communication, to establish and maintain local superiority (including air) in an area of naval operations, to seize and defend advanced naval bases, and to conduct such land and air operations as may be essential to the prosecution of a naval campaign.

Briefly, the Navy's two basic functions are sea control and power projection. Sea control is achieved by the engagement and destruction of hostile aircraft, ships and submarines at sea, or by the deterrence of hostile action through the threat of destruction. Sea control is a requirement for most naval operations. It is required so that the U.S. Navy may have operating areas that are secure for the projection of power, such as carrier strike or amphibious assault, and sea lines of communication that assure buildup and resupply of allied forces in the theater of operations and free flow of strategic resources. Effective sea control also enhances security for the nation's sea-based strategic deterrent.

## Naval Ship Construction and Repairs

The parameters of 'this Deck Covering Manual relate to naval vessels and support vessels, both in new construction and repair work.

New ships are generally designed by naval architects, approved by the Navy, and built to Navy specifications.

Repair work plans and specifications are the responsibility of the Supervisor of Shipbuilding.

There is a Supervisor of Shipbuilding for each Naval District and if a shipyard has a large building program, a Supervisor could be assigned to that specific shipyard. It is the Supervisor of Shipbuilding's responsibility to determine that every ship is built to Navy standards and to approve and accept the completed work.

Naval Ship Engineering Command (NAVSEC) is responsible for writing the specifications for materials to be installed on a ship and is responsible for the habitability areas such as deck covering, bulkheads, furniture and so forth.

Naval Sea Systems Command (NAVSEA) is involved with materials that go on the Navy ships and the approval of the materials under MIL specifications and the placement on the "Qualified Products List."

### Qualification and Qualified Products List

Qualification is the testing of products for compliance with the requirements of a specification prior to and independent of purchasing action. The qualification procedure prevents delay in delivery of items under contract which might be caused by problems in design or composition, or by time-consuming tests required to prove that the specification requirements can be met.

To assure continuous availability of products in such cases, qualification of specific products or a family of products is required prior to opening of bids or the award of negotiated contracts. Criteria for retention of qualification are applied on a periodic basis. Testing of a product for compliance with the requirements of a specification in advance of, and independent of any specific acquisition, is known as qualification testing. To establish a Qualified Products List (QPL), an approved and dated military or Federal specification must exist which requires qualification and sets forth the qualification examination and tests and criteria for retention.

The fact that a product has been examined and tested and placed upon a QPL signifies only that at the time of examination and test the manufacturer could make a product which met specification requirements. Inclusion on a QPL does not in any way relieve the manufacturer or distributor of his contractual obligation to deliver items meeting all specification requirements.

The major benefit of the Qualified Products List is to assure the shipbuilder and owner of products that perform in accordance to Navy proven performance standards. Some few items, used in Naval shipbuilding, are not required to have to be tested and listed on the QPL. These products must meet criteria of certain specific tests and manufacturer is required to submit a certificate that these conditions are met.

This Deck Covering Manual includes QPL and Department of Defense specifications where listed for specific decking systems. Over a period of time some of these can change so users of this Manual need to become aware of these changes or cancellations and act on them accordingly.

## MARINE BODIES OF INFLUENCE

### UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES

#### CENTERS FOR DISEASE CONTROL

##### National Center for Prevention Services

The United States Department of Health and Human Services is a member of the World Health Organization and has accepted the International Health Regulations of that organization. The two major functions of this organization having direct impact on the shipbuilding and rig building industries are:

Division of Quarantine  
Vessel Sanitation Program

##### Division of Quarantine

Each country shall employ all means in its power to diminish the danger from the spread of plague by rodents and their ectoparasites and shall keep itself constantly informed of the conditions in any area, especially any port infected or suspected of being infected by rodent plague. If the port has been designated under the health authority, it may derat the ship or cause the deratting to be done under its direction and control should this condition be found. Deratting shall be carried out so as to avoid as far as possible damage to the ship and to any cargo and shall not take longer than is absolutely necessary. Wherever possible, deratting shall be done when the holds are empty.

On arrival of a ship having on board a person suffering from pulmonary plague, the health authority may place the passengers and crew of the ship in isolation for a period of six days, reckoned from the date of the last exposure to infection.

International Regulations require each Health Administration to maintain a sufficient number of ports in its territory with adequate personnel competent to inspect ships for the issue of deratting and deratting exemption certificates.

In industrialized countries, sanitarians, health inspectors or equivalent personnel are normally employed for the purposes of general ship inspection and for the supervision of inspection in connection with the issue of deratting and deratting exemption certificates. Such persons are public health trained and have a knowledge of the problems which can be caused by rodents, factors which will influence their presence on ships and the ecology and habits of rodents and the evidence which their infestations present. The training also comprises knowledge of ship design and structure, likely harbourage points for rodents in ships and the problems which can be caused by their presence. A comprehensive knowledge of the construction of port buildings, wharves, dock areas, terminals for storage of bulk foods such as grain and animal feeding stuffs is necessary.

In the United States the Division of Quarantine is the health unit responsible for issuing deratting and deratting exemption certificates. The Division of Quarantine does not perform deratting procedures. Pest infestation and fumigation work are normally carried out by specialist contracting companies who are able to perform the specialized procedures involved to the satisfaction of the port health authority. Vessels (usually not less than 100 gross tons) proceeding to foreign ports and including fishing vessels, require the renewal of deratting or deratting exemption certificates at six monthly intervals.

Dept. Health (continued)

## Vessel Sanitation Program

The Vessel Sanitation Program (VSP) is a cooperative activity between the cruise ship industry and the Centers for Disease Control (CDC), Public Health Service, U.S. Department of Health and Human Services. The purpose and goals of the VSP are to achieve and maintain a level of sanitation that will lower the risk of gastrointestinal disease outbreaks and assist the passenger line industry in its effort to provide a healthful environment for passengers and crew.

The Vessel Sanitation Program is based on the inspection guidelines set forth in Centers for Disease Control's VSP Operations Manual, the World Health Organization (WHO) "Guide to Ship Sanitation," the 1976 edition of the Food and Drug Administration's "Food Service Sanitation Manual," and the National Sanitation Foundation (NSF) "Food Service Equipment Standards."

The aggressive efforts to maintain high standards of shipboard sanitation are critical to VSP's success. CDC's functions include technical assistance, consultation, unannounced twice yearly inspections and, when necessary, reinspections of all vessels in the VSP. The VSP combines the commitment of private industry with government oversight to ensure that ships meet the highest sanitary standards for the protection of the traveling public.

Although cooperation with the Vessel Sanitation Program is voluntary for carriers, the Public Health Service (PHS) is authorized to take measures necessary to prevent the introduction, transmission or spread of communicable diseases in the United States from a foreign country. Regulations to carry out this duty authorize the PHS to conduct regular sanitary inspections of carriers traveling to a U.S. port from a foreign area. This inspection is conducted to determine the existence of vermin, contaminated food or water or other unsanitary conditions that may contribute to the introduction, spread or transmission of communicable disease.

The Vessel Sanitation Program requires participants to report any diarrhea illness on board the ship. A record must be maintained, the Master of the Ship must notify the quarantine station 24 hours prior to arrival, and with this information the Center for Disease Control will decide if the condition requires a field investigation.

## Inspection of Vessels

The Periodic unannounced inspection are full inspections of all phases of the ship and its operation to maintain safe, sanitary conditions aboard ship, and include:

- Water and food sanitation
- Personnel - must be free of infections and communicable disease
- Equipment, warewashing and facilities
- Solid and liquid waste disposal
- Toilet and handwashing facilities
- Pest control, toxic substances and miscellaneous items.

A strict scoring system is maintained on each item and the vessel must receive a total of 86 points out of 100 to pass the inspection. Vessels are given the opportunity to correct any deficiencies and to have them noted in the Summary of Sanitation Inspections of International Cruise Ships which is available for public information.



# MARINE DECK PREPARATION

## CONTENTS

	<b>Page</b>
1. GENERAL INFORMATION	62
2. TOOLS USED IN DECK PREPARATION	62
A. Abrasive Blasting	62
(1) Sand Blasting	62
(2) Power Shot Blasting	62
B. Power Tool Cleaning	63
(1) Power Sanding	63
(2) Power Wire Brushing	63
C. Specialized Cleaning Equipment	63
(1) Rockwell Deck Crawlers RN-727	63
(2) Needle Guns	63
(3) Knuckle Buster	63
3. CLEANING THE DECK SURFACE	63
A. Steel	63
(1) New construction	63
(2) Rehabilitation Work	64
(a) Unpainted Decks	64
(b) Painted Decks	64
B. Aluminum and Stainless Steel	64
(1) New Construction	64
(2) Rehabilitation Work	6 4
(a) Unprotected Deck	64
(b) Painted or Deck Covering	65
4. PRIMER PROTECTIVE COATINGS	65
A. Inorganic Zinc	65
B. Zinc Chromate Primer	66
C. Navy 150 Primer	66
D. Epoxy Primer	66
E. Red Lead Primer	67
F. Preparation for Aluminum and Stainless Steel	67

Deck Preparation (continued)

	Page
5. REMOVAL OF EXISTING DECK COVERING FOR REHABILITATION WORK	67
A. Resilient Decking Materials	67
(1) Non-Asbestos Containing Material	67
(2) Asbestos Containing Resilient Decking	67
B. Composition Decking Systems	67
C. Terrazzo and Hard Surface Decking	68
(1) Terrazzo	68
(2) Hard Surface Decking	68
D. Non-Skid Decking	68
E. Carpeting	69
6. OTHER DECK PREPARATION PROCEDURES	69
A. Treatment of Welds	69
B. Solvent Cleaning of Decks	69
C. Priming Sub-Decks for Finished Decking Systems	70
D. Overlaying New Decking on Existing Decking System	70
7. SAFETY PROCEDURES	70

## MARINE DECK PREPARATION

### 1. GENERAL INFORMATION

Proper deck preparation assures a successful installation. Poor deck preparation assures a failure of the decking system.

It is sound installation practice to remove all rust, mill scale, paint, grease, oil, dirt and any other extraneous matter.

Most specifications state that decks should be cleaned and prepared in accordance with Steel Structures Painting Council (SSPC) SP-3 Standards.

Steel decks, depending on deck covering to be used, should be prepared to the standard of clean steel to bright metal.

Aluminum and Stainless Steel should be wiped with solvent to **remove** the oily surface film, be abraded with Open Coat Aluminum Oxide #24 or nylon sanding pads and primed with decking material recommended by the manufacturer.

### 2. TOOLS USED IN DECK PREPARATION

#### A. Abrasive Blasting

##### (1) Sand Blasting

This method is more commonly known as sand blasting and is generally done by Shipyard personnel. Often this work, in new construction, is done at the "Wheel Abrader" location prior to erection on the vessel.

A reference for this work is the Society of Naval Architects T&R Bulletin 4-9, entitled "Abrasive Blasting Guide for Aged or Coated Steel Surfaces."

##### (2) Power Shot Blasting

In confined areas and on shipboard locations sand blasting creates too much dust and contamination hazards. A more efficient **system** is the Power Shot Blasting system which is a self contained unit that recaptures the debris after the metal shot impacts the surface and breaks loose rust, paint, non-skid decking and finished decking **systems**. The profile created by this system provides an excellent surface on which the new decking system will be applied. Size of shot blast equipment dictates areas wherein this equipment can be used.

## Deck Preparation (continued)

### B. Power Tool Cleaning

#### (1) Power Sanding

Power driven rotating disc, reciprocating or belt driven sanders with an abrasive surface are used to remove rust, paint, welding excess and decking material. Various coarsenesses of stones, discs or sanding paper may be selected depending on surface to be removed. Open Coat Aluminum Oxide S24 Grit sanding paper is widely used in deck preparation work. Be certain grinders have a safety stone guard.

#### (2) Power Wire Brushing

Uses a power driven rotary radial or cup steel wire brushes to clean the surface. This system is only used when other systems are not available or when only light removal is required. A disadvantage lies in the wire brush polishing the steel deck rather than cleaning it and leaving a dense surface hard to adhere to.

### C. Specialized Cleaning Equipment

#### (1) Rockwell Deck Crawlers RN-727

This unit is available in an electric or air driven type and is used to **remove** the residue of adhesive or priming material left on the deck-from other sanders or grinders.

#### (2) Needle Guns

This equipment is generally air operated and propels a number of hardened needles on the surface to clean in comers, close to the bulkheads, in pitted steel with rust or dirt or around obstructions that cannot be moved.

#### (3) Knuckle Buster

An air driven piece of equipment that generally has three hardened pistons that impact on the deck and allows cleaning in close spaces that other equipment cannot enter.

## 3. CLEANING THE DECK SURFACE

### A. Steel

#### (1) New construction

Steel surface to be prepared by removal of mill scale, rust, preconstruction primers, oil, grease and other extraneous **matter**, as discussed previously.

## Deck Preparation (continued)

Surface should be power cleaned to clean or bright steel. All loose paint or paint with marginal adhesion must be removed.

Grind welds to bright metal surface, 1/16 inch or less above the steel deck, or "fair out the welds" using an underlayment.

Shop coat primers should be applied thin, no more than 3' to 4 mils, and generally should be mechanically removed before decking is applied. Thick coatings can lose bond and cause adhesion failure of decking material.

### (2) Rehabilitation Work

#### (a) Unpainted Decks

Surface must be thoroughly abraded to remove rust and oxidation prior to installing any decking material.

#### (b) Painted Decks

Paint to be abraded to clean steel **or** bright metal.

## B. Aluminum and Stainless Steel

### (1) New Construction

Remove oxidation, protective oils and other surface debris by mechanically abrading the surface with a Nylon Sanding Pad or Open Coat Aluminum Oxide #24 sanding paper and one of the previously discussed power cleaning systems.

Oils or grease can be removed using the Solvent Cleaning systems as described in Item 6 "Other Deck Preparation Procedures."

Caution: Never allow steel and aluminum surfaces to come in direct contact as an electrolytic action will take place. Always place an insulating material or a 1/8 to 1/4 inch application of a troweled composition material between the steel and aluminum.

### (2) Rehabilitation Work

#### (a) Unprotected Deck

Aluminum decks are seldom left uncovered. In cases where this occurs, oxidation must be removed by abrading the surface as recommended previously.

## Deck Preparation (continued)

### (b) Painted or Deck Covering

Remove the paint by sanding.

Remove deck covering, adhesive or primer by one of the abrasion methods previously discussed. Abraded surface to obtain a profile sufficient to accept new decking system.

## 4. PRIMER PROTECTIVE COATINGS

A number of protective coatings are in use to reduce oxidation and corrosion while metal is in storage or during various phases of construction.

While many decking materials will adhere to protective coatings, most manufacturers will not guarantee an installation over these coatings because of the potential adhesion failure of the coating to the deck or intercoat adhesion failure between the decking and coating. It is recommended, in most situations, to remove the protective coating before installing the decking material.

### A. Inorganic Zinc

This protective coating is a preconstruction primer that is generally applied over steel at the Wheel Abrader or Sand Blast Unit to protect the metal surface during construction.

The application thickness **is** most important to assure good adhesion and maximum corrosion protection. It is generally installed around 0.9 mils up to 2.5 mils. If applied 3 mils thick, it can lose adhesion, can get powdery and in some drying conditions small fissure cracks will **occur**.

If the Inorganic Zinc is applied 3 mils or greater in thickness, the surface should be re-sand blasted and recoated to the proper thickness. A second application of Inorganic Zinc must never be applied until the first coat has been removed by sand blasting.

When small fissures occur, it generally does not interfere with the adhesion qualities of the primer to the deck.

The Inorganic Zinc Coating can be solvent washed at any time it is required. Some deck coverings such as Mastic Underlayments and Solid Color monolithic systems can be installed directly over Inorganic Zinc, provided it is lightly sanded, but to be safe it is generally best to remove the protective coating.

If the finished decking is an elastomeric urethane or an epoxy system going over the soft Inorganic Zinc, the protective primer must be completely removed down to bright metal. If Inorganic Zinc on the steel is over a year old, it generally has exceeded its protective life and should be totally removed.

## Deck Preparation (continued)

### B. Zinc Chromate Primer

This primer is also applied prior to construction to protect the steel from oxidation and corrosion. The material is generally installed 1 to 2 mils thick.

Prior to installing the finished decking, sand the Zinc Chromate Primer and get as close to bright metal as possible. Trade practice requires the complete removal of at least 50% down to bright metal, and the part that remains is considered part of the steel deck. Material is generally sanded with Open Face, Aluminum Oxide 31/2 Grit Paper.

Finished decking should not be installed on Zinc Chromate Primer less than 6 months old or more than 1 year old. Primer should be removed in both cases.

### C. Navy 150 Primer

The 150 Primer provides very good protection against rust and oxidation. It can only be applied over steel that has been abraded to bright metal.

Specifications allow the 150 Primer to be installed from 2 to 4 mils thick. Contractor experience has shown better results are obtained if maximum thickness does not exceed 3mils.

If 150 Primer is applied over a dirty deck, it will have poor adhesion. If applied too thick, a false cure can occur and primer will delaminate from the deck.

If 150 Primer is installed properly, it will have excellent adhesion and many Specialty Resin Decking Systems can be installed directly over the Primer.

### D. Epoxy Primer

Epoxy Primers are generally installed on ship parts during construction of the ship. Material should be applied 2 to 3 mils thick maximum to bright metal surface that has been solvent washed. If Epoxy Primer is applied too thick, the adhesion to the deck will be poor.

Apply only one coat of primer. Multiple Coats and/or "Tie" Coats should not be used as delamination is possible.

If the Epoxy Primer has been on the deck surface for a year or longer, it must be removed. If old Epoxy Primer is overlaid with a decking system, poor adhesion can result.

Primer should dry a minimum of 48 hours before installing the decking-system. Solvent wash the primer before installing the deck system.

Caution: Some epoxy materials have an oily appearance on the surface. This is known as an "Amine Blush" and is generally caused by excess curing agent rising to the top. Remove by sanding or solvent washing before covering with finished decking.

## Deck Preparation (continued)

### E. Red Lead Primer

This Primer is not used very much because OSHA regulations oppose its use in shipboard construction.

If any surface to receive decking material is primed with Red Lead, remove primer before installing decking material.

### F. Preparation for Aluminum and Stainless Steel

Sand surface thoroughly using a Nylon pad or Open Coat, Aluminum Oxide resin bonded #24 grit paper.

Install a neoprene chemical bonding system approximately 1/8 to 1/4 inch thick or a Neoprene underlayment 1/4 inch thick. Apply in a fluid mix and pass corn broom over the surface to provide a rough profile for better adhesion by the finished deck material.

In some Wheel Houses the aluminum is very light gauge which creates an adhesion problem for the decking material. In these areas install both the neoprene bonding system and the neoprene underlayment to a minimum thickness of 1/4 inch.

## 5. REMOVAL OF EXISTING DECK COVERING FOR REHABILITATION WORK

### A. Resilient Decking Materials

#### (1) Non-Asbestos Containing Material

Resilient materials are generally removed and not overlaid. These materials can be removed by using long handled ice scrapers, by heating material to soften it or with hammer and wide blade chisels.

Adhesive remaining on the deck can be removed by the use of grinding equipment or in large areas by use of Power Shot Blasting, as discussed in Section 2.A.(2) of Marine Deck Preparation.

#### (2) Asbestos Containing Resilient Decking

Vinyl Asbestos Tile, Asphalt Tile and Saturated Asbestos Felt Paper all contain asbestos and require specially trained personnel and procedures for removal, and should not be removed by inexperienced or untrained personnel.

### B. Composition Decking Systems

If these systems are tightly adhered to the decking surface, they are often left in place and new decking, of various types, can be applied over them. In these situations the surface is cleaned, patched where needed, abraded and the new deck material installed.

## Deck Preparation (continued)

If the decking material is to be removed, it can be done with the use of chipping guns, Power Shot Blasting methods or with a hammer and chisel. Any priming residue that remains can be removed by the use of Power Sanding or Grinding. Steel should be abraded until it attains a clean steel or bright metal appearance as may be required for the installation of the new material.

### C. Terrazzo and Hard Surface Decking

#### (1) Terrazzo

If the terrazzo material is tightly bonded to the deck, it can be rehabilitated by filling in cracks, grouting and regrinding the terrazzo surface.

If the surface condition is too unsatisfactory to rehabilitate, a new decking material can be overlaid. The terrazzo surface should be checked for positive adhesion in all areas. If adhesion is poor in some minor areas, the terrazzo can be removed, a patching underlayment installed, the entire surface thoroughly abraded and the new material installed over the existing terrazzo.

If the terrazzo needs to be removed, use the same methods described in Section 5. B. "Composition Decking Systems."

#### (2) Hard Surface Decking

These systems generally consist of Ceramic Tile and Quarry Tile decking materials. All surfaces must be thoroughly examined to be certain tiles are tightly bonded and the setting bed and grout joints are in an acceptable condition if an overlay is to be installed.

To install an overlay, the tile surfaces must be vigorously abraded using power sanding or grinding equipment. Remove all grinding debris and clean surface by solvent washing. Trowel apply an underlayment to level the tooled joints to the surface of the tiles. A resilient composition or terrazzo decking system can be installed.

If the Hard Surface Decking material must be removed, use the methods set forth in Section 5 B "Composition Decking Systems."

### D. Non-Skid Decking

These systems are generally installed on the flight decks of aircraft carriers and special exterior deck areas where high, non-slip traction is required. These materials have very high adhesion characteristics and are hard to abrade because of the hard, coarse aggregate in the formulation. The most successful removal method is with the use of a Power Shot Blasting machine that both removes the material and provides a sufficient profile on the deck for the installation of the new non-skid material.

## Deck Preparation (continued)

The removal can be done in selected areas with new Non-Skid material being installed on the area that is removed and overlapping the sound area that was not removed. Where required, the entire Non-Skid installation can be removed and replaced.

Because of the high rate of corrosion on the cleaned, exterior surface, the deck should have a primer coat of Non-Skid material applied as quickly as the Non-Skid material is removed and the deck is properly abraded and cleaned.

### E. Carpeting

Most carpets are installed in the marine industry by the use of special adhesives which hold the carpet tightly to the deck.

Carpet can be removed by the use of long handled ice scrapers or by hammer and wide blade chisels. Once the surface is broken, the carpet can generally be pulled up by hand.

Carpets that are so tightly bonded to the steel deck that they must be removed by the use of power equipment are generally removed by the use of a Tennant Machine having many sharp tooth blades that cut the carpet into narrow strips making it easier to remove.

The remaining adhesive is removed by Power Sanding or Grinding providing a clean steel or bright metal surface over which the new decking material is installed.

## 6. OTHER DECK PREPARATION PROCEDURES

### A. Treatment of Welds

When resilient material or carpet is to be installed, the welds must be ground down 1/16 inch to flush to the deck surface, whichever is stated in the specifications.

To reduce installation cost, the dirt created by this operation and eliminate the time involved in grinding, most shipyards "fair the deck welds" with an application of an approved underlayment 1/4 inch thick. It is important to have sufficient thickness of underlayment over the highest point of the welds so no visible ridge is seen.

### B. Solvent Cleaning of Decks

Sanding dust or residue, oily and dirty surfaces are often cleaned by solvent wiping. Failure to remove these contaminants can cause adhesion failure of the finished decking material.

The procedures set forth in the Steel Structures Painting Council (SSPC) Specification SP 1-63 "Solvent Cleaning" should be followed.

## Deck Preparation (continued)

The cleaning should be done by the Decking Contractor so cleaning can be under the same responsibility as the deck installation.

Caution: The rags used must be changed continuously, otherwise the dirty cloths will contaminate the decks rather than clean them.

Solvents must be selected carefully to avoid leaving a greasy film which can develop from some petrochemical type solvents.

### C. Priming Sub-Decks for Finished Decking Systems

Immediately after the sub-decks have been cleaned, apply the recommended primer of the decking manufacturer to reduce "flash" rust build up from occurring.

A cleaned deck should never remain unprimed for longer than overnight and preferably it should be primed the day the cleaning is completed. If contractor is not prepared to do the full decking installation, immediately after deck has been cleaned, a primer, as recommended, should be applied to provide some protection. Before installing finished decking, install a second prime coat.

### D. Overlaying New Decking on Existing Decking System

If existing decking such as composition decking, terrazzo or hard surface tile is to be overlaid, the existing decking material should be carefully checked for adhesion to the subdeck surface. Remove any loose material and reinstall the tile or fill in the removed area with an approved underlayment.

Surface should be abraded and/or washed clean with water and a free rinsing detergent. Allow surface to dry and install decking in accordance with manufacturer's instructions.

## 7. SAFETY PROCEDURES

Most deck covering materials have some kind of potential safety hazard during installation and it is the responsibility of the Shipyard and the Contractor Installer to be fully aware of these hazards and to take the necessary precautions to reduce and control them.

The Contractor and the Shipyard must maintain a file of Material Safety Data Sheets on all products being used in a decking installation and these must be readily available to all working at the job site.

The Contractor and the Shipyard are responsible for compliance with all safety standards mandated by OSHA, SARA and the Shipyard's own standards.

Workers employed by the Shipyard and the Contractor must receive training in the Standards and Safe Practice Work Rules. They must continually be made

## Deck Preparation (continued)

aware of new and changed standards, be aware of any hazardous ingredients in the products being installed and must be supplied with approved safety equipment.

Materials approved for installation should be from manufacturers who fully comply with OSHA and SARA Standards. Labels with full warnings are to be placed on containers and products and workers must be trained on how to read and understand the warnings on these labels.

### Volatile Flammable Solvents

Products such as polyesters, polyurethanes, epoxies, non-skid systems and other liquid resins often contain volatile and flammable solvents that can cause fires, explosions and/or toxic vapors that affect the human body.

Adhesive used for resilient flooring materials, carpet, high dielectric strength flooring and acid resistant flooring also can cause similar hazards.

When installing any of these products, the warnings and safety recommendations of the manufacturers must be strictly followed. Important cautions to follow:

- Forced air ventilation should be provided and warning signs properly posted.

- No open flames, welding **or** smoking when mixing or installing.

- Store at recommended temperatures and carefully mix products.

- Continuous fire watch for products that require these precautions.

### **Equipment**

Equipment that must be made available and be put into use by the installers, where recommended, include

- Properly fitted full or half-mask respirators for each installer.

- Gloves that prevent chemical penetration into skin of the installers.

- Goggles and/or safety glasses.

Insist that workers wear properly fitting, clean clothes.

#### Action in case of spills

Quickly flush with water any portion of skin or body contacted by chemical and seek medical attention, if necessary.

Drink plenty of water if any chemical is ingested and obtain medical attention.

Follow Material Safety Data Sheet recommendations for cleaning up spills.

## **Underlayments**

## UNDERLAYMENT MATERIAL

### LATEX MASTIC UNDERLAYMENT

#### TYPE I... LIGHTWEIGHT SYSTEM

#### 1. PRODUCT DESCRIPTION

This underlayment consists of a mixture of inorganic powders and latex or neoprene resin binders where a lightweight underlayment is required. Applied by trowel generally from 1/8 to 1/2 inch thick over properly prepared deck surface. If installed thicker, longer drying time is required before installing finished decking.

This underlayment is used to fill in low or depressed areas, to pitch to drains or scuppers, to fair welding seams, under most decking material and particularly hard surface decking such as ceramic tile, quarry tile and terrazzo.

#### 2. FEATURES

Lightweight - good adhesive strength - fire retardant

Oil, moisture and corrosion resistant

Install over steel and aluminum decks, provides impact and indentation resistance

Compatible with all finish decking systems.

#### 3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION 59-MA - **6** Type I

U. S. DEPARTMENT OF DEFENSE MIL-D-3135 Type I, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Foranaft	Selby, Battersby & Co.
Monoprene	Weatherguard/Marbleloid
Subkote #1	Crossfield Products Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Underlayment...Latex Mastic I (continued)

5. AREAS OF GENERAL USE

As a general underlayment.

Weight critical ships, wet spaces and under ceramic and quarry tile, terrazzo and carpet.

In Pilot house areas with flexible decks, use neoprene type system only.

As a bonding agent for magnesium oxychloride cement systems over steel and aluminum decks.

Provides excellent affinity for adhesives and resins deck systems.

6. LIMITATIONS OF USE

On aluminum decks, only the neoprene resin system should be used.

Thicknesses over 1/2 inch should be on rigid sub deck surface only.

Do not use when a hard underlayment is required.

Do not use thick application where time limitations restrict longer drying period.

7. COST COEFFICIENT 1.23

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 13/4 pounds per square foot at 1/4 inch thickness.

Adhesion Strength - a minimum of 100 pounds per square inch, by shear test, after aging 96 hours.

Indentation - Residual indentation of a 96 hour old sample, after load has been removed a minimum of two hours, shall not exceed 35%.

Moisture Absorption - Maximum of 5% moisture absorption, by weight.

Oil Resistance - Maximum of 6.5% absorption, by weight.

Fire Resistance - Char length, ignition and combustion must conform to fire test requirements of MIL-STD-1623.

Impact Resistance - Two 8 foot drops of 2 pound steel ball produces maximum of 1/8 inch permanent indentation and no chipping, cracking or loss of adhesion.

Corrosion Resistance - After 15 day salt immersion test no corrosion of steel deck, except that caused by latex or neoprene resin during setting period.

9. APPLICATION METHODS

The Manufacturer's application instructions must be strictly followed,

## Underlayment ...Latex Mastic I (continued)

General Application Steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

### B. Prime Coat

Pour prime coat powder into emulsion or resin and mix to creamy consistency, then apply to deck with brush or dauber.

### C. Thickness Coat

Install mixed materials into wet prime coat

Pour powders into liquid as recommended. Mix mechanically and apply by trowel to thickness required.

### D. Optional Step

If smoother surface is desired trowel thin grout coat as in prime coat mix. Surface can be lightly sanded when dry.

Allow 15 to 20 hours drying before installing finished decking. If conditions are damp or applied thicker than 1/2 inch, allow 2 or more days drying time.

## 10. CAUTIONARY NOTES

Powder mixture is light and must be mixed with caution.

On aluminum decks use a neoprene resin prime and thickness coats.

Neoprene or latex types can be installed thicker than 1/2 inch on rigid sub-decks provided it is installed in thin, multiple steps to eliminate surface skinning.

Air flow can cause shrinkage cracks which can be filled with grout coat.

If any cracks appear after 7 days check adhesion to decking.

## 11. MAINTENANCE

Underlayments do not require a maintenance program.

## 12. WARRANTY

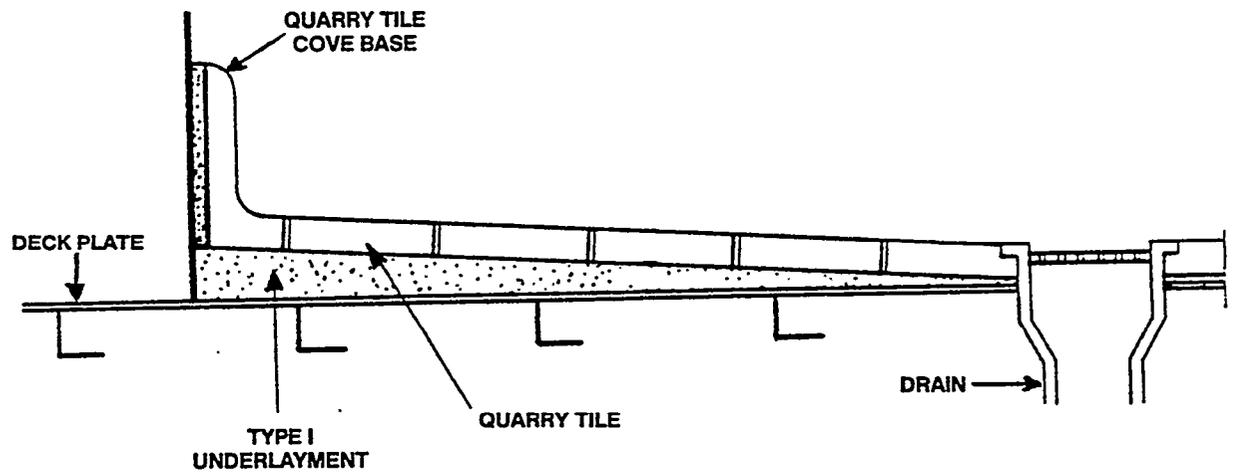
Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# LATEX MASTIC UNDERLAYMENT, TYPE I

## LIGHTWEIGHT SYSTEM



## UNDERLAYMENT MATERIAL

### LATEX MASTIC UNDERLAYMENT - TYPE II

#### I. PRODUCT DESCRIPTION

A multi-purpose underlayment, light in weight, and widely used in Marine decking installations. Material consists of a latex binder and inorganic powders mixed to a mortar consistency and applied by trowel from a feather edge to approximately ¼ inch thick in most installations. Thicker installations can be made.

Used to fill in low or depressed areas, to fair welds; to create pitch in deck and ramping and generally to prepare surface to receive the finished decking material. Wide range of applications make this a much used underlayment.

#### 2. FEATURES

Light to medium weight, excellent adhesion and easy to trowel;

Fire retardant, oil and moisture resistant with high impact resistance.

Produces excellent surface for resilient and resin decking systems.

Can be applied over steel and aluminum.

Drying time can be varied to allow for "fast turnaround" repairs.

Where allowed surface can be sanded - or troweled smooth if sanding unacceptable.

#### 3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION 59-MA-6 Type 1, Class 2

U. S. DEPARTMENT OF DEFENSE MIL-D-3135 Type II

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>Trade Name</u>	<u>Manufacturer</u>
Levelite	Selby, Battersby & Co.
Quik-Set	Crossfield Products Corp.
Subkote 222	Crossfield Products Corp.
U-20	Westpac Products Co.
U.D. - 201 - L	Negwit Products

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

## 5. AREAS OF GENERAL USE

Level decks, pitch to drains and scuppers, for ramping, fairing weld seams and to smooth off lapped deck plates.

Widely used under resilient materials, carpet and resin decking systems.

Can be troweled from a feather edge to thickness as much as one inch or more.

Can be used to form cove base on bulkheads.

## 6. LIMITATIONS OF USE

Not recommended as a finished decking material.

Has good water resistance but generally not used in showers or wet spaces.

When installed over aluminum decks a special bond coat is required.

Generally not installed over thin, flexible decking, such as in pilot houses.

## 7. COST COEFFICIENT 0.87

Note: See Section on Cost Coefficients for explanation of use.

## 8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.5 pounds per square foot 1/4 inch thick.

Adhesive strength - A minimum of 100 pounds per square foot, by shear test, after aging 96 hours.

Indentation - Residual indentation of a 96 hours old sample, two hours after load has been removed, shall not exceed 35%.

Moisture Absorption - Maximum of 5% absorption, by weight.

Oil Resistance - Maximum absorption of 6.5%, by weight.

Fire Resistance - Char length, ignition and combustion must conform to fire test requirements of MIL-STD-1623.

Impact Resistance - Two 8 foot drops of 2 pound steel ball produces maximum permanent indentation of 1/16 inch, with no chipping, cracking or loss of adhesion to steel plate.

Corrosion Resistance - After 15 day salt immersion test no corrosion of steel deck, except that caused by latex resin during setting period.

## 9. APPLICATION METHODS

The Manufacturer's application instructions must be strictly followed.

General application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

## Underlayment...Latex Mastic II (continued)

### B. Prime Coat

Over steel - if underlayment is to be sanded smooth, apply fluid, slurry coat of emulsion and power.

- where sanding is not permitted, apply flexible bonding coat and then a drier mixture of emulsion and power.

Over aluminum - apply flexible bonding coat, as recommended.

### C. Body Coat

Install into wet slurry coat, or if flexible bonding coat is installed apply body coat into it after it dries.

Pour powders into emulsion in recommended proportions, mix mechanically until a uniform blend is obtained and apply by a tight trowelling to thickness required.

For underlayment systems that are faster drying or with higher strengths, contact manufacturer.

Allow underlayment to dry about **16** hours before installing finished decking. If conditions are damp or if underlayment is installed thick, additional dry time might be required.

## 10. CAUTIONARY NOTES

Where possible, avoid air flowing over surface while wet as it can cause erratic curing.

When installing trowel applied polymeric resin decking systems, it is advisable to allow several days drying so moisture can be released.

Do not allow latex resin to freeze or to allow room temperature to go below 50o F. during installation.

Use recommended flexible priming system over aluminum and flexible decking materials.

## 11. MAINTENANCE

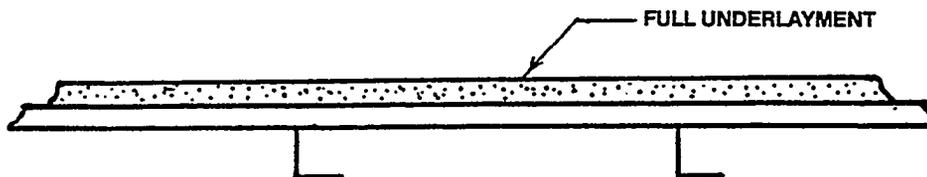
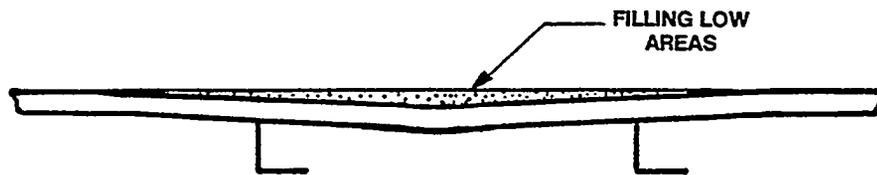
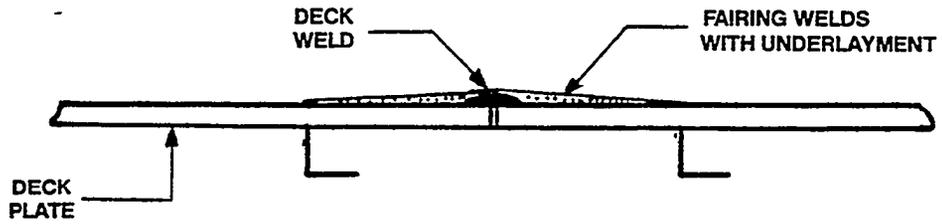
Underlayments do not require a maintenance program.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. - CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**LATEX MASTIC UNDERLAYMENT, TYPE II**

## UNDERLAYMENT MATERIAL

### MAGNESIUM OXYCHLORIDE CEMENT SCRATCH UNDERLAYMENT

#### 1. PRODUCT DESCRIPTION

This system is a blend of magnesium oxide, inert fillers and gauging solution of magnesium chloride, which forms a mortar mixture that is trowel applied to the specified thickness.

Completed installation produces a monolithic underlayment for use on decks or on bulkheads to form a cove base. Product is used as an underlayment for finished oxychloride cement products, resilient tile, carpet and similar decking materials.

#### 2. FEATURES

Fireproof, good compressive strength and vermin resistant.

Levels up warped decks and decks with low spots.

Can more easily be installed to a thicker depth than most underlayments.

Provides excellent surface for most finished decking systems.

#### 3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION 59 - MA - 2C

U. S. DEPARTMENT OF DEFENSE MIL-D-16680

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Asbestolith	Asbestolith Mfg. Corp.
Fibretuff #5	Fraser-Edwards Company
Kompolite	Weatherguard/Marbleloid Products, Inc.
Loralite	Williard Marine Decking, Inc.
Selbalith Scratch	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Underlayment ...Magnesite (continued)

#### 5. AREAS OF GENERAL USE

As an underlayment for oxychloride cement installations.

Where a fireproof decking system is required.

Underlayment for resilient material, carpet and many mastic decking systems.

Cost savings where a thick underlayment is required.

#### 6. LIMITATIONS OF USE

Material is hygroscopic and must not be installed in showers or other wet space, nor be exposed to acids.

Material withstands intermittent wettings.

For interior decking spaces only.

Do not let material come in direct contact with aluminum or steel as an electrolytic reaction will occur. An insulated bonding coat must be installed first.

Minimum thickness 1/2 to 5/8 inches.

For successful adhesion must be installed over a chemical bonding agent or mechanical fastening system.

#### 7. COST COEFFICIENT 2.36

Note: See Section on Cost Coefficients for explanation of use.

#### 8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.5 pounds per square foot per 1/4 inch thickness.

Indentation - Residual indentation of a 96 hour old sample, after load has been removed for two hours, shall not exceed 3%.

Moisture Absorption - Not to exceed 8% by weight.

Fire Resistance - Must have minimum rating of fire retardant when tested in accordance with MIL-STD-1623.

Impact Resistance - Maximum permanent indentation of 1/16 inch and no chipping, cracking or loss of adhesion.

#### 9. APPLICATION METHOD

The Manufacturer's Application Instructions must be strictly followed.

## Underlayment... Magnesite (continued)

General application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

### B. Bonding Medium

#### For thickness under 1 inch

- (1) Tack weld 3" x 8" x 13 gauge expanded metal to steel deck with welds **9** inches in one direction and 8 inches in the other. Apply anticorrosive coating. Used for thicknesses of 3/4 to 1 inch.
- (2) In lieu of expanded metal, trowel 1/8 inch thick bonding coat, such as Selbagrip by Selby, Battersby & Co. or Magnabond by Crossfield Products Corp., or equal, over properly prepared deck. Surface to be rough for good adhesion of underlayment.

#### For thickness over 1 inch

- (1) Weld 5" x 1" x **1/16"** thick steel, unpainted "Butterfly" deck clips, 12 to 15 inches on center, and protect with anticorrosive coating. Each clip weighs approximately 0.13 pounds.

### C. Corrosion and electrolytic protection

On steel decks apply 2 coats of anticorrosive coating, such as komul, bituminous enamel or equal.

If this product is in contact with aluminum decks or bulkheads, apply a full coat of a troweled, neoprene type, bonding coat to prevent electrolytic reaction between chloride salt and aluminum.

### D. Scratch Body Coat

Mix magnesite powder with correct baume density magnesium chloride gauging solution to proper slump consistency. Spread mixed material with a trowel and darby to proper thickness, and allow to set. Finish with tight steel troweling to produce smooth surface for finished decking or finish surface rough using a darby with nails in it or a garden rake if a magnesium oxychloride finished decking is to be installed.

Allow overnight drying if finished decking is to be magnesium oxychloride type.

Allow 7 days drying if finished decking is resilient material, carpet or similar decking products.

In some installations a white salt "bloom" appears on surface. It can generally be removed with clean water or a free rinsing detergent and a scrubbing machine with a steel wool pad.

Underlayment...Magnesite (continued)

## 10. CAUTIONARY NOTES

Temperature and humidity have a direct effect on the initial set and drying time.

Air currents can cause erratic curing and fissure cracks in the surface.

Use only magnesium chloride mixed with fresh water for gauging liquid. Mix solution the day before using to allow for heat dissipation.

Never install in direct contact with aluminum - always install neoprene bonding coat.

Never install in direct contact with steel - always apply a full coat of an anticorrosive coating.

## 11. MAINTENANCE

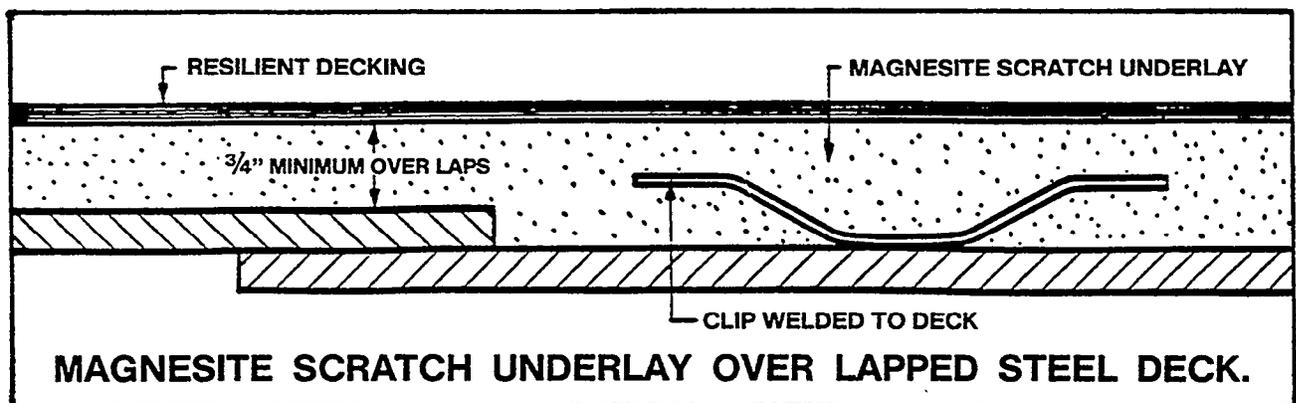
Underlayments do not require a maintenance program.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## UNDERLAYMENT MATERIAL

### POLYMERIC RESIN UNDERLAYMENT

#### 1. PRODUCT DESCRIPTION

A polymeric resin underlayment, trowel applied to required thickness, which is generally ¼ inch. It consists of an epoxy resin, curing agent and graded aggregates.

This product is usually installed as an underlayment in areas where a polymeric resin finished deck system is to be installed. This underlayment eliminates the 5 to 6 day drying period required to release the water portion of a latex underlayment.

Use to level decks, fair weld seams, pitch to drains and smooth lapped deck plates.

#### 2. FEATURES

Contains no water which could interfere with curing of polymeric resin deck systems.

Excellent adhesion, high in compressive, tensile and flexural strengths.

High resistance to oil, grease, corrosion and many chemicals.

Can be used in wet and dry spaces.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-3135 Type I Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Epoxy Underlay	Selby, Battersby & Co.
U-20 Epoxy Underlay	American Abrasive Metals Co.
UD - 301	Negwit Products, Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Underlayment... Polymeric Resin (continued)

5. AREAS OF GENERAL USE

As an underlayment for terrazzo, decorative or solid color polymeric resin finished decking.

Wet and dry spaces.

To level decks, pitch to drains, fairing welds and similar underlayment application.

Install from feather edge to any needed thickness.

6. LIMITATIONS OF USE

Polymeric resin underlayments are considerably more expensive than latex mastic underlayments and generally used only under polymeric resin finished decking.

Do not install in areas where deck temperatures exceed 150° F as system will soften.

System too rigid to install on thin, flexible decks.

Do not install if deck temperature drops below 50° F.

7. COST COEFFICIENT 1.70

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.5 pounds per square foot to ¼ inch thickness.

Adhesive Strength - A minimum of 200 pounds per square inch, by shear test, after aging 96 hours.

Indentation - Residual indentation of a 96 hours old sample, two hours after load has been removed, shall not exceed 2%.

Moisture Absorption - Maximum of 2%, by weight.

Oil Resistance - Maximum of 3%, by weight.

Fire Resistance - Char length, ignition and combustion must conform to fire test requirements of MIL-STD-1623.

Impact Resistance - Two 8 foot drops of 2 pound steel ball produces maximum of 1/16 inch permanent indentation and no chipping, cracking **or** loss of adhesion.

Corrosion Resistance - After 15 day salt immersion test steel deck to show no signs of corrosion or detachment from the deck.

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

## Underlayment...Polymeric Resin (continued)

General application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

### B. Prime Coat

Pour curing agent into polymeric resin liquid. Mix with mechanical mixer the required time to obtain a uniform consistency.

Apply to deck with steel trowel or squeege, being certain to cover the entire area. Body coat is to be troweled into the wet prime coat to provide good intercoat adhesion.

An optional priming system is to sprinkle 45 mesh silica sand into wet primer and allow overnight curing. This provides a "rough" surface which keeps body coat from slipping while troweling.

### C. Body Coat

Pour recommended quantity of curing agent into resin and mechanically mix until a uniform consistency is obtained. Pour properly graded powder into mixed resin and curing agent and mechanically mix until the powders are thoroughly wet.

Trowel tightly into place to required thickness. Allow overnight curing when deck temperature is 70° F, longer when temperature is lower. When cured it is ready for installation of finished decking material.

## 10. CAUTIONARY NOTES

Do not mix resin and curing agent until just prior to installation.

Store material in areas where temperature will remain between 50° and 90° F.

Once resin, curing agent and powders have been thoroughly mixed, dump out of container onto the deck to reduce heat buildup in mixture caused by confined space of mixing container.

Keep mixed epoxy from coming into contact with water during troweling and curing.

If any of the polymeric materials contain solvents, eliminate any open flames, provide ventilation, ban any food from the area and use only sparkproof equipment.

Underlayment...Polymeric Resin (continued)

11. MAINTENANCE

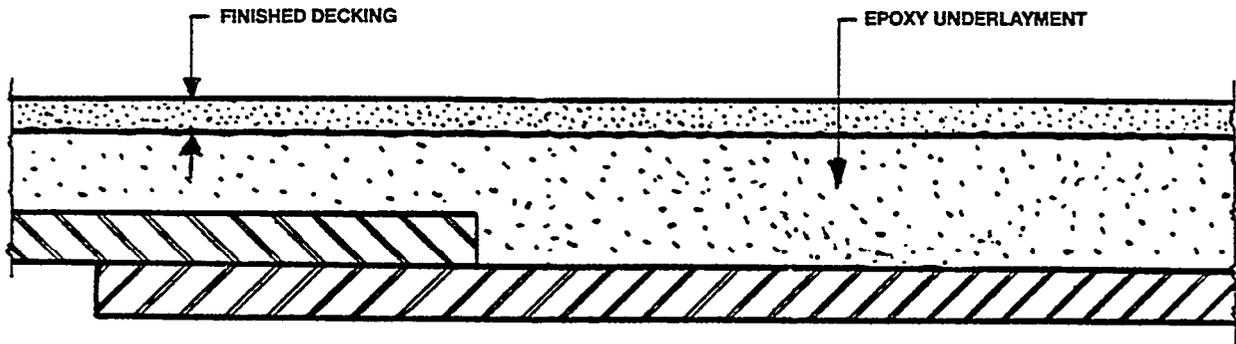
Underlayments do not require a maintenance program.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**POLYMERIC RESIN UNDERLAYMENT**

## **Insulation Decking**

# INSULATION DECKING

## DECK TOP INSULATION - TYPE I

### 1. PRODUCT DESCRIPTION

A trowel applied magnesium oxychloride cement deck system with built-in thermal insulating qualities and capable of meeting all the quality standards for an A-60 fire rated deck.

Material is applied to the minimum thickness required for the A-60 rating but can be installed as thick as necessary to provide the insulating qualities required. It is generally installed 1-3/16 inch thick or thicker.

Designed to insulate living quarters over hot spaces or those exposed to weather conditions, either very cold or very hot.

Product must be asbestos free. It is an underlayment material which is capable of being covered with all types of finished decking materials.

By installing this sytem on the deck, it permits free accessibility to electrical, water, steam and other service lines attached below the deck.

### 2. FEATURES

Provides insulating qualities to make space above very hot or cold areas habitable.

Provides highest fire safety protection afforded by an A-60 decking system.

An underlayment capable of being covered by a finished decking material and leveling uneven decks.

### 3. SPECIFICATION REFERENCE

United States Coast Guard Specification 164.006 for an A-60 Fire Rated Deck.  
International Marine Organization - Resolution A.214 (VII)  
U. S. Department of Defense MIL-D-23134A

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Selbalith 7K	Selby, Battersby & Co.
Insulite II	E. H. O'Neill Company, Incorporated

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Insulation...Type I (continued)

## 5. AREAS OF GENERAL USE

Over engine rooms.

Over bulk fuel tanks.

Over boiler rooms.

Over radar and electronic space.

In off-shore rig living quarters exposed to weather conditions.

## 6. LIMITATIONS OF USE

Do not use as a finished decking material.

Do not let material come in direct contact with aluminum or steel as an electrolytic reaction will occur. An insulating bonding coat must be installed first.

Material is hygroscopic and must not be installed in wet spaces unless a waterproof membrane is installed on top and turned up the bulkhead.

Generally not installed on an exterior deck.

## 7. COST COEFFICIENT 3.64

Note: See Section on Cost Coefficients for explanation of use.

## 8. PHYSICAL PROPERTIES

Weight - Not to exceed 4.4 pounds per square foot for 1 inch thickness.

Bond Strength - Not less than 50 pounds per square inch in sheer strength.

Fire Resistance - A-60 rated deck.

Thermal Conductivity - Less than 1 British thermal unit per square foot, per hour, per degree Fahrenheit, for 1 inch thick at a mean temperature of 75 F., "K" factor to be 0.70, or lower, at 1 inch.

Water Absorption - Not to absorb more than 20% by weight after 24 hour immersion test.

Indentation - Less than 4.5 percent of actual thickness of installed material.

Impact Resistance - Not to exceed 1/8 inch after two drops from 8 feet height of 2 pound steel ball with no chipping, cracking or loss of bond.

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this - Manual.

### B. Bond and/or anti-corrosive coating

#### 1. Steel decks

- (a) Butterfly clips are welded **9** to 12 inches on center and 2 inches in from bulkhead, in accordance with manufacturer's instructions;

Apply two full coats of anti-corrosive coating, similar to product Komul, over the deck and the butterfly clips.

- (b) Install neoprene bonding system over steel deck and pass a corn broom to provide a texture surface, in accordance with manufacturer's instructions.

#### 2. Aluminum decks

Install neoprene bonding system, as stated in 1 (b).

### C. Body coat

Mix deck top insulation powder with the premixed magnesium chloride gauging solution so mixed material has a slump of 1/2 a bucket.

Apply mixed material to deck using a darby and when proper set occurs, finish with a steel trowel, at the thickness specified.

If finished decking is to be resilient tile, carpet or resin flooring, surface is to be troweled smooth.

If finished decking is to be **a** magnesite material, the surface is to be left rough, per manufacturer's instructions, for intercoat adhesion.

Surface to be primed, as recommended by manufacturer, prior to installing the finished decking.

Insulation...Type I (continued)

10. CAUTIONARY NOTES

Use only magnesium chloride mixed with fresh water for gauging liquid. Mix solution the day before using to allow for heat dissipation.

Always use a neoprene bonding coat **when** installing over aluminum.

Always use a **full** coat of an anticorrosive coating when coming in contact with steel deck.

11. MAINTENANCE

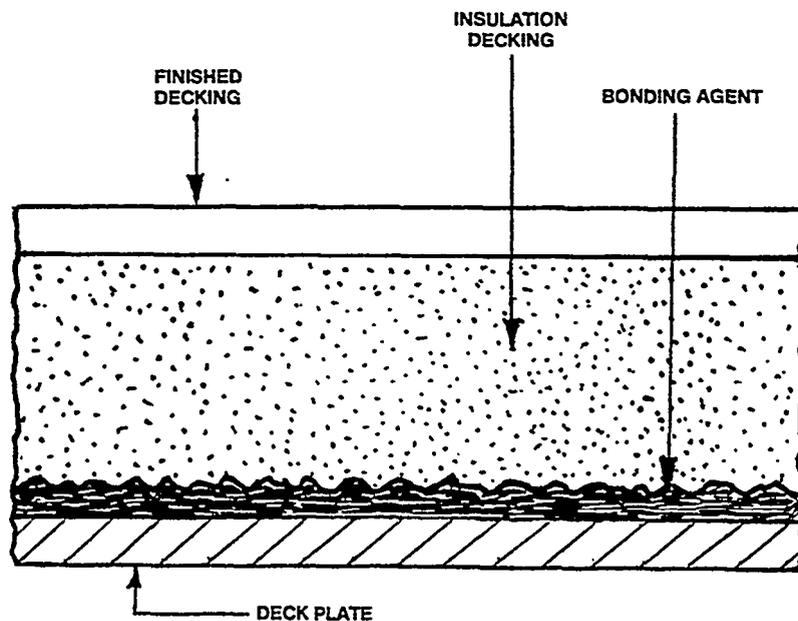
Manufacturer's Maintenance Instructions to be **followed**.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is **to** provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**MAGNESITE INSULATION — TYPE I**

## INSULATION DECKING

### DECK TOP INSULATION - TYPE II

#### 1. PRODUCT DESCRIPTION

This insulated decking system provides the lowest "K" factors and thereby the highest thermal insulating capabilities of any current decking material, thereby providing temperature comfort to those working and living in these areas.

By installing this system on the deck it permits free accessibility to electrical water, steam and other service lines attached below the deck. It stops heat transfer through the deck, beams and stiffeners exposed on the underside of the deck.

This system consists of a 1 inch thick calcium silica insulating block and 3/4 inch of magnesium oxychloride cement. that provides insulating qualities with a "K" factor of 0.22 BTU/square foot/hour/ F.

#### 2. FEATURES

A very low thermal coefficient - K factor of 0.22.

Incombustible

Best insulating decking system.

Non-toxic.

#### 3. SPECIFICATION REFERENCE

No current specification reference.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Deck-top Insulation with insulating block	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Insulation...Type II (continued)

5. AREAS OF GENERAL USE

Over boiler rooms.

Over engine rooms.

Over bulk fuel tanks.

Over radar and electronic spaces.

6. LIMITATIONS OF USE

Do not use as a finished decking material.

System is more labor intensive than troweled insulating system.

Weight is high at 10 pounds per square foot 1-3/4 inches thick.

Minimal thickness is 1-3/4 inches.

Generally not installed on an exterior deck.

7. COST COEFFICIENT 5.46

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 10 pounds per square foot 1-3/4" thick

Fire Rating - Incombustible

Toxicity - Non-toxic

"K" Factor - Shall not exceed 1.00 B.T.U., per square foot, per hour per degree Fahrenheit for one inch thick at mean temperature of 75° F.

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

## Insulation...Type II (continued)

### B. Installing insulating block

1. Weld steel insulating pins to steel deck starting 3 inches in from bulkhead and placed 6 inches in one direction and 12 inches in the other.
2. Apply by brush, two coats of anti-corrosive coating, komul or similar, to deck and pins.
3. Lay calcium silica block between the pins.
4. Lay 15 pound saturated felt over the block with the pins penetrating the felt. Overlap each sheet 3 inches.
5. Lay 3.4 pound, galvanized metal lath over the pins. Place steel washers coated with anti-corrosive coating over the pins. Bend pins to lock galvanized lath into place.

### C. Body coat

1. Mix previously made-up magnesium chloride gauging solution with insulating powder. Trowelable mix should have a slump one-half the height of a bucket.
2. Spread mix into galvanized lath and to a thickness of 3/4 inch using a darby and then a steel trowel. Install in accordance with manufacturer's recommendations.

### D. Finish Decking

1. After insulating decking material has dried sufficiently install finished decking selected.

## 10. CAUTIONARY NOTES

Be certain steel pins are properly welded to the deck starting 3 inches from bulkhead and 6 to 12 inches apart.

Apply anti-corrosive coating on steel deck and steel pins.

Use 3.4 pound, galvanized metal lath.

In mixing gauging liquid for the magnesite material use only magnesium chloride and fresh water. Never use sea water.

## 11. MAINTENANCE

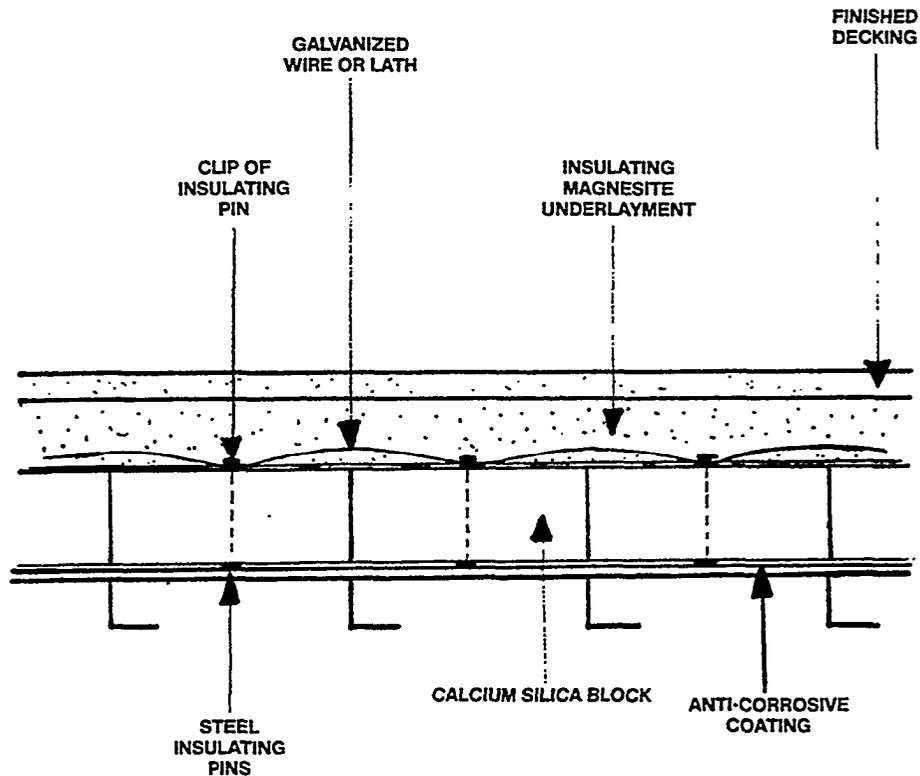
As an underlayment no maintenance is generally required.

12. WARRANTY

Decking contractor, having insalled product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**CALCIUM SILICA BLOCK INSULATION — TYPE II**

## **Ammunition Holds**

## DECKING FOR AMMUNITION HOLDS

### AMMUNITION MAGNESITE

#### 1. PRODUCT DESCRIPTION

A magnesium oxychloride cement system that is non-spark and fire retardant. It is designed for installing between the steel channels in the cargo ammunition hold.

It has sufficient strength to withstand forklift truck loading and produces a smooth surface thereby eliminating jolts that could dislodge load from forklift trucks.

This product weighs 10 pounds per square foot at 2 inch thickness, 60% lighter than Latex Concrete, which is excellent for weight critical areas. Material is normally installed 1-1/4 to 2 inches thick.

Meets all standards of previously active specification MIL-D-18873.

#### 2. FEATURES

Non-spark.

Fire retardant.

Light in weight (10 pounds, per square foot, per 2 inches thick).

Non-toxic.

Withstands driving of 8 penny nails without chipping, cracking or loss of bond.

#### 3. SPECIFICATION REFERENCE.

No specification currently in effect.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Nailable Selbalith	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.'

Ammo Magnesite (continued)

5. AREAS OF GENERAL USE

Cargo areas of ammunition holds between steel channels.

6. LIMITATIONS OF USE

Do not apply directly over aluminum or other white metals.

Steel must be coated with anti-corrosive compound to prevent salts in magnesite from causing corrosion of steel.

7. COST COEFFICIENT 4.22

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 10 pounds, per square foot, 2 inches thick.

Indentation - Maximum of 1/8 inch when 2 pound steel ball is dropped 8 feet, with a minimum of two drops.

Indentation - Maximum of 1.5 percent of thickness when subjected to a load of 2000 pounds for 30 minutes over a 1 inch square indenting face.

Oil Resistance - Maximum absorption of 10 percent by weight in 24 hour immersion test.

Water Absorption - Maximum absorption of 12 percent by weight in 24 hour immersion test.

Fire Resistance - Fire retardant.

Toxicity - Non-toxic.

Non-slip Properties - When tested in accordance with MIL-D-18873 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.3	0.5	-	0.3	0.4	-
Rubber	0.6	0.6	0.5	0.6	0.6	0.3

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

### B. Bonding System

Select one of these bonding systems:

1. Butterfly clips for application thicknesses over 1 inch weld clips 9 to 12 inches on center. Apply two coats of anti-corrosive compound, such as Komul anti-corrosive coating, on steel deck and butterfly clips.
2. Metal lath for application thicknesses less than 1 inch thickness weld 3" x 8" x 13 gauge metal lath, 9 inches in one direction and 8" in the other. Apply two coats of anti-corrosive compound, such as Komul anti-corrosive coating, on steel deck and metal lath.
3. For flexible deck apply a troweled bonding agent. Apply with trowel, 1/8 to 1/4 inch thick, a neoprene bonding agent and pass corn broom while wet to roughen surface.

### C. Body Coat

Mix magnesite compo and magnesium chloride gauging solution to a slump of 1/2 height of the bucket.

Install with a trowel between channels making certain material does not come out of the channels. When material takes initial set steel trowel surface to a flat, smooth finish.

### D. Sealer

One day after material sets apply two coats of an oil base sealer, a day apart, using short nap roller.

## 10. CAUTIONARY NOTES

Do not install in direct contact with aluminum or any other white metal.

Do not let material come out of the channels and contact aluminum "tie-downs" used to secure cargo.

Ammo Magnesite (continued)

Use only magnesium chloride for gauging solution.

Do not use sea water to mix gauging solution.

Do not wash deck until it is two weeks old or older.

Make certain arms of butterfly clips are up off deck so material "locks" under the arms for positive adhesion.

Always install anti-corrosive coating over steel decks.

II. MAINTENANCE

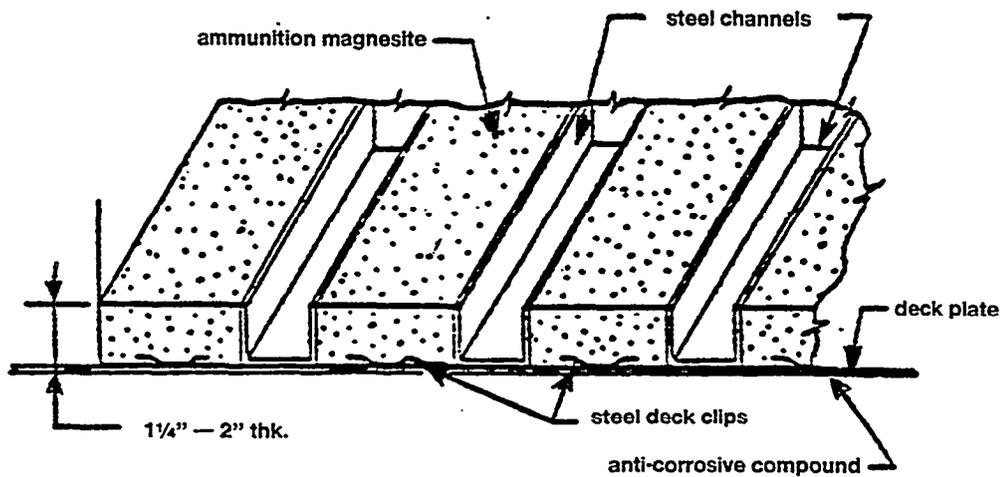
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



# DECKING FOR AMMUNITION HOLDS

## LATEX CONCRETE

### 1. PRODUCT DESCRIPTION

Latex Concrete is a non-spark, fire retardant decking material that can be installed over aluminum or steel between the channels in the cargo ammunition holds.

It produces a smooth surface that makes it excellent for forklift truck loading areas. It is generally installed 1-1/4 to 2 inches thick.

Latex Concrete can also be used in other areas where deep fills are required and where non-spark qualities are needed, such as reefer boxes.

### 2. FEATURES

Non-spark.

Fire retardant.

No electrolytic reaction with aluminum channels.

Can be installed over aluminum and steel.

Non-toxic material.

### 3. SPECIFICATION REFERENCE

U.S. Department of Defense MIL-D-21631

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
A-70 Deck	Crossfield Products
Latex 12	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessary a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

### 5. AREAS OF GENERAL USE

Cargo ammunition holds, between aluminum or steel channels.

Can be used in reefer boxes and forklift truck loading areas.

Latex Concrete (continued)

6. LIMITATIONS OF USE

Never install in freezing temperatures.

High humidity and low temperatures increase drying time.

Weight can limit its use in other than cargo ammunition holds.

7. COST COEFFICIENT 3.09

Note: See Section on Cost Coefficients for Explanation of Use

8. PHYSICAL PROPERTIES

Weight - 24.5 pounds per square foot at 2 inch thickness.

Indentation - Not to exceed 1.5 percent of thickness under 2000 pound load for 30 minutes.

Impact Resistance - Maximum of 1/8 inch after two impacts of 7-3/4 pound steel ball dropped from height of 8 feet.

Fire resistance - Shall be rated fire retardant when tested in accordance with MIL-STD-1623.

Spark Resistance - No sparking shall be noted when surface is abraded with a rotating wire wheel or when struck angular blows with a steel hammer.

Moisture Absorption - After 24 hours immersion in water material shall gain no more than 2 percent by weight.

Oil Absorption - After 24 hours immersion in SAE 10W oil material shall gain no more than 2 percent by weight.

Non-slip Properties - When tested in accordance with MIL-D-21631 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.3	0.5	-	0.3	0.4	-
Rubber	0.6	0.6	0.25	0.6	0.6	0.3

## **9. APPLICATION METHODS**

The Manufacturer's Application Instructions must be strictly followed.

General application steps include:

### **A. Preparation**

Follow instructions under DECK PREPARATION as contained in this Manual.

### **B. Prime Coat**

There are several options available:

1. Prime with latex and powder - apply thin to wet surface.
2. Install 2" x 2" x 10 gauge steel mesh in steel holds to reduce surface fissures often experienced in drying of thick applications.

Apply latex and powder slurry coat to wet surface.

3. Neoprene Bond Coat should be applied to deck when installing in open areas.

### **C. Body Coat**

Mix latex emulsion and powders to trowelable consistency. Apply by steel trowel to thickness required.

### **D. Grout Coat**

The normal drying of applications of this thickness can cause shrinkage fissures. Grout these fissures using Portland Cement (4 parts) and Latex Emulsion (1 part) by volume.

## **10. CAUTIONARY NOTES**

Remove mill scale, oil, grease, rust or other matter so surface is clean.

If deck material is quite flexible, use neoprene bonding agent to assure good adhesion.

Do not apply in freezing temperatures.

Grout any fissure cracks that occur.

## **11. MAINTENANCE**

Manufacturer's Maintenance Instructions to be followed.

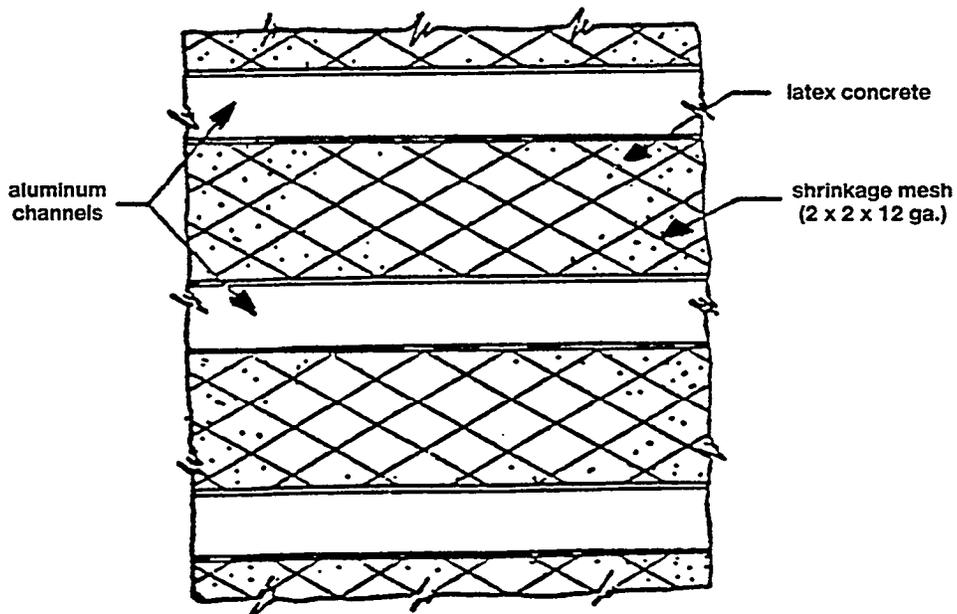
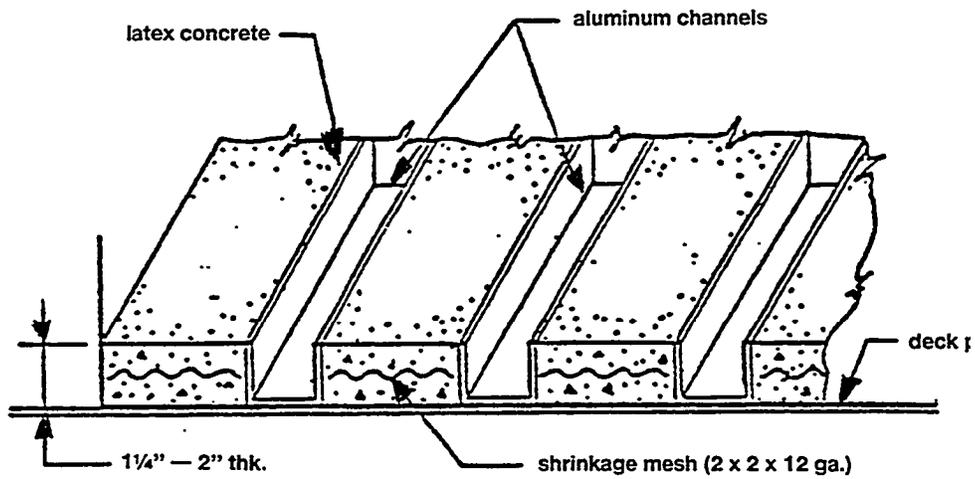
Latex Concrete (continued)

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**Bonding Agent**

## BONDING AGENT

### BONDING AGENT FOR MAGNESIUM OXYCHLORIDE CEMENT

#### 1. PRODUCT DESCRIPTION

A latex or emulsion system with inorganic powders that is trowel applied to the deck to provide a bonding medium for all magnesium oxychloride cement systems.

System can also be used to bond other trowel applied decking systems and to bond concrete materials.

This system provides excellent adhesion over entire surface as compared to spot adhesion provided by clips and other mechanical fasteners.

#### 2. FEATURES

Excellent adhesion to steel decks.

Provides excellent bond for magnesium oxychloride cement systems.

Easy to install.

#### 3. SPECIFICATION REFERENCE

Product a component of other approved systems, such as MIL-D 16680 Deck Covering Magnesia Aggregate Mixture.

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Dex-0-Tex Magnabond #3	Crossfield Products Corp.
Selbagrip	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein **nor** does listing affirm that they are approved on specifications referenced.

#### 5. AREAS OF GENERAL USE

As a priming system used under magnesium oxychloride cement decking systems.

As a primer for other resin systems especially when being installed over flexible decks.

Bonding Agent (continued)

6. LIMITATIONS OF USE

When finished decking is thicker than 1 inch, a different bonding medium is recommended.

7. COST COEFFICIENT - Included in finished decking 0.52

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Thickness 3/32 to 1/8 inch

Adhesive Strength A minimum of 100 psi.

9. APPLICATION METHODS

The Manufacturer's application Instructions must be strictly **followed**.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

B. Body Coat

Mix resin or emulsion with inorganic powders to proportion recommended by manufacturer. Use a drill and paddle and blend until powders are fully wet out.

Apply with a steel trowel to approximately 3/32 inch thick and making certain entire deck area is fully covered. Immediately after troweling, and while mix is still wet, pass a corn broom over surface to produce furrows that provide adhesion for finished decking material.

10. CAUTIONARY NOTES

Do not install when deck temperature is below 55° F.

Install masking tape on partitions, fixtures and other areas not to receive the material.

Never add water to emulsion or resin material.

Allow a minimum of overnight drying before applying magnesite or any other deck material.

Bonding Agent (continued)

11. MAINTENANCE

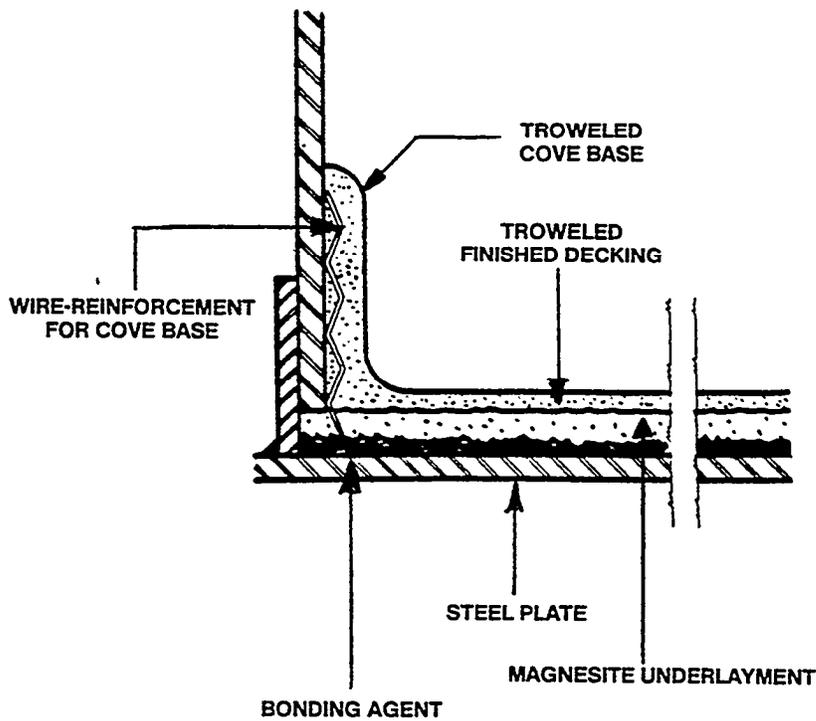
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**BONDING AGENT**



# FLOATING DECK SYSTEM...FOR SOUND DEADENING

## METAL CLAD SYSTEM

### 1. PRODUCT DESCRIPTION

The increased noise levels and vibration sounds on ships and drill rigs caused by high speed diesel engines, rig drilling equipment, high speed propeller shafts and other machinery have risen to heights considered unsafe for certain ship and rig personnel. The International Marine community has instigated studies to correct these problems and progress has been made. This Section covers floating deck systems which provides noise reduction, making areas safer from sound damage to ship personnel.

While recommended noise levels by the International Maritime Organization vary from space to space, the general range desired would be in the 70 to 85 dB range for new vessels over 1600 gross tons. A floating deck system alone cannot accomplish these levels but when combined with other sound deadening changes, it will be a factor to help reach those goals.

The floating deck systems isolate the accommodation areas from the ships' structural members and reduce both airborne and structural borne sound. The reduction of noise levels reduces fatigue, hearing loss and generally promotes higher levels of crew efficiency.

Floating deck systems are generally composed of an insulating material such as mineral wool that are laid loose on the structural deck and thereby isolate the deck from the structure. They generally have a metal cladding that allows bulkheads and furniture to be fastened to them. Deck systems are generally designed to provide an A-60 deck fire rating. Some decks with modifications can be reduced to an A-30 or A-0 as required for special spaces.

### 2. FEATURES

A-60 deck fire rating and approvals by recognized Maritime organizations.

Provides sound reduction index of 40 dB or higher.

Resists warping, shrinking, swelling and cracking.

Metal must be of sufficient strength to be able to be tack welded.

Deck system strong enough to carry weight of bulkheads, fittings and furniture.

Resists dilute acids and alkalis.

Does not harbor insects, vermin or mold growth.

Sound Deadening...Metal Clad (continued)

### 3. SPECIFICATION REFERENCE

A-60 Deck Fire Test - in accordance with International Convention of Safety of Life at Sea 1974 Chapter II-2, Part A, Regulation International Maritime Organization or other internationally recognized testing agency.

### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Asahi Marilite SR-F	Ask Corporation Tokyo, Japan
BIP Accommodation Panel System	BU-IL Industries Co., Ltd. Kyungnam, Korea
Isolamin Floating Floor Panel FF 73 and FF 53	Isolamin-Ecomax AB Sweden
Akerpanel F-470 Floating Floor	Norac Company Arendal, Norway

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

### 5. AREAS OF GENERAL USE

Can be used in most areas of ship or rig but find widest use in greatest noise areas, such as

- over engine rooms
- over machinery spaces
- over areas with high volume thrusters
- in tug boats where noise levels are very high.

### 6. LIMITATIONS OF USE

These systems increase cost of building the ship, add 6 to 8 pounds per square foot in weight and are time consuming to install.

Generally not used in wet spaces.

Generally not used in high level decks or in spaces not over noisy operation.

Do not use in areas where tack welding is not permitted.

Do not use where weight is prohibitive, such as in weight critical ships.

In odd shaped areas fitting tight against the bulkhead may present an installation problem.

Sound Deadening...Metal Clad (continued)

7. COST COEFFICIENT 7.51

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 2 inch system 5.5 to 6.5 pounds per square foot

3 inch system 7 to 7.50 pounds per square foot

Fire Resistance - Qualify as an A-60 deck when test by qualified certification group in accordance with international Convention of Safety of Life at Sea - 1974, Chapter II-2, Part A, Regulation 3(c).

Sound Reduction Index - 44 dB

Sound Insulation Index (Ia) - 47 dB

Density of Mineral Wool - 10 pounds per cubic foot or higher.

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

If deck has low spots or pitched in wrong direction, apply Type II or Type I Latex Mastic Underlayment.

B. Floating Deck Units

Units generally consist of 1 to 2 courses of mineral wool 2 to 3 inches thick, with densities of 10 to 12.5 pounds per cubic foot and in sizes of approximately 2 feet wide up to 90 inches long.

Most units are metal clad with cold rolled, galvanized or aluminum sheathing 3/32 to 1/8 inch thick.

Cut panel to completely cover entire area. Install in brick layer or staggered pattern. Tack weld metal panels to each other about every 20 to 25 inches. If two layers of mineral wool are used, seams are offset eliminating joint paths which allow passage of sound and heat. If any joint occurs at bulkhead, caulk with elastic caulking material.

If any projection occurs through the deck, install a metal sleeve and work floating deck units around it. Pack sleeve with mineral wool or Class A insulation. Install a rubber seal at top of packing and caulk any open areas at deck juncture with elastic caulk material.

## Sound Deadening...Metal Clad (continued)

### C. Bulkhead and Furniture

Install "U" channel to floating deck with self tapping screws, or by tack welding if metal cladding is strong enough, and erect non-structural bulkhead system in accordance with manufacturer's instruction.

Furniture and fitting can be attached to deck using self tapping screws.

### D. Finished Decking

Install finish decking such as carpet, sheet vinyl, vinyl composition tiles, parquet wood flooring or trowel applied decking system to the metal cladding. Follow recommended deck preparation and installation instructions of the decking manufacturer.

## 10. CAUTIONARY NOTES

At uninsulated, exterior bulkheads build a 3 inch wide gutter of mild steel to catch and remove condensation and prevent water from penetrating the system. Where this is done, be certain to install the mineral wool on the underside of the structural deck directly under the deck gutter and down the exterior bulkhead a minimum length of 15 inches in each direction to retain "rated" deck approval.

At interior bulkheads fit material right to bulkhead and apply a bead of elastic caulking material at the juncture of the bulkhead and floating deck material.

Isolate system at exterior bulkheads by installing elastomeric caulking.

If very heavy equipment is to be installed, such as captain's chair, etc., it may be necessary to fasten this equipment to the structural deck and install the floating deck system around it.

When installing finish decking material, abrade surface with sand paper and wipe clean. Use only the manufacturer's recommended primer or adhesive to obtain full contact with the metal cladding.

## 11. MAINTENANCE

These decks are covered with a finished decking material and do not require maintenance program.

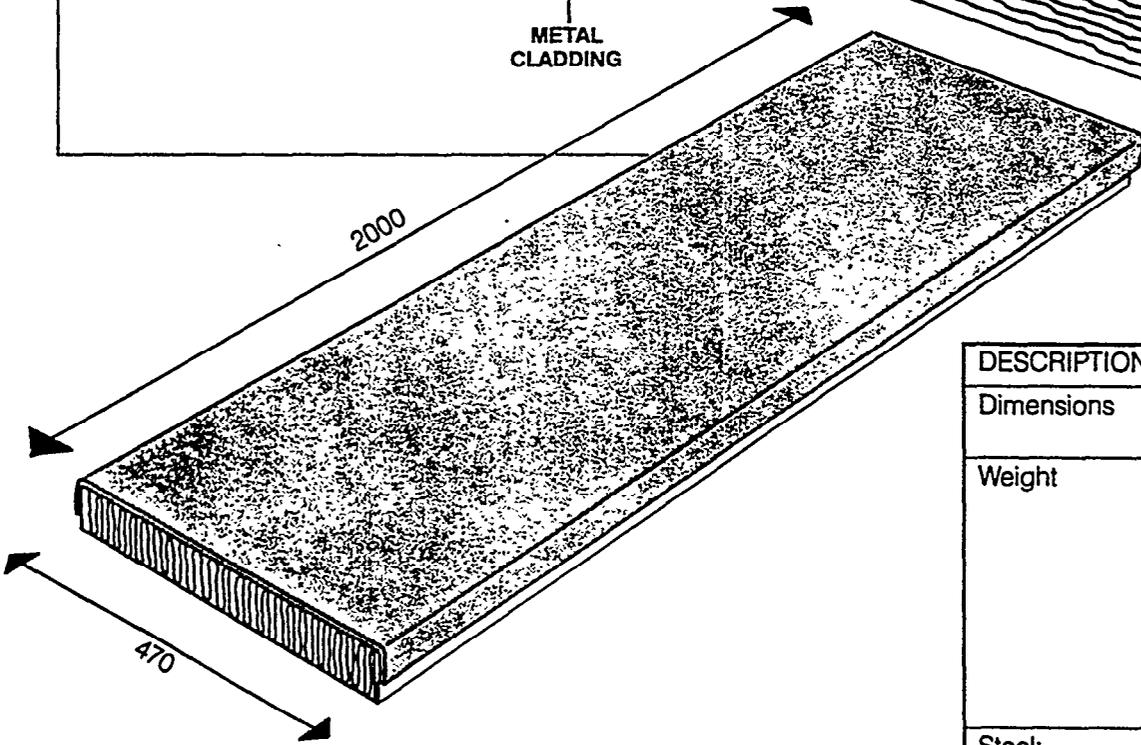
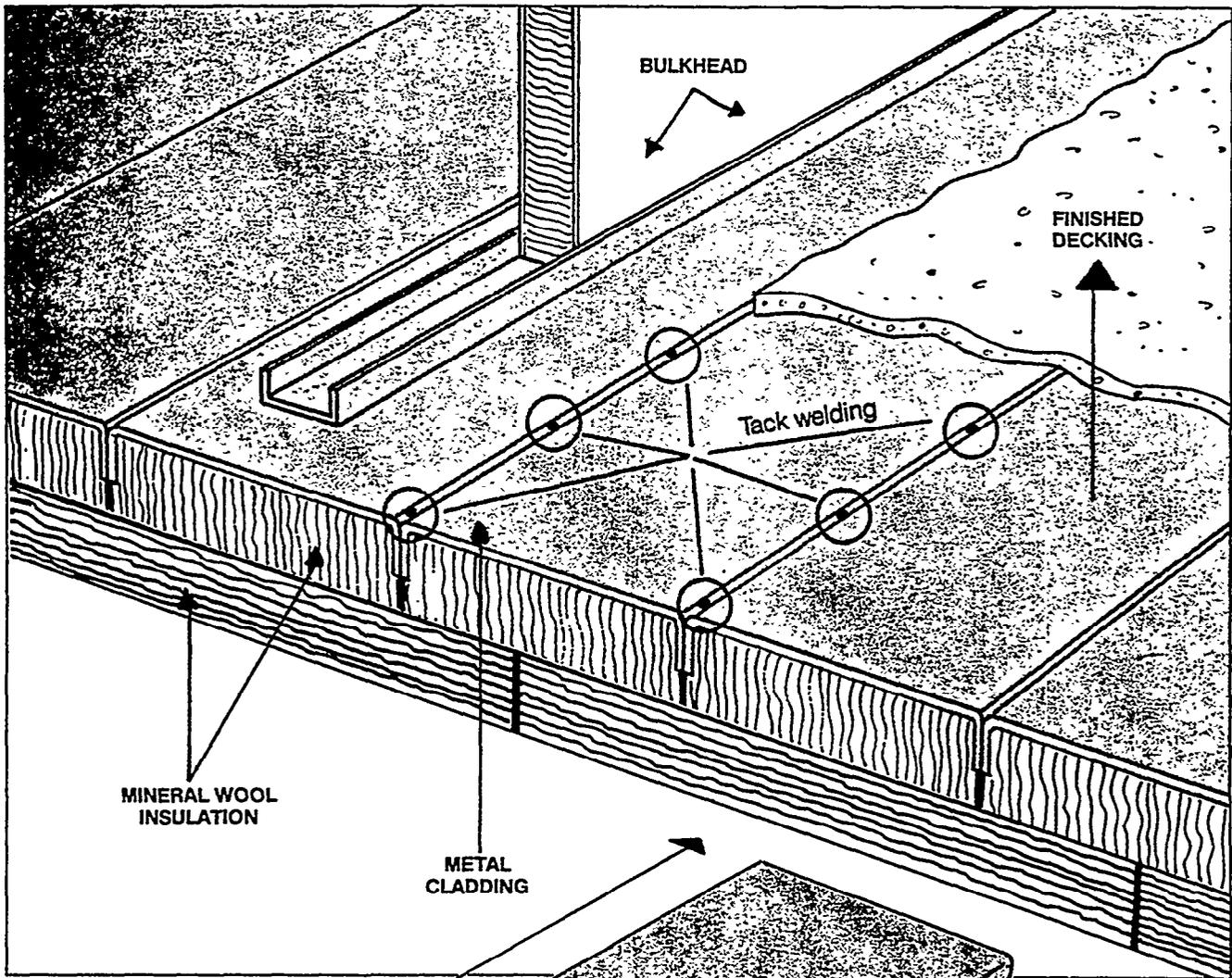
## 12. WARRANTY

Decking contractor, having installed product in accordance with Manufacturer's Instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction details are included in each Section, where applicable.

Sound Deadening...Metal Clad (continued)  
**FLOATING-FLOOR**



DESCRIPTION	Floating Floor
Dimensions	Width 470 mm length 2000 mm
Weight	A0: 28 kg/m <sup>2</sup> A-30: 32 kg/m <sup>2</sup> A-60: 34 kg/m <sup>2</sup> 30 mm insulation 200 kg/m <sup>3</sup> 50 mm insulation 200 kg/m <sup>3</sup> 60 mm: insulation 200 kg/m <sup>3</sup>
Steel:	2,5 mm ST37 galvanized
Fireclass:	A-0 - A-60

**METAL CLAD SYSTEM**

# FLOATING DECK SYSTEM... FOR SOUND DEADENING

## MARINE FLOOR PANEL AND SPINE SYSTEM

### 1. PRODUCT DESCRIPTION

The increased noise levels and vibration sounds on ships and drill rigs caused by high speed diesel engines, rig drilling equipment, high speed propeller shafts and other machinery have risen to heights considered unsafe for certain ship and rig personnel. The International Marine community has instigated studies to correct these problems and progress has been made. This Section covers floating deck systems which provide noise reduction, making areas safer from sound damage to ship personnel.

While recommended noise levels by the International Maritime Organization vary from space to space, the general range desired would be in the 70 to 85 dB range for new vessels over 1600 gross tons. A floating deck system alone cannot accomplish these levels but when combined with other sound deadening changes, it will be a factor to help reach those goals.

The floating deck systems isolate the accommodation areas from the ships' structural members and reduce both airborne and structural borne sound. The reduction of noise levels reduces fatigue, hearing loss and generally promotes higher levels of crew efficiency.

This system includes a 3/4 inch thick calcium silica marine floor panel with a laminated surface and 1/8 inch thick metal spines placed over the base material of 2 inch mineral wool with a density of 12.47 pounds per cubic foot that is laid loose on the structural decking. The marine floor panels are grooved on all four sides and the spines fit into the grooves to lock each panel to the adjacent panel and eliminating the need to weld panels together.

The marine floor panels are laid in a staggered pattern so the joints in the mineral wool are covered, thereby eliminating sound and heat through these joints. Staples are shot into the panels across the joints to secure the panels.

### 2. FEATURES

A-60 deck rating and approvals by recognized Maritime organizations.

Floating floor system which provides insulation from structural and airborne sound and includes thermal insulation.

Sound reduction index of 45 dB or higher.

Sound insulation index (Ia) of 49 dB.

Does not need to be welded.

Eliminates flow through joints that allow heat and sound to escape.

System supports "B" and "A" Class bulkhead linings completely, isolating accommodation areas from the structure of the ship.

Sound Deadening...Panel & Spine (continued)

Resists dilute acids and alkalis.

Does not harbor insects, vermin or mold growth.

Can be installed in new construction, refits or conversions.

Will not swell, shrink, warp or crack even in extremes of temperature.

3. SPECIFICATION REFERENCE

A-60 Deck Fire Test - In accordance with International Convention of Safety of Life at Sea 1974 Chapter II-2, Part A, Regulation International Maritime Organization or other internationally recognized testing agency.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Cape Marine Floor System	Cape Marine Glaskow, Scotland

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Can be used in most areas of ship or rig but find widest use in greatest noise areas, such as

- over engine rooms
- over machinery spaces
- over areas with high volume thrusters
- in tug boats where noise levels are very high.

6. LIMITATIONS OF USE

Do not use where increased cost of this system, the extra weight and additional installation time are unacceptable.

Generally not used in wet spaces.

Generally not used in higher level decks or in spaces that are not over noisy operation areas.

Generally not used in weight critical ships.

7. COST COEFFICIENT 7.98

Note: See Section on Cost Coefficients for explanation of use.

## Sound Deadening...Panel & Spine (continued)

### 8. PHYSICAL PROPERTIES

Weight - Total system 6.14 pounds per square foot.

Fire Resistance - A-60 deck rating

International Convention for Safety of Life at Sea (S.O.L.A.S.)  
1974, Chapter II - 2 Part A Regulation 3(c)

Merchant Shipping Regulations (Passenger) Regulations  
1980, Part I, Regulation I(2)

Merchant Shipping Regulations (Cargo Ship) 1980 Part I,  
Regulation I(2)

The Fishing Vessels (Safety Provisions) Rules 1975, Part  
I, Rule (5).

Sound Reduction Index 45 dB.

Sound Insulation Index 49 dB.

Density of Mineral Wool 12.47 pounds per cubic foot.

Thermal Insulation "U" Value of 0.6 w/square meter/degree centigrade.

### 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Level low spots or pitch of deck using latex mastic underlayment, Type I or II.

#### B. Mineral Wool

Lay loose on the structural deck 2 inch thick mineral wool sheets having a density of 12.47 pounds per cubic foot. Butt sheets against each other and up to the bulkhead.

#### C. Marine Floor Panels and Metal Spines

The marine floor panels, 3/4 inch thick, 2 foot wide and 7 foot 10-1/2 inches long are laid over the mineral wool. Lay in staggered pattern to ensure that panel joints do not coincide with the joints in the mineral wool.

## Sound Deadening...Panel & Spine (continued)

Insert spines in the floor panels and staple panels together. Seal joints and perimeter with an elastic caulking material.

Panels can be cut with a jig saw to fit panels around various bulkhead projections and angles. If pipe or other service lines come through deck, weld sleeve to deck, pass lines through it and pack sleeve with mineral wool or Class "A" insulation.

### D. Bulkhead and Furniture

Install "U" channel into the floor panels with screws and erect the non-structural bulkhead system in accordance with manufacturer's instructions.

Furniture and accommodation are fastened to the floor panels with self tapping screws or into a plug inserted into the panel.

### E. Finished Decking

Install finished decking such as carpet, sheet vinyl, vinyl composition tiles, parquet wood flooring or trowel applied decking systems with the proper adhesive or deck preparation, following recommendations of the finished decking manufacturer.

## 10. CAUTIONARY NOTES

At uninsulated, exterior bulkheads build a 3 inch wide gutter of mild steel to catch and remove condensation and prevent water from penetrating the system. Where this is done, be certain to install the mineral wool on the underside of the structural deck directly under the deck gutter and down the exterior bulkhead a minimum length of 15 inches in each direction to retain "rated" deck approval.

At interior bulkheads fit material right to bulkhead and apply a bead of elastic caulking material at the juncture of the bulkhead and floating deck material.

Isolate system at exterior bulkheads by installing elastomeric caulking.

If very heavy equipment is to be installed, such as captain's chair, etc., it may be necessary to fasten this equipment to the structural deck and install the floating deck system around it.

When installing finish decking material, abrade surface with sand paper and wipe clean. Use only the manufacturer's recommended primer or adhesive to obtain full contact with the metal cladding.

## 11. MAINTENANCE

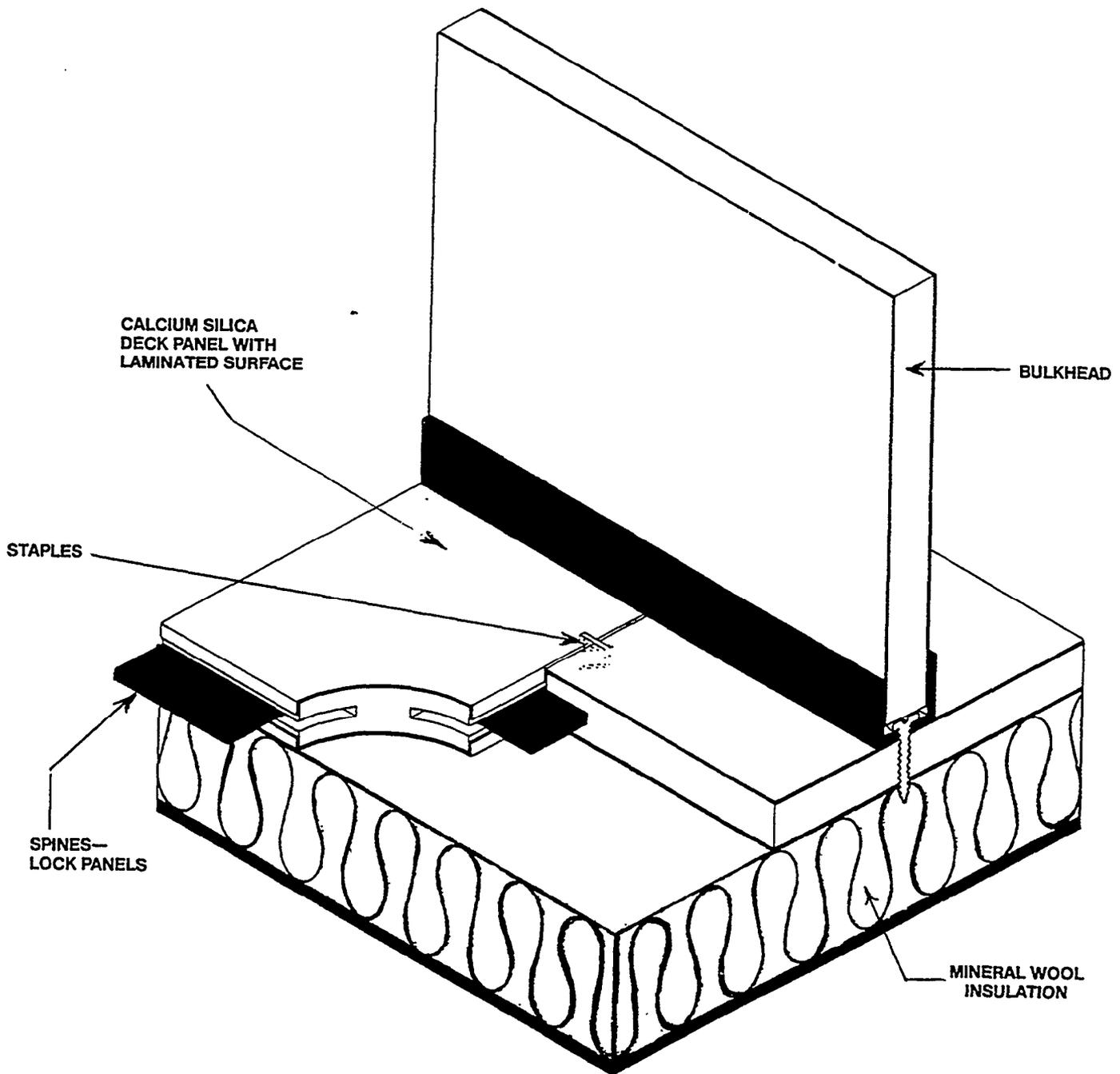
These decks are covered with a finished decking material and do not require maintenance program.

12. WARRANTY

Decking contractor, having installed product in accordance with Manufacturer's Instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction details are included in each Section, where applicable.



**FLOOR PANEL and SPINE SYSTEM**

**Solid Color Monolithic**

## SOLID COLOR MONOLITHIC SYSTEM

### LATEX MASTIC AND NEOPRENE DECK COVERING - TYPE II

#### 1. PRODUCT DESCRIPTION

A trowel applied latex mastic or resin emulsion deck covering which includes inorganic powders and aggregates mixed to a mortar consistency for ease of application.

Material is generally installed 1/4 inch thick and has a solid color finish. Material can be installed thicker or thinner than 1/4 inch and can be turned up the bulkhead as a cove base.

Finished product can be modified to meet varying conditions of use with high chemical resistance and/or high abrasion resistance. System meets all specification requirements regarding non-slip properties.

#### 2. FEATURES

Versatile decking system usable in most areas of ships and drill rigs.

High abrasion resistance.

Good to high chemical resistance.

Non-slip surface that meets or exceeds Federal specification.

Use in wet spaces, in conjunction with resin type waterproof membrane.

Fire retardant system.

Excellent adhesion to deck surfaces.

#### 3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION	59-MA-7
U.S. DEPARTMENT OF DEFENSE	MIL-D-3134 - Type II

Note: Specifications listed are a reference for products in this section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Latex Type II (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Dex-0-Tex Neotex 28	Crossfield Products Corp.
Dex-0-Tex P-61	Crossfield Products Corp.
Monile 200	Mameco International
Selbatuf	Selby, Battersby & Co.
Monoprene N-27	Weatherguard/Marbleloid Products
Promdek Direct Bond	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Galleys  
Heads  
Work spaces  
Passageways  
Sleeping accommodations  
Showers and wet spaces  
Chart rooms  
Commissary spaces  
Bakeries  
Foyers  
Wheelhouses  
Reefer boxes  
Most spaces in ships and rigs.

6. LIMITATIONS OF USE

Solid color finish would not provide decorative surface such as in terrazzo.

Do not store material or attempt to install it when deck temperature is 40° F. or lower.

Do not thin emulsion as physical properties will be harmed.

Latex Type II (continued)

7. COST COEFFICIENT      Latex 2.40              Neoprene 2.63

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.8 pounds, per square foot per 1/4 inch thick.

Water Absorption - Not more than 5% based on weight after 24 hour immersion testing.

Adhesive Strength - A minimum of 65 pounds per square inch.

Fire Resistance - To be rated a minimum of fire retardant when tested in accordance with MIL-STD-1623. ASTM - E-162 - flame spread and smoke deposited - 25 or less.

Compressive Strength - 5,500 psi at 1/4 inch thickness.

Indentation Resistance - Not to exceed 7% of thickness after 30 minute load of 2000 pounds.

Impact Resistance - Not to exceed 1/16 inch of permanent indentation after two 8 foot drops of a 2 pound steel ball. There should be no chipping, cracking or loss of adhesion.

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	<b>Dry</b>	Wet	Oily	<b>Dry</b>	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

## Latex Type II (continued)

### B. Bond or prime coat

#### 1. Flexible Deck System

Trowel apply fluid mix of neoprene emulsion and recommended powders to the deck. While still wet pass a corn broom to obtain rough texture.

#### 2. Rigid Decks

Mix appropriate powders with prime coat emulsion to make a fluid mix and apply a thin slurry coat.

### C. Body Coat

Make stiff mix of resin and powders that produce a slump of approximately 1/3 the height of the bucket. Apply by trowel to thickness specified.

### D. Sanding Operation

If body coat is installed smooth enough sanding is not necessary. If sanding is required use 3M - #3-1/2 grit open coat paper.

### E. Grout Coat Application

Make fluid mix of grout powders and emulsion and apply a thin scrape coat to fill in pin holes. In some cases a second grout coat may be required. Always sand surface after each grout coat.

### F. Topcoat Application

Apply two applications of pigmented resinous topcoats, in color and resin system selected

- Epoxy resin type is tough wearing system with good chemical resistance and is free of solvents
- Polyurethane type has high abrasion resistance but is high in solvent content
- Acrylic type high in non-slip characteristics for wet spaces and light traffic areas.

## 10. CAUTIONARY NOTES

Do not store where emulsion can freeze.

Never add water to emulsion.

At completion of job allow 3 to 5 days curing time before allowing traffic on decking.

Latex Type II (continued)

Wash residue off equipment before it hardens on equipment.

Do not install over decks with thick prime coats. Remove to clean steel.

Temperatures mentioned in manufacturer's instructions refer to deck temperature and not temperature of the air.

11. MAINTENANCE

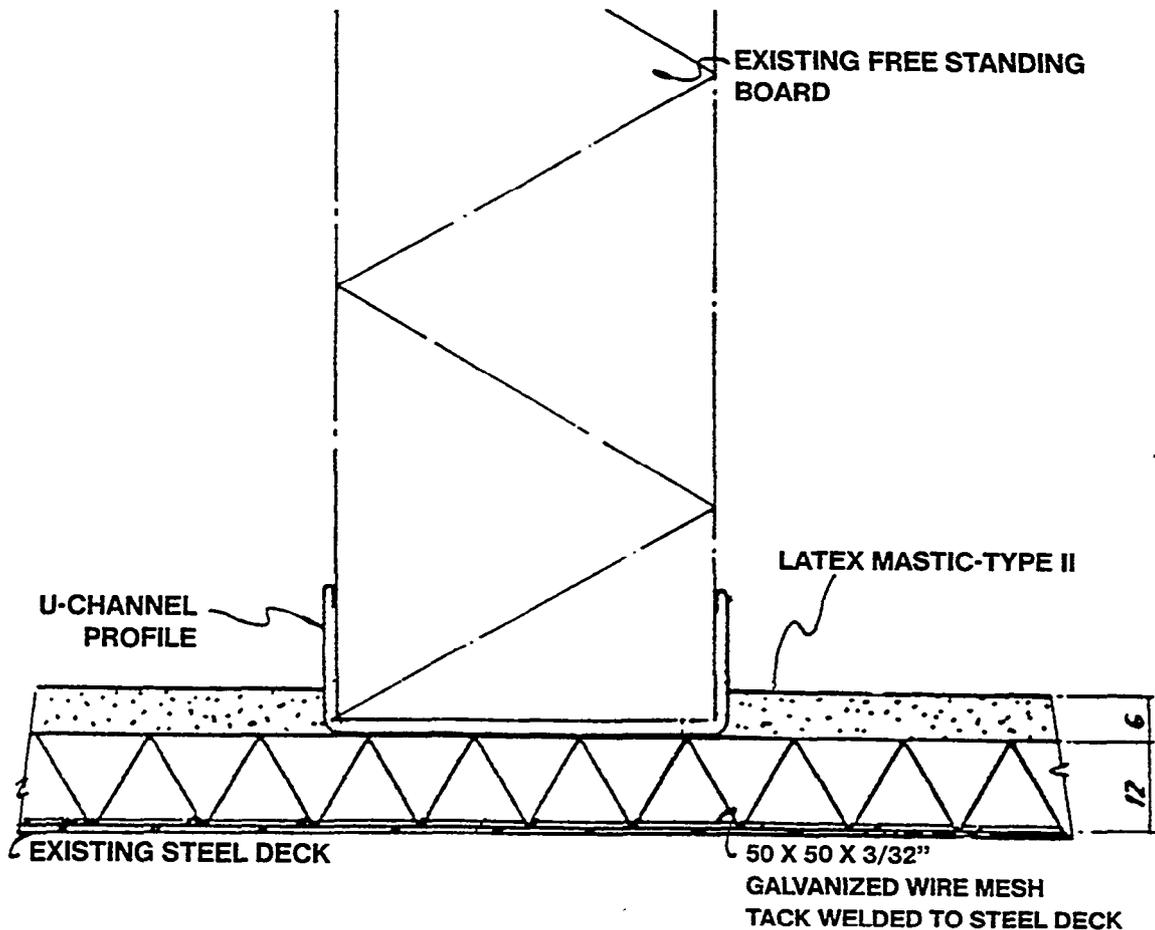
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## SOLID COLOR MONOLITHIC SYSTEM

### TWO COMPONENT RESIN, SOLID COLOR DECK SYSTEM

#### I. PRODUCT DESCRIPTION

System is a 100% solids, two component, trowel applied epoxy resin mixed with a powder and trowel applied to specified thickness.

Finish system is a solid color and is generally installed 1/4 inch thick. It withstands heavy traffic, has high flexibility, compressive strength and chemical resistance.

Product can be installed over an underlayment, directly on the steel deck and turned up the bulkhead as a cove base.

#### 2. FEATURES

Excellent adhesion

High flexibility

Non-slip surface meets or exceeds federal specification

Fire retardant

No oil or water absorption.

#### 3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION

59-MA-7

U. S. DEPARTMENT OF DEFENSE

MIL-D-3134-Type II

Note: Specifications listed are a reference for products in this section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

##### TRADE NAME

##### MANUFACTURER

Cheminert

Crossfield Products Corp.

Epoxy 10

General Polymers

Monile E-330

Mameco

Selbaclad

Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Two Component Resin (continued)

5. AREAS OF GENERAL USE

Work spaces

Chemical storage areas

Laboratories

Food preparation areas

High impact areas

Cargo storage areas

6. LIMITATIONS OF USE

Do not use where deck temperatures exceed 150° F.

Do not install where surface is wet during installation.

Do not install where a decorative product is desired.

Sufficient cure time between application steps must be made available to installer.

7. COST COEFFICIENT 3.00

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.8 pounds, per square foot per 1/4 inch thick.

Water Absorption - Not more than 5% based on weight after 24 hour immersion testing.

Adhesive Strength - A minimum of 65 pounds per square inch.

Fire Resistance - To be rated a minimum of fire retardant when tested in accordance with MIL-STD-1623. ASTM - E-162 - flame spread and smoke deposited - 25 or less.

Compressive Strength - 5,500 psi at 1/4 inch thickness.

Indentation Resistance - Not to exceed 7% of thickness after 30 minute load of 2000 pounds.

Impact Resistance - Not to exceed **1/16** inch of permanent indentation after two 8 foot drops of a 2 pound steel ball. There should be no chipping, cracking or loss of adhesion.

## Two Component Resin (continued)

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

### 9. APPLICATION METHODS

10. The Manufacturer's Application Instructions must be strictly followed.

General Application steps include.

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

#### B. Bond or Prime Coat

##### 1. Flexible Deck System

Trowel apply fluid mix of neoprene emulsion and recommended powders to the deck. While still wet pass a corn broom to obtain rough texture.

##### 2. Rigid Decks

Mix resin and curing agent thoroughly and apply thin coat, by trowel, to deck surface.

#### C. Body Coat

Mix resin and curing agent until thoroughly blended. Add powders to mixture and mix for about 1-1/2 minutes and apply by trowel to specified thickness. Body coat should be installed into wet prime coat or dry prime coat into which sand was sprinkled.

#### D. Grout Coat

Mix resin, curing agent and powders as was done for prime coat for rigid decks and apply scrape coat over body coat that has cured for 16 hours.

After first grout coat has cured, apply second grout coat following same procedures.

## Two Component Resin (continued)

### E. Topcoat Application

Apply two separate applications of pigmented topcoat, allowing sufficient cure time between each coat. Apply with trowel and then pass a short nap mohair roller to provide even color and texture.

### 10. CAUTIONARY NOTES

Always store material in area 60° F. or higher.

Allow a -minimum of 3 to 5 days curing time before allowing any traffic on the deck.

Installation temperature of deck and for curing period should be 65° to 80° F.

Clean equipment with a solvent like Toluene or Xylol before material hardens.

Proper deck preparation is most important prior to installation starting. See Section on Deck Preparation.

### 11. MAINTENANCE

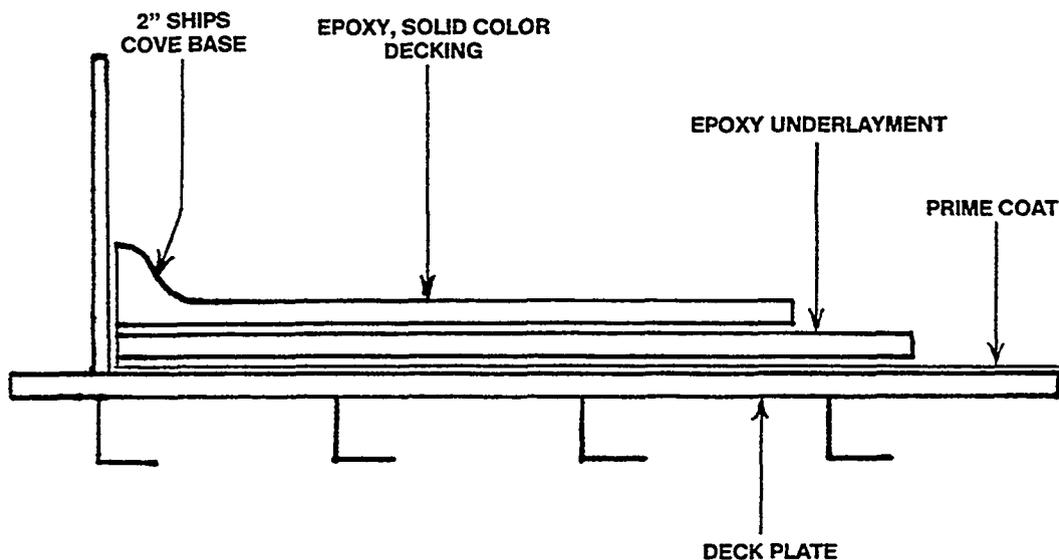
Manufacturer's Maintenance Instructions to be followed.

### 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion **of** installation.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



SOLID COLOR MONOLITHIC SYSTEM

MAGNESIUM OXYCHLORIDE CEMENT (MAGNESITE) DECKING

1. PRODUCT DESCRIPTION

A trowel applied, monolithic decking that consists of magnesium oxychloride cement. It is a pigmented mixture that produces a solid color deck system.

System is bonded to the deck through a mechanical or chemical bonding method. The system is fireproof, grease resistant, produces a smooth surface, has good non-slip qualities and is easy to maintain.

Can be used in both new construction and renovation work. Newly installed deck can be put into service the next day.

Material is listed by U.S. Coast Guard, and many international maritime countries as an A-60 rated deck. Material does not contain asbestos.

2. FEATURES

U.S.C.G. and other international approvals as a rated A-60 deck material.

Fireproof deck material.

Withstands much abuse.

Excellent resistance to oils and grease.

Can be put into service within 24 hours.

3. SPECIFICATION REFERENCE

MARITIME ADMINISTRATION	59-MA-2C
U.S. DEPARTMENT OF DEFENSE	MIL-D-16680
U.S. COAST GUARD	164.006 A-60 Rated Deck

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Magnesite (continued)

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Fibretuff X5	Fraser-Edwards Company
Kompolite	Weatherguard/Marbleloid
Loralite	Willard Marine Decking, Inc.
Selbalith Hard Finish	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

#### 5. AREAS OF GENERAL USE

Food preparation

Galley

Bakery

Meat cutting area

Crew quarters

Work spaces

Storage areas

Mess rooms

Ship's stores

#### **6.** LIMITATIONS OF USE

Do not install in areas of constant wetness, such as showers.

Do not let magnesite come in direct contact with aluminum or steel as an electrolytic reaction will occur. An insulating bonding coat must be installed.

Do not use on exterior decks.

Do not install where a decorative deck material is desired.

#### 7. COST COEFFICIENT 4.20

Note: See Section on Cost Coefficients for explanation of use.

Magnesite (continued)

## 8. PHYSICAL PROPERTIES

Weight - Not to exceed 3 pounds, per square foot per 1/4 inch thickness.

Fire Resistance - Shall conform to fire test requirements set forth in Federal Test MIL-STD-1623.

Water Absorption - Not to absorb more than 7 percent by weight after 24 hour immersion test.

Indentation - Shall show 0.003 inch, or less, when tested with load of 2000 pounds over 1 square inch for a period of 30 minutes.

Resistance to Impact - Shall not be more than 1/16 inch permanent indentation after two drops of a 2 pound steel ball from a height of 8 feet.

Non-slip Properties - When tested in accordance with MIL-D-16680 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding-Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.3	0.5	-	0.3	0.4	-
Rubber	0.7	0.7	0.5	0.5	0.8	0.3

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual,

### B. Bond and/or anti-corrosive coating

#### 1. Steel decks

- (a) Butterfly clips are welded 9 to 12 inches on center and 2 inches in from bulkhead, in accordance with manufacturer's instructions.

Apply two full coats of anti-corrosive coating, similar to product Komul, over the deck and the butterfly clips.

- (b) Install neoprene bonding system over steel deck and pass a corn broom to provide a texture surface, in accordance with manufacturer's instructions to a thickness of approximately 1/8 inch.

- (c) Install expanded metal lath by welding to the deck on 18 inch centers and coat with anti-corrosive coating similar to the product Komul.

Magnesite (continued)

2. Aluminum decks

Install neoprene bonding system, as stated in 1 (b).

C. Body Coat

Mix magnesite powder with the previously prepared magnesium chloride gauging solution so the mixed material has a sump of 1/2 a bucket.

Apply mixed material to the deck using a darby, then a wood float and hard finish with a steel trowel to the specified thickness when proper set has been reached.

Install cove base, using similar application steps, to a height of 2 inches as a ship's cove and 3 to 4 inches as a full cove base, where called for.

D. Sealer Coat

Allow body coat to dry for 1-2 days and lightly steel wool surface and apply two coats of an oil base sealer using a lambs wool applicator.

10. CAUTIONARY NOTES

Use only magnesium chloride mixed with fresh water for gauging liquid. Mix solution the day before using to allow for heat dissipation.

Always use a neoprene bonding coat when installing over an aluminum deck or contacting an aluminum bulkhead.

Always use a full coat of an anti-corrosive coating when applying over a steel deck or coming in contact with steel fittings or bulkhead.

Deck temperature should be 60° to 75° F. during installation and setting period.

Never mix magnesite powder with water - always use magnesium chloride gauging solution.

Do not wash for two weeks to allow material to fully set.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

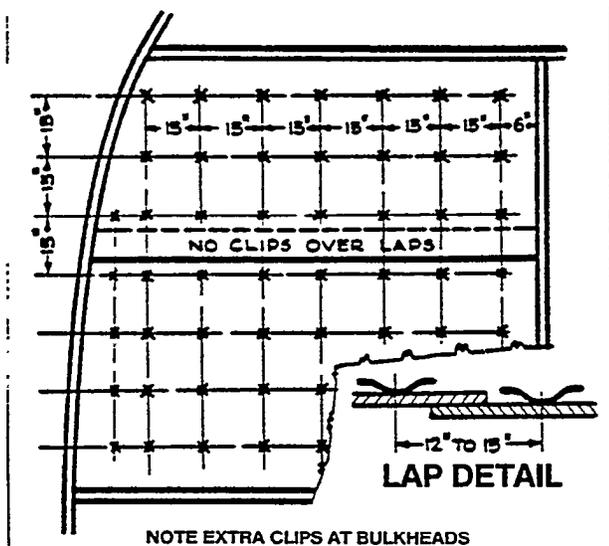
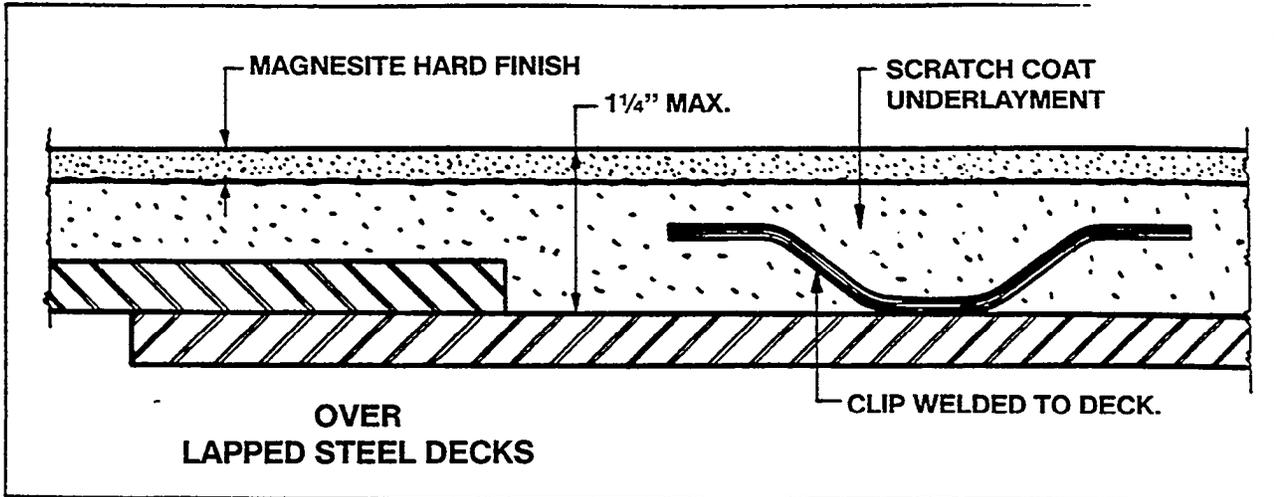
12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

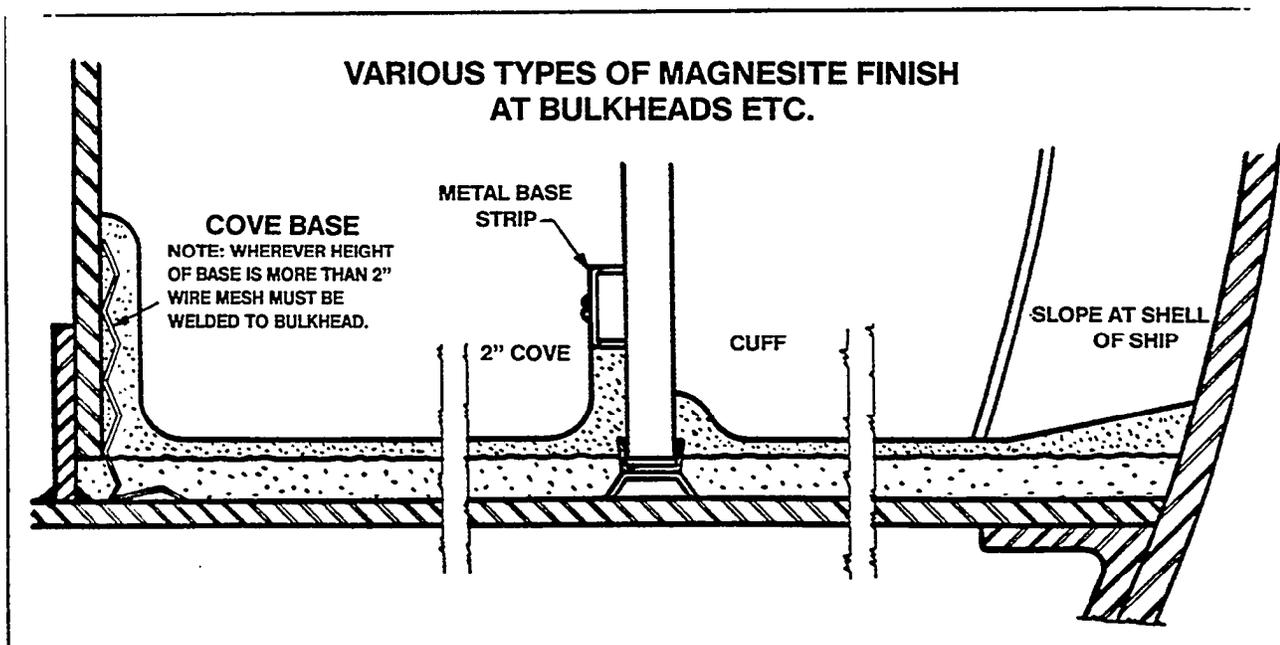
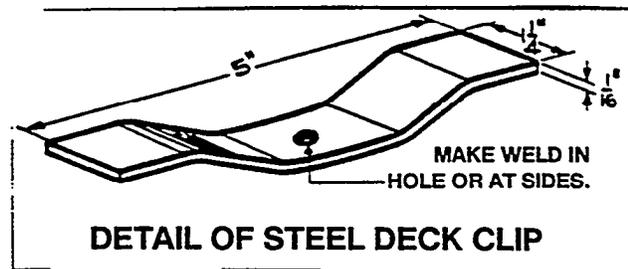
13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# MAGNESIUM OXYCHLORIDE CEMENT (MAGNESITE) DECKING DETAILS



PLAN DIAGRAM SHOWING TYPICAL LAYOUT FOR CLIPS



## Decorative Systems

## DECORATIVE SYSTEMS

### POLYMERIC DECORATIVE QUARTZ DECKING

#### EPOXY BROADCAST TYPE

##### 1. PRODUCT DESCRIPTION

A two component, 100% resin, epoxy system into which quartz aggregate is sprinkled to an approximate thickness of 1/8 inch.

System is a hard wearing decking that also has good chemical resistance and is fire retardant.

Cove base can be installed but this is best done using a steel trowel for application.

A wide variety of color combinations are available. Finish can be high gloss or low lustre sheen. If and when necessary, it can be resealed to provide long service life.

##### 2. FEATURES

Provides a decorative finish.

Built-in, non-slip surface.

Exhibits high wear resistance.

Excellent chemical properties.

Relatively easy to install.

Fire retardant.

##### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE      MIL-D-24613 Type 1 Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Decorative - Epoxy Broadcast (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
T-15	American Safety Technologies, Inc.
Decor-Dek	Crossfield Products Corp.
Selbatwede 41	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Heads

Galleys

Habitability spaces

Wet spaces

Passageways

6. LIMITATIONS OF USE

Lighting during installation must be quite good.

Built-in, non-slip texture requires a little more effort in cleaning.

7. COST COEFFICIENT 3.33

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds, for 30 minutes shall indent a maximum of 10 percent of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Decorative - Epoxy Broadcast (continued)

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

The Manufacturer's application instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use epoxy resin type.

B. Divider Strip

Install "L" shaped divider strip at toe of base and other juncture areas, as required.

C. Receiving Coat

Trowel apply a pigmented or clear epoxy by trowel to receive the quartz aggregate. Pass short nap mohair roller to smooth trowel marks.

D. Broadcast Coat

Quartz aggregate to be premixed into selected color combination. Broadcast aggregate, by hand or blower, into wet receiving coat until area looks dry and fully covered with aggregate.

E. Second Broadcast Coat

The day following first broadcast sweep up loose aggregate and repeat steps "C" and "D".

## Decorative - Epoxy Broadcast (continued)

### F. Grout Coats

Sweep up loose aggregate and apply two grout coats, generally on separate days. Install clear epoxy resin and curing agent with trowel or squeegee and pass short nap mohair roller to leave textured surface

### G. Finish Coat

One coat of gloss or low lustre clear epoxy is to be applied, as required.

## 10. CAUTIONARY NOTES

Have area well lighted.

Temperature of deck to be 55° F. or higher.

No open flames should be permitted in area during installation and cure.

When applying grout and finish coat installer should always maintain a puddle of epoxy material to keep a wet edge.

Deck must be free of water during installation.

## 11. MAINTENANCE

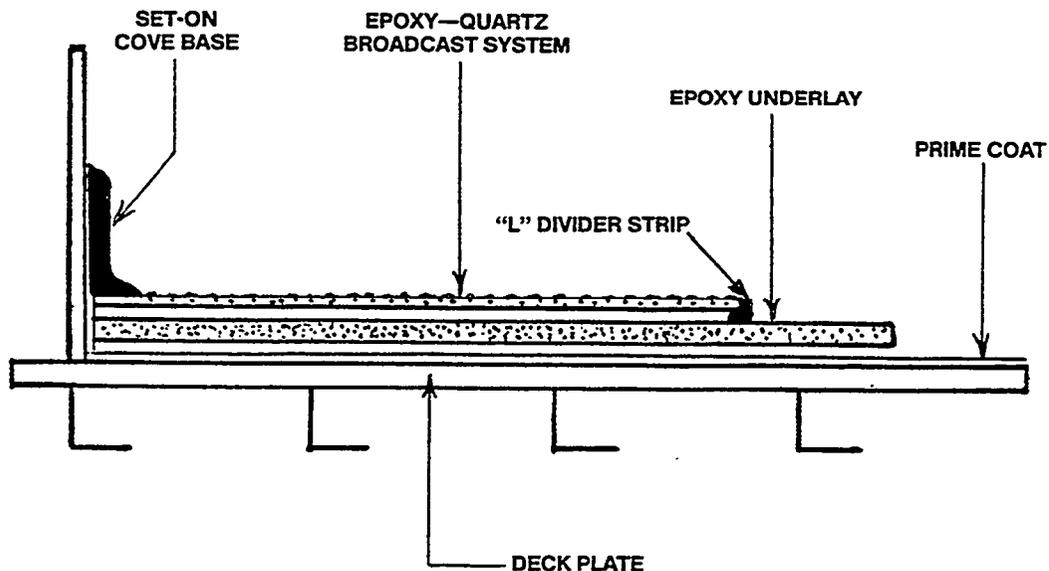
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## DECORATIVE SYSTEMS

### POLYMERIC DECORATIVE QUARTZ DECKING

#### EPOXY TROWEL TYPE

#### 1. PRODUCT DESCRIPTION

A two component, 100% resin, epoxy system with decorative quartz aggregate that is trowel applied to approximately 1/8 to 1/4 inch thick.

System is a hard wearing decking material that also has very good chemical resistance. Product can be installed in varying non-slip textures, as specified. It can also be installed as a cove base on the bulkheads. System is fire retardant and quite durable.

This system can be installed with a high gloss or low sheen finish. A wide selection of color combinations are available. If and when necessary, it can be resealed to provide long service life.

#### 2. FEATURES

Decorative finish.

Excellent chemical properties.

Built-in, non-slip surface.

Exhibits high wear resistance.

Fire retardant.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE      MIL-D-24613 Type I Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Decorative - Epoxy Trowel (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
T-10	American Safety Technologies, Inc.
Decor-Dek	Crossfield Products Corp.
Selbatwede 71	Selby, Battersby & Co.
- Selbatwede HD	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Heads

Galleys

Passageways

Wet spaces

Habitability spaces.

6. LIMITATIONS OF USE

Requires experienced mechanic to install.

Lighting during installation must be quite good.

7. COST COEFFICIENT 4.74

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed **1/16** inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load **of** 2000 pounds, for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Decorative - Epoxy Trowel (continued)

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	<b>Dry</b>	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

**9. APPLICATION METHODS**

The Manufacturer's application instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use epoxy resin type.

B. Divider Strip

Install "L" shaped divider strip at toe of base and other juncture areas, as required.

C. Prime Coat

Mix epoxy resin and curing agent in recommended proportions and trowel apply to deck.

D. Body Coat

Mix epoxy resin and curing agent, incorporate quartz aggregate and continue to mix until a uniform mixture is obtained. Trowel into wet prime coat and tighten surface to thickness specified.

Installer should have light in front to show where any trowel marks are occurring and should smooth them out.

## Decorative - Epoxy Trowel (continued)

### E. Grout Coat

Apply two coats, generally one day apart, of epoxy resin and curing agent with a trowel or squeegee. Pass a short nap, mohair roller over surface to provide uniform texture.

### F. Finish Coat

One coat of gloss or low lustre clear epoxy is to be applied, as required.

## 10. CAUTIONARY NOTES

Have area well lighted.

Temperature of deck to be 55° F. or higher.

No open flames should be permitted in area during installation and cure.

When applying grout and finish coat installer should always maintain a puddle of epoxy material to keep a wet edge.

Deck must be free of water during installation.

## 11. MAINTENANCE

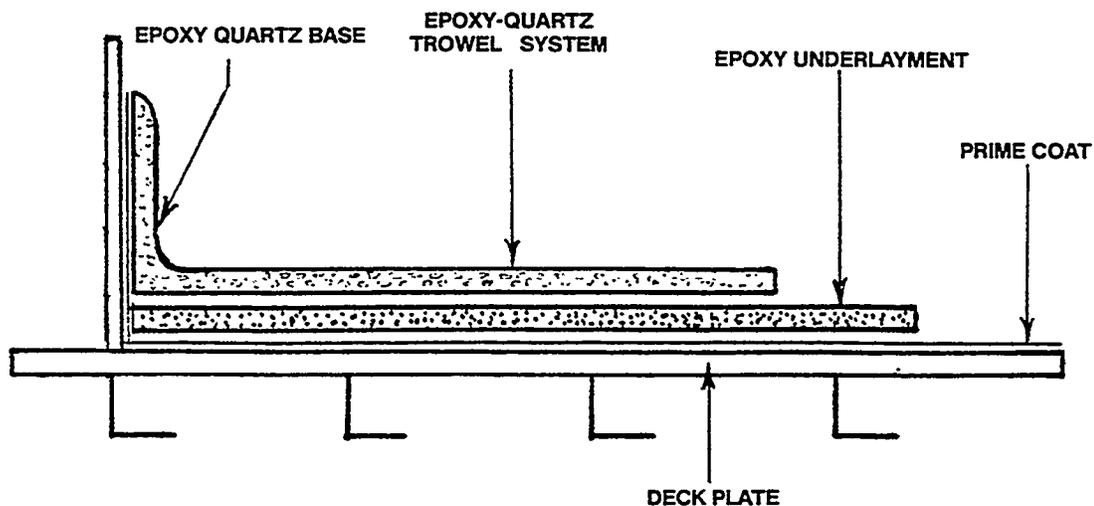
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## DECORATIVE SYSTEMS

### POLYMERIC DECORATIVE FLAKE DECKING

#### EPOXY TYPE

##### 1. PRODUCT DESCRIPTION

An epoxy resin system, either clear or pigmented into which colored vinyl chips are broadcast to produce a decorative decking system.

The colored vinyl chips are encapsulated in either a pigmented or clear epoxy resin to provide 100% flake coverage.

Light weight makes this system ideal for use on weight critical ships. System is fire retardant and is recommended for moderate traffic in interior areas of ships.

##### 2. FEATURES

System requires minimum skill levels for installation.

System weighs 0.36 pounds per square foot at 40 mils thickness and is an excellent selection for weight critical ships and specific areas.

Available in wide range of color combinations.

Fire retardant.

Short installation time.

Good abrasion resistance.

##### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE      MIL-D-24613 Type I, Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Decorative - Epoxy Flakes (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
CF-100	American Safety Technologies, Inc.
Dex-0-Tex Colorflake M	Crossfield Products Corp.
Selbaflor	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

All weight critical areas

Habitability areas

Commissary spaces

Laboratory

Hospital/Infirmary areas

Recreation areas

Chapels

Service shops.

**6. LIMITATIONS OF USE**

Not to be installed in areas of heavy foot traffic or fork lift truck traffic.

Usually requires an underlayment when installed in ship construction on steel or aluminum decks.

Cove base installations are difficult to get smooth because of packing of flakes on vertical surface.

Generally installed in interior installations only.

Not usually installed where a heavy, non-slip surface is required.

Not as durable as marble or quartz aggregate polymeric systems.

Decorative - Epoxy Flakes (continued)

7. COST COEFFICIENT 2.18

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds, for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

**The Manufacturer's application instructions must be strictly followed.**

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use epoxy resin type.

B. Underlayment (if required)

Trowel apply, to thickness required, a filled epoxy underlayment or a light weight neoprene underlayment, similar to materials that meet MIL-D-3135 Type 1.

## Decorative - Epoxy Flakes (continued)

### C. Receiving Coat

Use either a clear epoxy or a pigmented epoxy catalyzed system to receive color flakes. Mix resin and curing agent in recommended proportions. Apply with trowel or squeegee and smooth out trowel marks with short nap, mohair roller.

### D. Flaking Application

Broadcast, pre-mixed flakes in colors selected, into the receiving coat while it is still wet. Flakes must be sprinkled in uniform thickness until full area is covered. Mechanic should wear golf shoes to walk into wet receiving coat.

Note: Maximum job satisfaction occurs when flake pattern is a blend of colors rather than a solid color.

### E. Grout Coat

Sweep up flakes that have not adhered when receiving coat system has cured. Apply one coat of clear epoxy coating over flakes with trowel or squeegee and pass a short nap mohair roller over coating to smooth the epoxy.

### F. Sanding

When first grout coat has cured lightly, sand the surface to eliminate any curled edges of the flakes. Remove sanding dust with vacuum pickup. Mechanic must not let any dirt get on the floor or next coat will lock dirt in the system.

### G. Finish Coat

Apply clear epoxy finish coat exactly as was done in Step E.

If a smooth finish is desired additional finish coats can be applied.

## 10. CAUTIONARY NOTES

Mechanics must keep dirt, oil or grease from getting on the floor after the flaking operation has been complete as clear finish coats will overlay them and make them a permanent part of the finished floor.

Blend flakes thoroughly to have uniform color distribution but blend them gently to prevent breaking them into fine powder.

Deck must be free of water during installation and curing period.

Important to do an "extra-good" job of removal of sanding dust before applying clear grout and finish coats.

Be certain to properly ventilate area during installation.

Decorative - Epoxy Flakes (continued)

11. MAINTENANCE

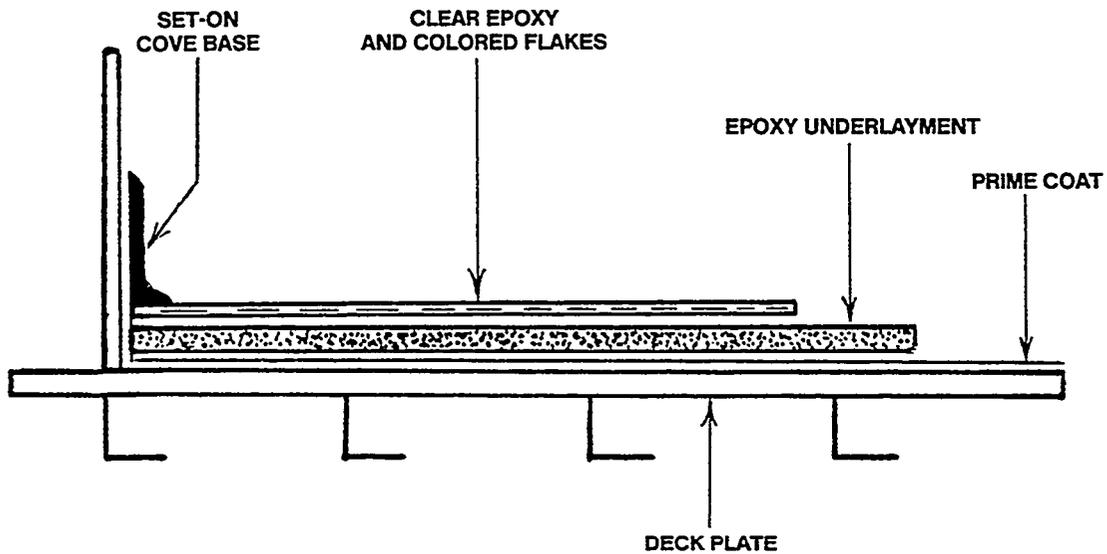
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## DECORATIVE SYSTEMS

### POLYMERIC DECORATIVE TERRAZZO DECKING

#### EPOXY WITH MARBLE CHIPS

##### 1. PRODUCT DESCRIPTION

A two component, 100% resin, epoxy system with marble aggregate that is trowel applied approximately **3/16** inch thick.

System produces a terrazzo like appearance but eliminates the grinding, grouting and polishing operations of ground terrazzo.

The system is quite durable, fire retardant and long wearing. If and when necessary it can be resealed to provide long life.

##### 2. FEATURES

Decorative, terrazzo appearing, finish.

Excellent wearing qualities.

Excellent chemical resistance.

Built-in non-slip surface.

Exhibits high wear resistance.

Fire retardant.

##### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE

MIL-D-24613 Type I Class 3

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Decorative - Epoxy Marble (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
T-10	American Safety Technologies, Inc.
T-100	American Safety Technologies, Inc.
Dex-0-Text Terrazzo M	Crossfield Products Corp.
Terracolor	Crossfield Products Corp.
Selbalux	Selby, Battersby & Co.
West-Dek CS-250	Westpac Products Co., Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Habitability spaces

Galleys

Food preparation areas

Wet spaces.

6. LIMITATIONS OF USE

Deck must be free of moisture.

Should have good lighting during installation.

Generally not installed in shops and work areas.

7. COST COEFFICIENT 5.05

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds, for 30 minutes shall indent a maximum of 10 percent of thickness.

Decorative - Epoxy Marble (continued)

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use epoxy resin type.

### B. Divider Strip

Install "L shaped divider strip at toe of base and other juncture areas, as required.

### C. Prime Coat

Mix epoxy resin and curing agent in recommended proportions and trowel apply- to deck.

### D. Body Coat

Mix epoxy resin and curing agent, incorporate marble aggregate and continue to mix until a uniform mixture is obtained. Trowel into wet prime coat and tighten surface to thickness specified.

Installer should have light in front to show where any trowel marks are occurring and should smooth them out.

## Decorative - Epoxy Marble (continued)

### E. Grout Coat

Apply two coats, generally one day apart, of epoxy resin and curing agent with a trowel or squeegee. Pass a short nap, mohair roller over surface to provide uniform texture.

### F. Finish Coat

One coat of gloss or low lustre clear epoxy is to be applied, as required.

## 10. CAUTIONARY NOTES

Have area well lighted.

Temperature of deck to be 55°F. or higher.

No open flames should be permitted in area during installation and cure.

When applying grout and finish coat installer should always maintain a puddle of epoxy material to keep a wet edge.

Deck must be free of water during installation.

## 11. MAINTENANCE

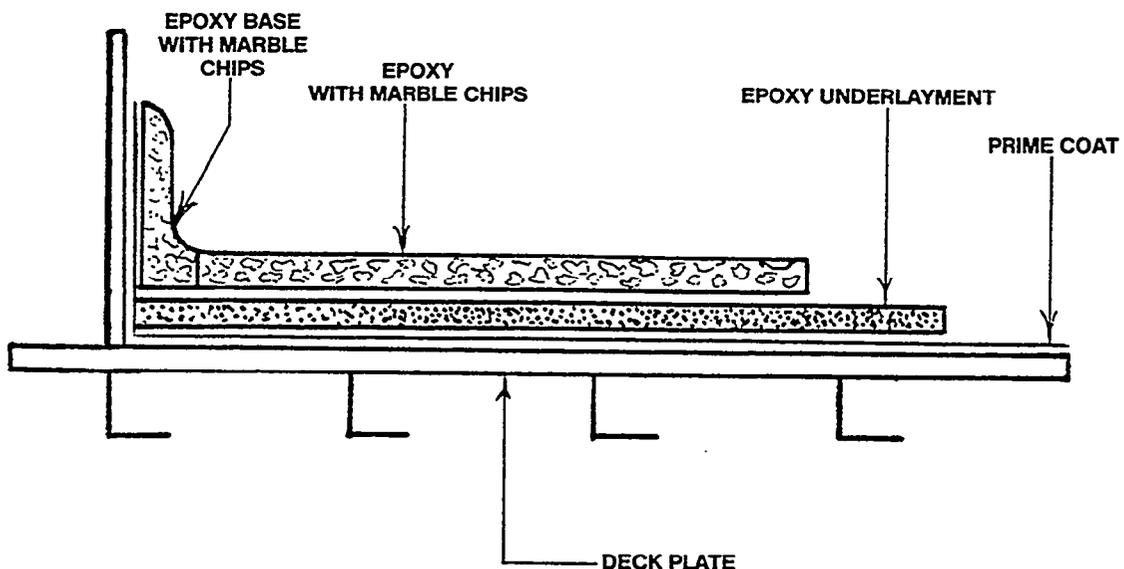
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## DECORATIVE SYSTEMS

### POLYMERIC DECORATIVE FLAKE DECKING

#### ELASTOMERIC URETHANE TYPE

#### 1. PRODUCT DESCRIPTION

A polyurethane elastomeric coating with a selection of vinyl color flakes in various color combinations. Provides a decorative deck system for interior applications.

The finished system is generally installed 1/8 inch thick and provides high abrasion resistance, flexibility and is fire retardant.

Generally the color flake pattern is installed over the entire area. Attempts to install the color flakes in a random pattern have not been satisfactory as it is difficult to attain uniformity of flake distribution.

#### 2. FEATURES

Provides high amount of flexibility which reduces movement and vibration cracking.

Fire retardant, conforming to fire test MIL-STD-1623.

High impact, corrosion and abrasion resistance.

The wide range of base and flake colors provide numerous color combinations.

Moderate chemical resistance.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE MIL-D-24613 Type II Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

TRADE NAME

MANUFACTURER

Proreco I

Products Research & Chemical  
Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Decorative - Urethane Flakes (continued)

5. AREAS OF GENERAL USE

In general purpose habitability areas

Passageways

Library

Mess decks and serving lines

Sick bay

Berthing areas

Lounge areas.

6. LIMITATIONS OF USE

This system is only used on interior spaces.

Install in areas with light to medium personnel traffic.

Cost of material is considered high.

Numerous application steps and coats.

Surface requires reapplication of clear glaze from time to time because of traffic wear.

Difficult to remove material, if ever necessary, and requires use of a special machine.

7. COST COEFFICIENT 5.24

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds, for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Decorative - Urethane Flakes (continued)

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0 . 1

**9. APPLICATION METHODS**

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use an epoxy resin or urethane resin type.

Metal decks must be abraded to a minimum of a bright metal finish preferably with a shot blast machine or other satisfactory abrader.

B. Prime Coat

Immediately after abrading surface apply manufacturer's recommended prime coat to reduce corrosion possibilities. If prime coat is not covered within 24 hours, reprime the surface.

C. Underlayment . . . (if required)

Install sufficient underlayment to fill in low spots or to level or pitch deck as required. Install type underlayment recommended by decking manufacturer. An epoxy resin underlayment provides a good base for intercoat adhesion of this system.

D. Bond Coat

Apply manufacturer's recommended primer to provide good bonding between the underlayment and the urethane base coat.

E. Base Coat

Thoroughly mix both components and apply to the deck in small quantities to prevent a thick buildup, using a conventional or notched trowel or a roller.

While base coat is wet sprinkle about half the quantity of the preblended flakes and allow to dry, which could be up to 16 hours or longer.

## Decorative - Urethane Flakes (continued)

### F. Flake Pattern

Apply a clear urethane by roller and sprinkle the remaining preblended flakes into the wet urethane. Apply flakes so the entire deck has a uniform pattern. Pass a roller, with clear urethane, to compact the flakes and to impregnate them with the urethane.

### G. Sealer

Apply two to six additional coats of clear, fast curing, urethane to provide the - finish required. After the first or second coat light sand the surface to remove any curled edges of the flakes.

## 10. CAUTIONARY NOTES

Abrade surface to provide a bright metal finish.

Surface must be dry and temperature between 40° F. and 120° F.

If surface is solvent wiped, change cloths continually to prevent spreading oil and dirt from the cloths.

Mechanics to wear protective covers over shoes to prevent dirt from being walked on decking material.

Install necessary underlayment to eliminate low spots and depressions.

Mix thoroughly, 3 to 5 minutes, so full chemical reaction takes place.

Provide proper ventilation for removal of solvents.

Do not allow any open flames in areas where this system is being installed.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

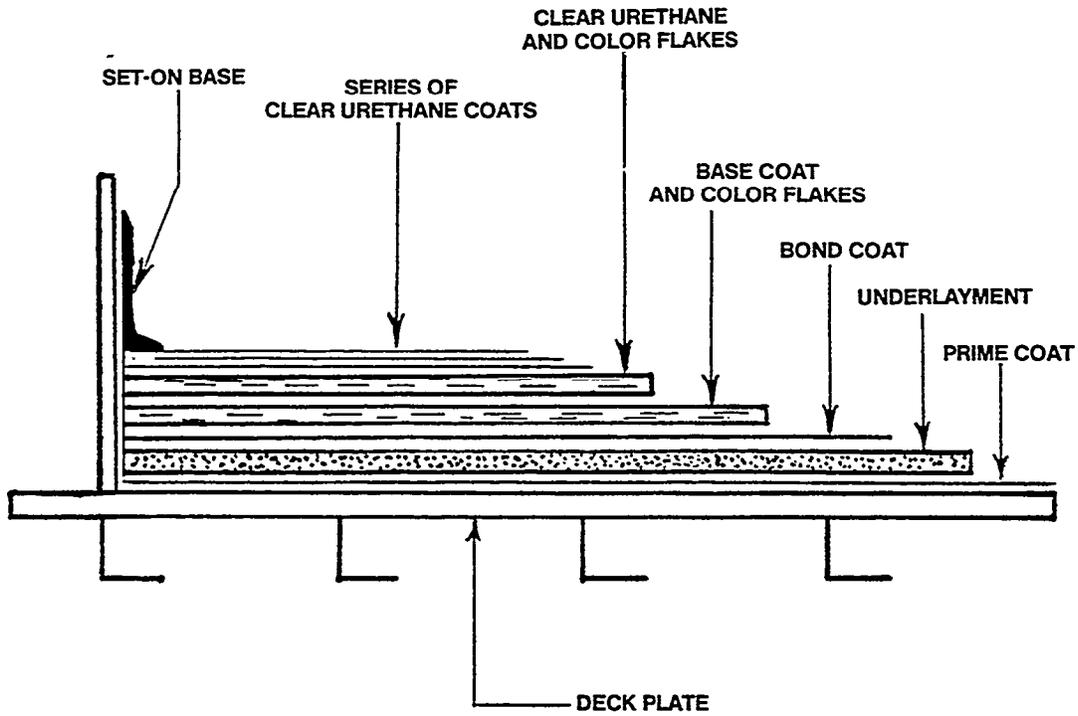
Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# POLYMERIC DECORATIVE FLAKE DECKING

## ELASTOMERIC URETHANE TYPE



## DECORATIVE SYSTEMS

### POLYMERIC RESIN DECKING

#### ONE-STEP SYSTEM WITH MARBLE CHIPS

##### 1. PRODUCT DESCRIPTION

A clear epoxy resin system with marble chips or quartz aggregate that is applied on the deck in a single troweling application and requires no sealer or finish coats.

Material is designed for use in interior spaces, is fire retardant, has some chemical resistance and good adhesion to steel.

##### 2. FEATURES

Reduces the number of application steps.

Can be used for fast turn-around work.

Installed cost reduced due to elimination of grout and finish coats.

##### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-24613 Type III

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

##### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
ST-100	American Safety Technologies, Inc.
Phoenix Epoxy One Step	Poseidon Industries, Ltd.
TM-35, One Step	Westpac Products Company, Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

##### 5. AREAS OF GENERAL USE

General habitability areas

Wet spaces

In areas needing to be redone and have limited time of availability.

Decorative - One Step (continued)

6. LIMITATIONS OF USE

Longevity of wear and chemical resistance are less than full step systems.

Initial gloss is lower than full step system.

Gloss retention is poor.

Dirt pick up is greater and cleaning more difficult.

System is resin rich and blotchy areas will result.

Has tendency to discolor when ground and sealed.

Some systems leave a porous surface that require additional coats of clear epoxy to reduce difficulty of keeping deck clean, and thereby eliminate the economics and the one-step characteristics.

7. COST COEFFICIENT 3.85

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - 3.0 pound per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds, for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual. When underlayment is required, use an epoxy resin type.

### B. Body Coat

Premix aggregates to obtain good distribution. Mix resin and curing agent in recommended proportions and add aggregate, continuing to mix until a uniform distribution is attained.

Apply to deck with a steel trowel and compact to level surface. Lighting must be high to allow installer to reduce the number of trowel marks.

Allow a minimum of 12 hours curing, and longer if surface remains tacky, before allowing light traffic on the surface.

Option - If a higher gloss or more uniform finish is desired, apply one or more seal coats.

## 10. CAUTIONARY NOTES

Make certain there is no water on deck at time of installation.

Thoroughly mix resin (Part A) and curing agent (Part B) to be certain full chemical reaction takes place.

Deck temperature should be a minimum of 55°F. at time of installation and during curing.

Maximum properties will be attained if decking system is allowed to cure for 4 days before normal traffic is permitted.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

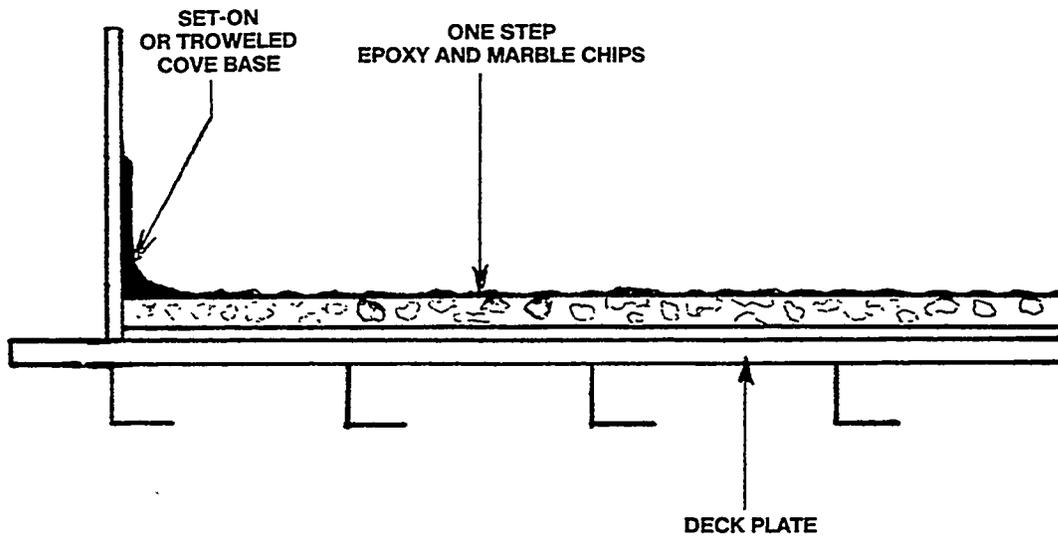
Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# POLYMERIC RESIN, ONE-STEP, DECKING

## EPOXY WITH MARBLE CHIPS



## Terrazzo Decking

## TERRAZZO DECKING. . . MACHINE GROUND SYSTEMS

### LATEX MASTIC AND RESIN EMULSION

#### GROUND TERRAZZO DECKING

#### 1. PRODUCT DESCRIPTION

Latex mastic and/or resin emulsion material into which marble chips and special powders are added. Mix is trowel applied 1/4, 3/8 or 1/2 inch thick and ground flat with terrazzo grinding equipment.

Material can also be installed up the bulkhead as a cove base. System is available in a wide variety of color combinations.

This system is fire retardant, has excellent adhesion, good water and oil resistance, produces good non-slip qualities and is light in weight.

#### 2. FEATURES

Thin set terrazzo, generally installed 3/8 inch as compared to 1-3/4 inches for conventional cement terrazzo.

Available in white, gray and pigmented matrix colors.

Can be installed over any sound sub-deck material.

Can be installed on both interior and exterior areas.

Material is fire retardant.

Excellent adhesion to steel.

Excellent impact resistance and indentation resistance.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE      MIL-D-3134, Type I, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Latex Terrazzo (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Neocrete Terrazzo #33	The Ascon Products Co.
Dex-0-Tex N-38	Crossfield Products Corp.
Dex-0-Tex P-61	Crossfield Products Corp.
Monile Roman Terrazzo	Mameco International
Novalite	Selby, Battersby & Co.
Terraprene N-3 6	Weatherguard/Marbleloid

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Wet spaces

Galley

Food Preparation

Heads

Habitability areas

Passageways

Mess Halls.

6. LIMITATIONS OF USE

Marble chip size is controlled by thickness terrazzo is installed. At the commonly specified thickness of 3/8 inch, maximum size will be #1 marble chip.

Three color marble chip combinations generally produce the most satisfactory results.

7. COST COEFFICIENT 5.29

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 3.0 pounds per square foot at 1/4 inch thickness.

Moisture Absorption - Not to absorb more than 5% moisture by weight when immersed in water for 24 hours.

Adhesive Strength - A minimum of 65 pounds per square inch to steel for initial strength and 95 psi after aging.

Impact Resistance - Shall not have more than 1/16 inch permanent indentation when subjected to two drops of a two pound steel ball from a height of 8 feet. No chipping, cracking or loss of bond.

Resistance to Indentaion - Shall not exceed indentation of more than 7% when subjected to a 2000 pound load for 30 minutes.

Fire Test - Product shall be rated fire retardant when tested as set forth in MIL-STD-1623.

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Install terrazzo divider strip at toe of base and doorways. Divider strip may also be used in the field of the terrazzo in uniform size squares or rectangles, but not larger than 6 feet on a side.

B. Bond coat (if deck is flexible)

Trowel neoprene bond coat on deck as a wet mix and pass a corn broom over surface to make it rough to receive terrazzo system.

C. Prime Coat (for rigid decks)

Apply a slurry coat of resin and fine powder to deck with dauber or brush.

## Latex Terrazzo (continued)

### D. Terrazzo mix

While prime coat is wet, trowel the terrazzo mix of resin, powder and marble chips into it to the thickness specified.

Compact the mix with the trowel to be certain there is good distribution of the marble chips. Install terrazzo mix 1/16 to 1/8 inch thicker than finished thickness required to allow for grinding.

### E. Grinding

Allow terrazzo mix to dry for 3 to 5 days depending on temperature and humidity. Grind surface with appropriate size grinding machine with a number 24 coarse stone. Make a second pass with a number 80 medium grit stone.

It is best to wet grind all terrazzo to produce a fine polish and eliminate dry scratch marks.

### F. Grouting

After deck has been rinsed with water to remove grinding residue, the pin holes caused by grinding are filled in with a troweled mix of resin and fine grout powder applied as a tight coat on surface with a steel trowel.

Grouting should be done the same day the grinding is done and while the terrazzo mix is still damp.

### G. Polishing

After grout coat has dried for 1 to 2 days, it is polished with the same grinding equipment using a number 120 grit, fine stone.

Rinse deck with water at completion of polishing to remove residue.

### H. Sealing terrazzo

When terrazzo has dried, apply two coats of acrylic sealer using lambs wool applicator.

## 10. CAUTIONARY NOTES

Deck temperature during installation and curing period must be 60° F. or higher.

“L” shaped divider strip must be placed at the toe of the cove base and at doorways to compartments.

A high amount of air flowing over the wet surface can cause uneven curing and potential surface crack. Take necessary precautions to prevent this condition.

Do not add water to the emulsion or the mixed materials. If material starts to set, discard it, as it cannot be reactivated.

Latex Terrazzo (continued)

11. MAINTENANCE

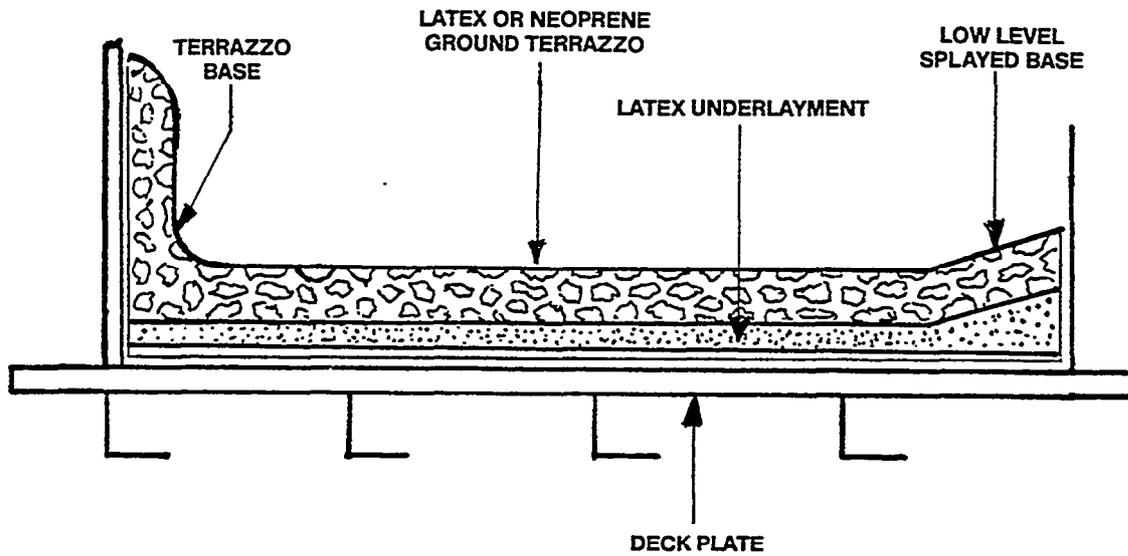
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



TERRAZZO DECKING.. . MACHINE GROUND SYSTEM

CATALYST CURED RESIN - GROUND TERRAZZO DECKING

1. PRODUCT DESCRIPTION

A catalyst cured resin mixed with marble aggregate, installed to a thickness of 1/4 inch and ground flat with terrazzo grinding equipment. The most widely used resin is the epoxy catalyst cured system, however, polyester and polyurethane are sometimes used.

Material can also be installed up the bulkhead as a cove base. This terrazzo system is available in a wide variety of color combinations.

Matrix has good chemical resistance, system is quite flexible, is fire retardant, has almost zero water and oil absorption and excellent adhesion.

2. FEATURES

Thin set terrazzo generally installed 1/4 inch thick available in white, gray and pigmented matrix colors.

Can be installed over any sound sub-deck surface.

Material is fire retardant.

Excellent adhesion.

Excellent impact and indentation resistance.

3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-3134, Type I, Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Dex-0-Tex Terrazzo M	Crossfield Products Corp.
Novaclad	Selby, Battersby & Co.
Vyn-L-Terrazzo	Willard Marine Decking

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Catalyst Resin Terrazzo (continued)

5. AREAS OF GENERAL USE

Habitability areas

Food preparation

Wet spaces

Galley

Heads

Passageways.

6. LIMITATIONS OF USE

Marble chip size is controlled by thickness of installed terrazzo. The thickness of these systems is 1/4 inch and the maximum size will be #0 marble chip.

Three color marble chip combinations generally produce the most satisfactory results.

Not installed in heavy work spaces or where a decorative system is not required.

7. COST COEFFICIENT 6.24

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 3.0 pounds per square foot at 1/4 inch thickness.

Moisture Absorption - Not to absorb more than 5% moisture by weight when immersed in water for 24 hours.

Oil Absorption - Not to exceed 3% by weight after immersion in oil for 24 hours.

Adhesive Strength - A minimum of 65 pounds per square inch to steel for initial strength and 95 psi after aging.

Impact Resistance - Shall not have more than 1/16 inch permanent indentation when subjected to two drops of a two pound steel ball from a height of 8 feet. No chipping, cracking or loss of bond.

Resistance to Indentation - Shall not exceed indentation of more than 7% when subjected to a 2000 pound load for 30 minutes.

Fire Test - Product shall be rated fire retardant when tested as set forth in MIL-STD-1623.

Catalyst Resin Terrazzo (continued)

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0 . 1

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Install terrazzo divider strip at toe of base and doorways.

B. Prime Coat

Mix epoxy resin and curing agent and apply to deck with a trowel as a scrape coat.

C. Terrazzo Mix

While prime coat is wet trowel the mixture of epoxy resin, curing agent and marble and powder mixture into it to thickness specified, generally slightly over 1/4 inch.

Compact mix thoroughly to obtain uniform distribution of the marble chips. Allow material to cure overnight.

D. Grinding

Using appropriate grinding equipment and a number 24 coarse stone, wet grind the terrazzo surface.

Make a second pass using a number 80 medium stone.

Remove grinding residue and rinse floor with water.

E. Grouting

After floor has dried, mix epoxy resins, curing agent and fine powder into a creamy mix and apply with steel trowel to fill in any pin holes caused by the grinding.

## Catalyst Resin Terrazzo (continued)

### F. Polishing

After grout has cured, generally overnight, polish surface with some grinding equipment using number 120 grit, fine stone.

Rinse deck with water to remove grinding residue.

### G. Sealing Terrazzo

Clean floor thoroughly and seal with two coats of acrylic sealer applied with lambs wool applicator.

## 10. CAUTIONARY NOTES

The thickness shall not exceed one-half inch.

Deck surface must be free of water during installation and curing period.

Deck temperature during installation and curing period must be 50°F. or higher.

“L” shaped divider strip must be placed at the top of the cove base and at doorways to compartments.

Do not let mixed epoxy resin and curing agent to remain in container too long as a heat build-up occurs which will generate some fumes. If this happens get rid of mixture and air out area.

Always add marble chips to resin and curing agent mixture, then add the powder. This order of mixing is important.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

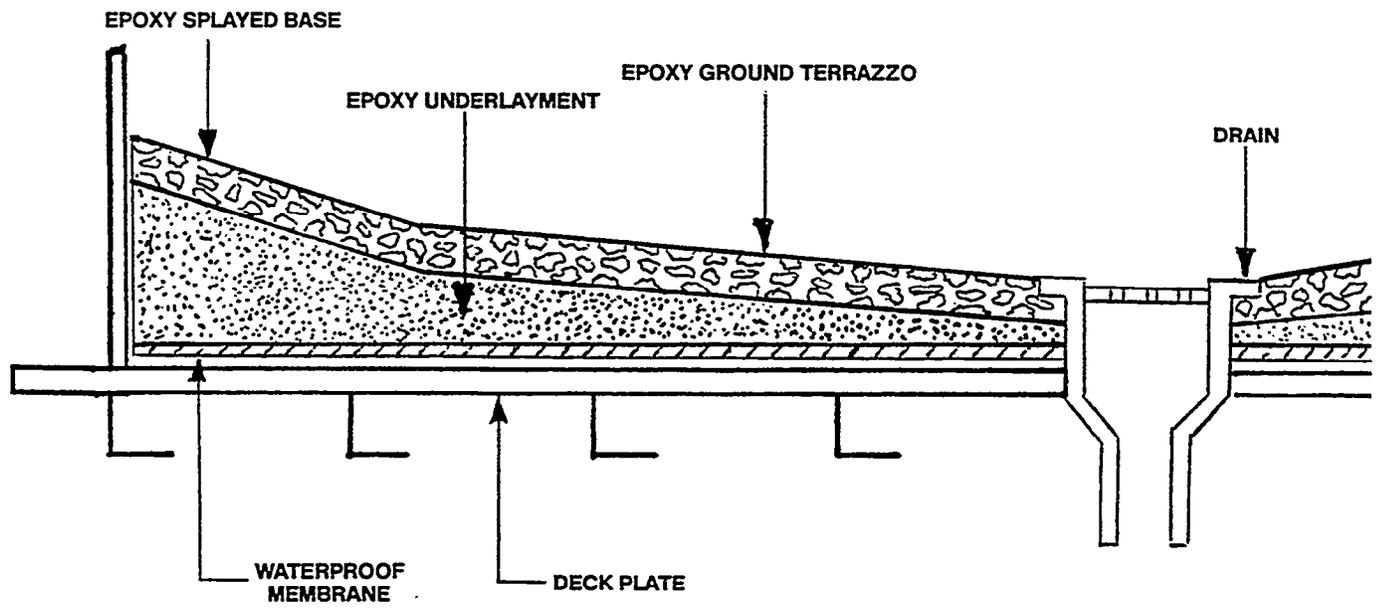
## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

Catalyst Resin Terrazzo (continued)



**Waterproof Membrane**

# WATERPROOF MEMBRANE SYSTEM

## NEOPRENE SYSTEM, WITH REINFORCEMENT

### 1. PRODUCT DESCRIPTION

A high solids neoprene emulsion type resin that is reinforced with non-directional fibreglas mat to provide a positive waterproof membrane.

This product is not a prefabricated sheet but a fluid neoprene applied at the job site and after the fluid neoprene is applied, the fibreglas mat is forced into the emulsion with a trowel.

The fluid applied system allows the membrane to be formed around all projections, to be turned up the bulkhead and to conform tightly to pads and other raised areas.

This waterproof membrane can be applied to most underlayments including magnesium oxychloride cement systems. The completed membrane can be covered by most resin decking systems currently in use in the Marine industry, including ceramic tile, quarry tile and terrazzo.

### 2. FEATURES

Provides positive waterproofing - no water absorption.

A flexible membrane system.

Can be installed on exterior and interior areas.

Excellent dimensional stability from -40° F. to + 140° F.

Lightweight - only 0.25 pounds, per square foot, per 3/32 inch thick.

Moisture vapor permeability, ASTM D-1653 - none

### 3. SPECIFICATION REFERENCE

No current specification in use.

### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Dex-0-Tex Waterproof Membrane	Crossfield Products Corp.
Promdek Waterproof Membrane	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

## Waterproof Membrane (continued)

### 5. AREAS OF GENERAL USE

To protect magnesite products, such as insulating materials, underlayments and finish deck, that are water sensitive when used in wet spaces.

In reefer boxes

In commissary spaces

Showers

Weather decks

Bridges

Laundries

### 6. LIMITATIONS OF USE

Not installed unless waterproofing is required.

Do not install if temperature goes below 45°F.

Do not use as a finished decking - it must be covered with a compatible finished decking system.

### 7. COST COEFFICIENT 1.18

Note: See Section on Cost Coefficients for explanation of use.

### 8. PHYSICAL PROPERTIES

Weight - 0.25 pounds, per square foot, per 3/32 inch thick.

Water Absorption - None, ASTM D-570.

Elongation - Exceeds 500%, ASTM D-751.

Moisture Vapor Permeability - None, ASTM D-1653.

### 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

## Waterproof Membrane (continued)

### B. Prime Coat

Mix recommended emulsion and powder and with a steel trowel apply a scrape coat to provide good adhesion. Allow prime coat to dry before applying membrane coat.

### C. Membrane Coat

Apply waterproof emulsion as it comes from manufacturer directly over dried prime coat using a steel trowel.

Imbed fibreglas mat into wet emulsion and force down into emulsion with the trowel. Apply additional emulsion with trowel to totally encapsulate the fibreglas with the neoprene.

Install deck membrane first. When dry, install membrane to specified height on bulkhead and run out over deck membrane overlapping a minimum of 3 to 4 inches.

Allow membrane to dry a minimum of 4 hours and apply additional emulsion if any air bubbles have developed or if neoprene film is too thin.

Finished decking can be installed after 24 hours of drying. If membrane is not covered with finished deck within 10 days, reactivate with another application of emulsion.

## 10. CAUTIONARY NOTES

Eliminate air currents while system is drying to avoid erratic physical properties.

Do not add water to neoprene emulsion, use as delivered.

Keep emulsion in warm place - keep from freezing.

## 11. MAINTENANCE

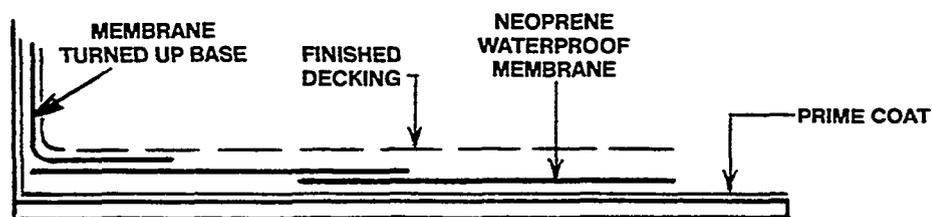
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.





## WEATHERDECK SYSTEMS

### NEOPRENE RESIN DECKING

#### 1. PRODUCT DESCRIPTION

A trowel applied, water based, neoprene resin deck covering which includes aggregates and inorganic powders that are applied to 1/4 inch thickness.

It provides a solid color finish and can be turned by the bulkhead to form an integral cove base.

System withstands wide range of temperature extremes. Finished system meets all specification requirements regarding non-slip properties.

Most steel, exterior decks are constructed so as to be waterproof. In some instances the designer desires to provide positive waterproofing characteristics to the weatherdeck system and includes a neoprene reinforced membrane under the weatherdeck systems.

(Note: Refer to Section entitled "Waterproof Membrane" for detailed information.)

#### 2. FEATURES

High weather resistant qualities.

Provides waterproof system.

Provides non-slip surface that meets or exceeds Federal specification.

A fire retardant system.

Can be used on both exterior and interior decks.

Protects steel from corrosion.

#### 3. SPECIFICATION REFERENCE

No current specific specification on this neoprene mastic decking system.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Dex-0-Tex Neotex 28	Crossfield Products Corp.
Promdek Direct Bond	Selby, Battersby & Co.
* Promdek Exterior Deck	Selby, Battersby & Co.
Monoprene N-27	Weatherguard/Marbleloid Products

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

\* System includes a weatherproof membrane.

Neoprene Weatherdeck (continued)

5. AREAS OF GENERAL USE

Promenade decks, open and closed

Weather decks

Wheel house

Pilot house

Bridge wings

Beach areas of swim pools

Chart room

Flying bridge

6. LIMITATIONS OF USE

Does not provide decorative pattern decking.

For maximum resiliency the neoprene resin should be used as bonding agent and throughout the troweled portions of this system.

Not recommended on work deck areas where heavy loads with sharp edges could damage deck material.

Do not install when deck temperature is 50° F. or lower.

7. COST COEFFICIENT 3.29

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 2.8 pounds, per square foot per 1/4 inch thick.

Water Absorption - Not more than 5% based on weight after 24 hour immersion testing.

Adhesive Strength - A minimum of 65 pounds per square inch.

Fire Resistance - To be rated a minimum of fire retardant when tested in accordance with MIL-STD-1623. ASTM - E-162 - flame spread and smoke deposited - 25 or less.

Compressive Strength - 5,500 psi at 1/4 inch thickness.

Indentation Resistance - Not to exceed 7% of thickness after 30 minute load of 2000 pounds.

Neoprene Weatherdeck (continued)

Impact Resistance - Not to exceed 1/16 inch of permanent indentation after two 8 foot drops of a 2 pound steel ball. There should be no chipping, cracking or loss of adhesion.

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

B. Underlayment (optional)

If deck is out of level, has low spots or needs to be pitched to drain, install sufficient thickness of a troweled underlayment, latex mastic type, MIL-D-3135 Type 1 or 2.

C. Bond Coat

Using a trowel, brush or dauber, apply a fluid mix of neoprene emulsion and recommended powders to the deck.

If a waterproof membrane is to be installed, allow bond coat to dry before installing the membrane, and then install the membrane in accordance with manufacturer's instructions.

Where no membrane is required, install the body coat into the bond coat, while it is still wet.

D. Body Coat

Make a stiff mix of neoprene emulsion and recommended powders. The body coat is to be applied in two separate thin applications allowing each application to dry before making next application. Total thickness of two applications should be approximately 3/32 inch. If surface is not installed smooth enough, installer should sand trowel marks.

## Neoprene Weatherdeck (continued)

### E. Grout Coats and Sanding

Mix neoprene and powders as described in bond coat. Apply tight, thin coat with trowel. Sand when dry enough to do so. Repeat a second application of grout and sanding.

### F. Topcoat Application

Apply two coats of pigmented topcoat using manufacturer's recommended material for weatherdeck applications.

## 10. CAUTIONARY NOTES

Never install neoprene body coat on exterior weatherdeck in one thick coat . . . . . always two thin coats.

Never install when deck temperature is 50° F. or less.

Emulsion must always be stored in area of 60° to 90° F.

Always apply grout coats in thin, scrape coat applications - never as thick coats as they are somewhat soft and will indent.

Do not add water to any of the mixes.

## 11. MAINTENANCE

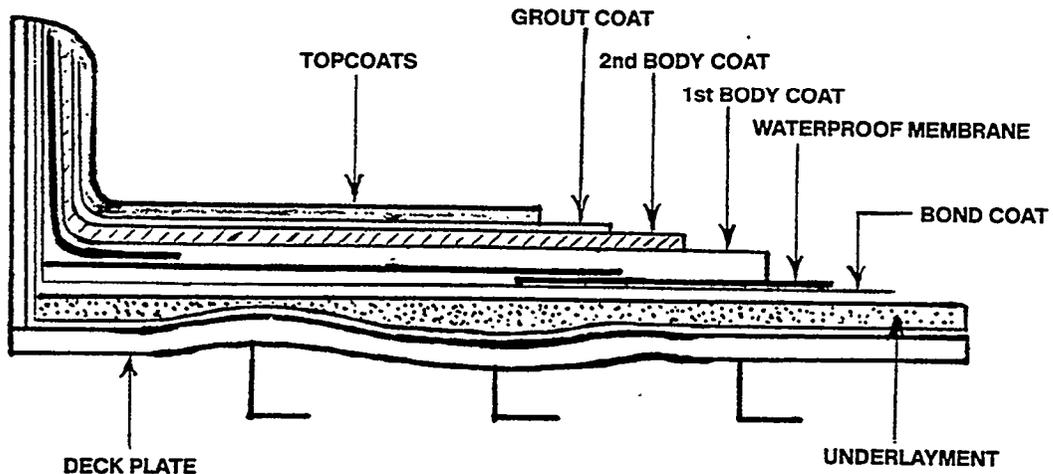
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## WEATHERDECK SYSTEMS

### ELASTOMERIC URETHANE DECKING

#### 1. PRODUCT DESCRIPTION

An elastomeric urethane decking that provides flexibility and impact resistance. The majority of the installations are on exterior deck areas; however, the product is also used in some specialized interior applications.

This decking system provides high non-slip characteristics, excellent weather resistance, protects the surface from corrosion and is fire retardant.

#### 2. FEATURES

Weather resistant.

Non-slip surface meets or exceeds Federal requirements.

Fire retardant, when tested under MIL-STD-1623.

Protects steel from corrosion.

Mainly installed on exterior decks but also in some special interior areas.

High abrasion resistance.

Resilient properties provide high impact resistance.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-23003.

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Proreco Marine Deck Coating Type III	Products Research & Chemical Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Urethane Weatherdeck (continued)

5. AREAS OF GENERAL USE

Weather decks

Bridge wings

Working decks of tug boats

Off shore drill platforms

Promenade decks

Helo decks

Special applications in torpedo strike down areas.

6. LIMITATIONS OF USE

Does not produce a decorative system.

Limited use where heavy loads with sharp edges through impact might cut the decking material.

High cost limits use.

Installation temperature must be above 40°F. and below 120° F.

Do not install on wet decks, in times of high humidity or when a high probability of rain.

7. COST COEFFICIENT 4.63

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to requirements in MIL-STD-1623.

Resistance to Wear - When tested in accordance with wear test in MIL-D-23003 material shall not show a maximum reduction in thickness of 30 mils.

Resistance to Impact - Material to within 25 impacts of a 2 pound solid steel ball dropped from height of 8 feet.

Resistance to Immersion - Material must resist 24 hour exposure to oil, grease, jet fuel JP-5, hydraulic fluid, ethyl alcohol and detergent, as set forth in MIL-D-23003, and shall not soften, lose adhesion, discolor or deteriorate in any other manner.

Non-slip Properties - The coefficient of friction to be 0.90 for a dry, wet and oily surface condition.

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Metal decks must be abraded to a minimum of a bright metal finish preferably with a shot blast machine or other satisfactory abrader.

### B. Prime Coat

Immediately after abrading surface apply manufacturer's recommended prime coat to reduce corrosion possibilities. If prime coat is not covered within 24 hours, reprime the surface.

### C. Underlayment . . . (if required)

Underlayment is used to fair the welds and to eliminate low spots or depressions.

A three component polyurethane underlayment is available. It is a little more difficult to trowel and more expensive than latex mastic underlayment MIL-D-3135, Type I.

### D. Base Coat

Apply elastomeric urethane base coat a minimum of 1/8 inch thick, using a straight edge or notched trowel or a roller.

Pour on deck in small quantities to reduce the potential of a heavy build-up.

### E. Non-Skid Coating

Apply this coating over base coat the day following application of the base coat to obtain strong intercoat adhesion. Apply a tight thin coat for maximum resiliency. Thick build-up of this material can cause mud cracking.

Mix material for 8 to 10 minutes per manufacturer's instructions. Apply mixed material by trowel and pass a roller over it while wet to provide a surface texture. Apply at coverage rate of 50 square feet per gallon.

Allow a minimum of 8 hours curing time before allowing even light traffic.

### F. Seal Coat

Apply specially formulated pigmented sealer coat in strict accordance with manufacturer's instructions. It can be used for a cosmetic coat and/or for deck markings.

Surface must be clean and dry before applying. Thoroughly mix both components together and apply with a short nap roller. One to two coats will provide uniform coverage.

10. CAUTIONARY NOTES

If applied too thick, coverage will be reduced and mud cracking can occur.

Provide normal precautions when flammable materials are used.

Material contains solvents and strong vapors and require the use of safety gloves, mask and ventilation.

To keep surface from becoming contaminated during installation, installers should wear protective covers on their shoes.

Apply material in thin coats rather than heavy coats.

If installers solvent wipe the surface to clean it, the rags must be changed often, otherwise the dirt and oils will only be spread over the surface.

A clean surface is important for each step of the application and the use of protective covers over worker's shoes is recommended.

11. MAINTENANCE

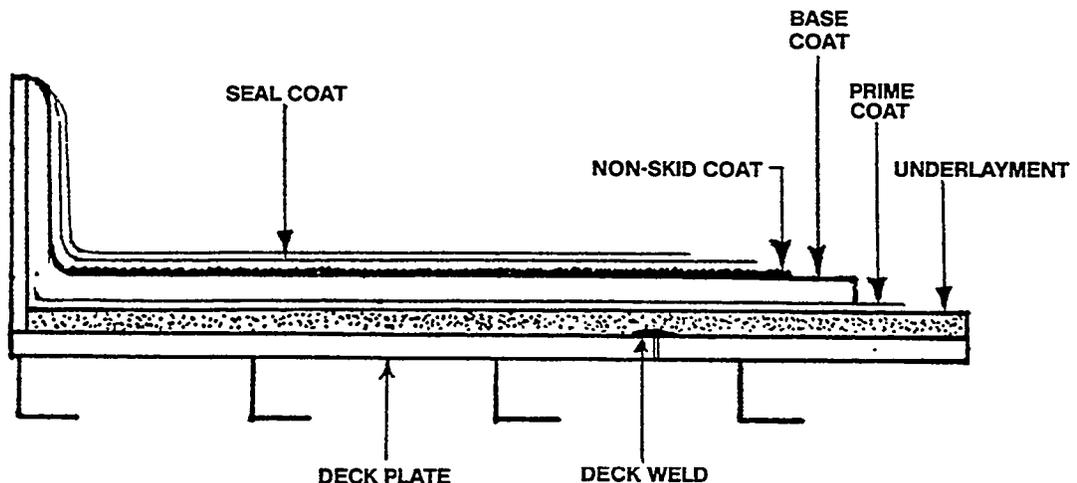
Manufacturer's Maintenance Instructions to be followed.

i. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**Weight Critical Decking**

## WEIGHT CRITICAL DECKING SYSTEM

### POLYMERIC - EPOXY RESIN WITH COLORED FLAXES

#### 1. PRODUCT DESCRIPTION

This system includes an epoxy resin with imbedded color flakes that provides a lightweight deck system for use in weight critical ships.

The flakes can be installed in either a clear or pigmented resin and provides 100% flake coverage over the area installed.

Weight reduction in ships increases economy of operation, distance traveled per unit of fuel used and provides increased speeds.

The normal thickness of this system is 1/16 inch and it is generally installed over a lightweight underlayment used to smooth out low spots, weld marks and uneven deck surfaces.

#### 2. FEATURES

Lightweight - 0.56 pounds per square foot 1/16 inch thick.

Good flexibility.

Fire retardant, conforming to fire test MIL-STD-1623.

Wide range of color combinations.

Good abrasion resistance.

Moderate cost range.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-24613 Type I, Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Light Weight Epoxy (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
CF - 100	American Safety Technologies, Inc.
Dex-O-Tex Colorflake M	Crossfield Products Corp.
Selbaflor	Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Passageways

Berthing areas

Lounge areas

Crew utility areas

Weight critical ship's spaces.

6. LIMITATIONS OF USE

Designed for interior spaces only.

Not used in heavy foot traffic or fork lift truck traffic.

Usually requires an underlayment.

Random chip pattern not recommended due to lack of uniformity.

Clear glaze coat needs reapplication due to traffic from time to time.

7. COST COEFFICIENT 2.18

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Not to exceed 3.0 pound, per square foot, per 1/4 inch thick.

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Light Weight Epoxy (continued)

Indentation - A load of 2000 pounds for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0.1

9. APPLICATION METHODS

The Manufacturer's application instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

B. Underlayment (if required)

Trowel apply, to thickness required, a filled epoxy underlayment or a lightweight neoprene underlayment, similar to materials that meet MIL-D-3135 Type 1.

C. Receiving Coat

Use either a clear epoxy or a pigmented epoxy catalyzed system to receive color flakes. Mix resin and curing agent in recommended proportions. Apply with trowel or squeegee and smooth out trowel marks with short nap, mohair roller.

D. Flaking Application

Broadcast, pre-mixed flakes in colors selected, into the receiving coat while it is still wet. Flakes must be sprinkled in uniform thickness until full area is covered. Mechanic should wear golf shoes to walk into wet receiving coat.

Note: Maximum job satisfaction occurs when flake pattern is a blend of colors rather than a solid color.

## Light Weight Epoxy (continued)

### E. Grout Coat

Sweep up flakes that have not adhered when receiving coat system has cured. Apply one coat of clear epoxy coating over flakes with trowel or squeegee and pass a short nap mohair roller over coating to smooth the epoxy.

### F. Sanding

When first grout coat has cured lightly, sand the surface to eliminate any curled edges of the flakes. Remove sanding dust with vacuum pickup. Mechanic must not let any dirt get on the floor or next coat will lock dirt in the system.

### G. Finish Coat

Apply clear epoxy finish coat exactly as was done in Step E.

If a smooth finish is desired, additional finish coats can be applied.

## 10. CAUTIONARY NOTES

Mechanics must keep dirt, oil or grease from getting on the floor after the flaking operation has been complete as clear finish coats will overlay them and make them a permanent part of the finished floor.

Blend flakes thoroughly to have uniform color distribution but blend them gently to prevent breaking them into fine powder.

Deck must be free of water during installation and curing period.

Important to do an "extra-good" job of removal of sanding dust before applying clear grout and finish coats.

Be certain to properly ventilate area during installation.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

This system is identical to Polymeric Decorative Flake Decking - Epoxy Type under the section on Decorative Systems. Utilize the Construction Details for that product when using it for weight critical decking.

## WEIGHT CRITICAL DECKING SYSTEM

### POLYMERIC - ELASTOMERIC URETHANE RESIN WITH COLORED FLAKES

#### 1. PRODUCT DESCRIPTION

An elastomeric urethane resin with imbedded color flakes that provides a lightweight deck-system for applications in weight critical ships.

The urethane is generally pigmented at the base coat level and the flakes can be imbedded into it or into a clear urethane applied over the base coat.

The marine industry, and particularly the Navy, design weight critical vessels to increase speed without increasing propulsion requirements, to lower fuel costs and to increase the distance range of travel on same amount of fuel.

Lightweight vessels have lighter metals, wider frame spacing and thinner outer skin which requires decking materials that have high flexibility and elasticity to reduce vibration and flexing stresses.

The normal installation thickness is 1/8 inch but in some areas such as officer space, berthing areas and similar locations the material has been installed as thin as 80 mils. At this thin an application the wearing qualities are not as good as the 1/8 inch system.

#### 2. FEATURES

Light weight - 0.97 pounds per square foot per 1/8 inch thick.

Flexible.

Fire retardant, conforming to fire test MIL-STD-1623.

Corrosion and abrasion resistant.

Elastic.

Wide range of color combinations.

Install in full flake pattern for best field results.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-24613, Type II, Class 2

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Light Weight Urethane (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Proreco I, Marine Deck Coating	Products Research & Chemical Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Berthing area

Passageways

Lounge areas

Crew utility areas

Weight critical design like CG-47 Series and the DDG-51 Series.

6. LIMITATIONS OF USE

Designed for interior spaces only.

Use in areas of light to moderate personnel traffic.

Cost in high range of deck coverings.

Random chip pattern not recommended due to lack of uniformity.

Numerous application steps and coats.

Glaze must be reapplied due to traffic wear.

Usually requires an underlayment.

7. COST COEFFICIENT 5.24

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Proreco I - 0.97 pounds per square foot 1/8 inch thick.

PRC PR-1539-L Underlayment - 1.11 pounds per square foot 1/8 inch thick.

Latex Mastic Type I - 0.875 pounds per square foot 1/8 inch thick.

Light Weight Urethane (continued)

Impact - Not to exceed 1/16 inch of permanent indentation with 2 drops of 2 pound ball from 8 foot height. No chipping, cracking or loss of bond.

Indentation - A load of 2000 pounds for 30 minutes shall indent a maximum of 10% of thickness.

Moisture Absorption - Not more than 2% in 24 hour immersion test.

Fire Resistance - To be rated fire retardant when tested in accordance with MIL-STD-1623.

Adhesive Strength - 250 pounds, per square inch.

Non-slip - Shall be rated non-slip when tested in accordance with ASTM-D-1141.

Non-slip Properties - When tested in accordance with MIL-D-24613 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	<b>Dry</b>	Wet	Oily	<b>Dry</b>	Wet	Oily
Leather	0.6	0.5	-	0.3	0.4	-
Rubber	0.6	0.7	0.3	0.4	0.7	0 . 1

**9. APPLICATION METHODS**

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The metal decks must be abraded to a minimum of a bright metal finish preferably with a shot blast machine or other satisfactory abraded.

B. Prime Coat

Immediately after abrading surface, apply manufacturer's recommended prime coat to reduce corrosion possibilities. If prime coat is not covered within 24 hours, reprime the surface.

C. Underlayment . . . (if required)

Low spots, depressions, pitch to drains and fairing the welds should be corrected using an underlayment such as latex mastic, Types I or II, a polyurethane resin - powder underlayment mixture, or an epoxy resin type.

## Light Weight Urethane (continued)

### D. Base Coat

Thoroughly mix the two components and apply to deck by conventional or notch trowel or roller to thickness required. Apply material in small quantities to eliminate thick buildup. Sprinkle approximately half the quantity of preblended flakes into the wet base coat and allow it to dry.

Roller apply another coat of clear urethane and sprinkle the remaining half of the preblended flakes into it while it is wet. Impregnate the chips with the urethane by compacting them with the roller. Allow overnight curing.

Note: Maximum job satisfaction occurs when flake pattern is a blend of colors rather than a solid color.

### E. Sealer

Apply two to six additional coats of a fast curing clear polyurethane to obtain the finish desired. After the second clear coat, sand lightly to remove any curled edges of the flakes.

## 10. CAUTIONARY NOTES

Abrade surface to provide a bright metal finish.

Surface must be dry and temperature between 40° F. and 120° F.

If surface is solvent wiped, change cloths continually to prevent spreading oil and dirt from the cloths.

Mechanics to wear protective covers over shoes to prevent dirt from being walked on decking material.

Install necessary underlayment to eliminate low spots and depressions.

Mix thoroughly, 3 to 5 minutes, so full chemical reaction takes place.

Provide proper ventilation for removal of solvents.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

This system is identical to Polymeric Decorative Flake Decking - Elastomeric Urethane Type under the section on Decorative Systems. Utilize the Construction Details for that product when using it for weight critical decking;

## Recreational & Exercise

# RECREATIONAL AND EXERCISE DECKING SYSTEMS

## NEOPRENE RESIN DECKING

### 1. PRODUCT DESCRIPTION

A trowel applied neoprene resin system, applied 1/4 inch thick for use in recreational and exercise spaces. System can be turned up the bulkhead to form a cove base, generally 4 to 6 inches high.

Material is installed in areas where sports such as basketball, volleyball, badminton and similar activities are played. Also used for exercise and calisthenics activities. When heavy weights and high impact loads are anticipated, floor mats should be placed over the decking in area of this activity.

Material will not warp, buckle or be affected by water and is fire retardant. System is easy and economical to refinish. Provides uniform ball bounce eliminating dead spots and is comfortable to play on.

### 2. FEATURES

Uniform ball action.

Comfortable under foot.

Fire retardant

Unaffected by water.

Can be used for multipurpose athletic and social activities.

### 3. SPECIFICATION REFERENCE

There is no specific specification for recreational deck systems. However, some MIL-D-3134 and ASTM tests are used for physical properties testing.

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

### 4. TRADE NAMES AND MANUFACTURERS

#### TRADE NAME

#### MANUFACTURER

Gym-Flor III

Crossfield Products Corp.

Selbagym 325

Selby, Battersby & Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

### 5. AREAS OF GENERAL USE

Gymnasiums

Tennis Courts

Volleyball courts

Badminton Courts

Jogging Track

Calisthenics Activities

## Neoprene Recreation Deck (continued)

### 6. LIMITATIONS OF USE

Use floor mats when area is used for weight lifting and equipment that generates high impact.

Use higher compressive strength material under roll-out bleachers to resist heavy impact loads.

Do not use spiked shoes or football cleats on this system.

### 7. COST COEFFICIENT 3.27

Note: See Section on Cost Coefficients for explanation of use.

### 8. PHYSICAL PROPERTIES

Weight - 2.8 pounds per square foot at 1/4 inch thickness.

Compressive Strength - 5000 pounds per square foot or higher - ASTM C-579.

Tensile Strength - 925 pounds per square foot - ASTM C-190

Fire Resistance - Rated fire retardant when tested in accordance with MIL-STD-1623.

Indentation - Initial indentation of 0.002 inches or 0.8%, at 1/4 inch thickness when tested in accordance with MIL-D-3134.

Impact Resistance - Indent of 0.025 inches with no cracking, chipping or detachment when tested under MIL-D-3134.

### 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

#### B. Prime Coat

Apply thin coat of resin and powders to properly prepared substructure.

#### C. Body Coat

Mix liquid resin and powders to a trowelable mixture and apply with trowel to approximately 1/4 inch thick.

## Neoprene Recreation Deck (continued)

### D. Grout Coat

If body coat is not smooth enough, sand surface with mechanical sanding equipment using a 3 1/2 open coat 3M paper. Sweep floor clean of sanding dust.

Mix liquid resin and powder and apply by edge troweling in a thin film to fill any declivities. Allow to dry 1-2 hours, or as necessary. Sand surface with 1-E paper and sweep up dust.

If floor still is not smooth, do a second grout application following the same procedures.

### E. Color Coat

Apply by short nap mohair roller two coats of waterbased acrylic (or similar) coating allowing recommended drying time between coats.

### F. Game Lines

If intended use is sports activity that requires game lines, these should be laid out on floor areas properly masked and game lines applied.

- G. Two coats of clear finish coats are applied to protect the game lines from wearing out. Clear material to be 100% solids epoxy or 40% to 60% urethane or combination of both. Clear urethane has higher abrasion resistance and clear epoxy deposits higher film thickness.

## 10. CAUTIONARY NOTES

Temperature of deck must be 60°F. or higher, for 48 hours before and after installation as well as during the installation.

Water based materials must be stored in temperatures above freezing and preferably between 60° and 80°F.

Final finish is an option of 100% epoxy or a clear urethane resin system. While the urethane has much higher abrasion resistance, it is necessary to have a fire watch and proper ventilation to exhaust high solvents in the urethane mixture.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

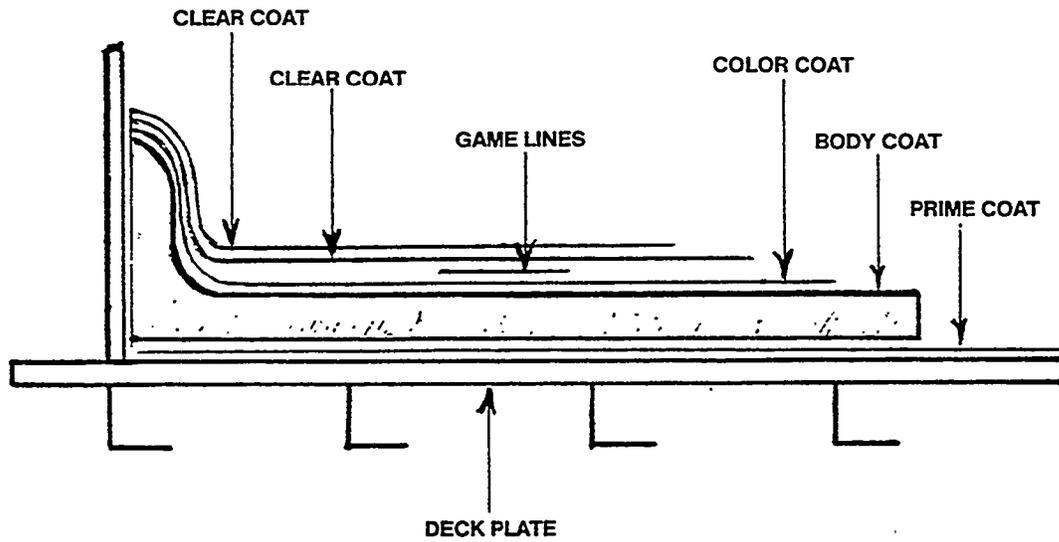
## 12. WARRANTY

Decking contractor, having installed product in accordance with Manufacturer's Instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction details are included in each Section, where applicable.

# RECREATIONAL AND EXERCISE DECKING SYSTEM



## Non-Skid Decking

## NON-SKID DECK COVERING

GENERAL PURPOSE, NON-LANDING AREA, HIGH DURABILITY

DOD-C-24667 TYPE IA/1B

COMPOSITION G, GRADE A, CLASS 1

### 1. PRODUCT DESCRIPTION

A high solids, high durability, high abrasive non-skid deck covering formulated for installation in non-landing areas such as weather decks, walkways, bridge wings and similar areas. The high surface profile damages steel arresting cable and is not used in aircraft landing or cable run-out areas.

This system is formulated to provide high durability, high wear resistance and excellent adhesion to steel and resists rust creeping if a fracture ever occurs. It is available in both a high and low volatile organic content.

Provides safe footing for personnel and a non-slip surface for flight mobile equipment and aircraft. Resists fire, jet blasts and chemical spillage of jet fuel, hydraulic fluid and other chemicals, and is applied by roller or brush.

### 2. FEATURES

Provides high durability and extended life expectancy.

High abrasion resistance provides excellent non-slip properties.

Resists blast from jets and is fire retardant.

Excellent adhesion and weathering qualities.

Corrosion resistance protects against rust creep, if system ever develops a crack.

Resists jet fuel, gasoline, hydraulic fluids and similar chemicals.

### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

DOD-C-24667 Type IA/1B

Composition G, Grade A, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
<u>Type 1A High Volatile and Type 1B Low Volatile</u>	
MS-400G	American Safety Technologies, Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Hangar decks

Weather decks

Walking and working traffic areas

Passageways

Where rolling equipment is used

Helicopter pads and vertical take-off areas

Aircraft elevators

Bridge wings

Carrier flight deck, but not in landing and cable run-out areas.

Where use conditions require a material of highest durability.

6. LIMITATIONS OF USE

Not to be installed in aircraft landing areas or cable run-out areas.

Deck surface must be grit-blasted to near white metal (SA 2.5).

Do not use on ammunition carrying ships to avoid any sparking of hard surface by any kind of impact.

Do not install in areas where a smooth easy to clean surface is required.

Must use manufacturer's recommended primer.

Material is applied by roller or notch trowel, cannot be sprayed.

7. COST COEFFICIENT 2.44

Note: See Section on Cost Coefficients for explanation of use.

Non-Landing/High Durability (continued)

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to fire test requirements set forth in MIL-STD-1623.

Resistance to Impact - Resist series of 2 pound steel balls dropped from 8 foot height in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade A 95% in 4 days  
100% in 14 days

Resistance to Wear - Tests run on U.S. Government wear testing machine in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade A 10%

Resistance to Accelerated Corrosion-

No loss of adhesion, separation between layers or corrosion of steel beyond 3/8 inch radius from center of impact area when tested in accordance with procedures set forth in DOD-C-24667.

Resistance to Immersion -

Sample shall not soften, lose adhesion, separate, lose color or show signs of deterioration when tested in accordance with procedures set forth in DOD-C-24667.

Weather Resistance - No cracking, checking, loss of adhesion or separation with a maximum chalking rating of 6 when tested in accordance with procedures set forth in DOD-C-24667.

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surfaces to receive non-skid decking.

If work time is not available to do preparation and installation according to full instructions, do not start the job as it will fail and need to be redone.

The deck cannot be "good enough" - it must be clean enough to withstand the white glove test.

Non-Landing/High Durability (continued)

Grit blast surface to SA 2.5 (near white metal).

Do not use grinding machine as it polishes the steel deck and the primer will peel off the polished surface, use grit blast machine.

In corners a deck crawler, if in proper condition to clean, can be used.

Make certain the steel around the catapult is as hard as the deck steel, otherwise the grit blast unit will tear it up.

B. Prime Coat

Use primer recommended by non-skid manufacturer.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted to protect against corrosion.

Primer must always be applied a minimum of 1 mil thicker than the depth of the grit blast. If 2.5 mils blast is used, the primer must be installed 3.5 mils to cover high points.

Mix base material and hardener in accordance with manufacturer's instructions. Do not thin material but apply in consistency received from manufacturer. Apply with roller or notched trowel.

Deck temperature can only be a minimum of 50° F. and a maximum of 120° F.

If anyone walks on primer or spills coffee, soda or anything else, the deck must be reblasted and reprimed.

C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a 1 mil thick coat of primer.

Mix base material and hardener and apply to properly cured prime coat in accordance with manufacturer's instructions.

Deck temperature must be between 50° F. and 120° F. Temperatures below 70 F. lengthen the cure time and above 70 F. speed up the cure time.

Apply using the recommended notched trowel or a roller.

A hard core phenolic roller allows the majority of the non-skid aggregate to be visible and produces a high profile.

A short nap mohair roller produces a lower profile surface which is not as rough.

## Non-Landing/High Durability (continued)

### D. Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety markings.

### 10. CAUTIONARY NOTES

This material must only be installed by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise an improperly mixed material will result in a decking failure.

Never install when minimum temperature range is not available, in high humidity, in inclement weather or when there is a high probability of rain. These conditions interfere with the chemical interaction and poor adhesion results which lead to traffic failure and loss of bond.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

When applying by roller, eliminate ridges caused by roller but do not overwork the non-skid.

### 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

### 12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

GENERAL PURPOSE, NON-LANDING AREA, STANDARD DURABILITY

DOD-C-24667 TYPE IA/1B

COMPOSITION G, GRADE B, CLASS 1

### 1. PRODUCT DESCRIPTION

A high abrasive, non-skid deck covering formulated to provide standard durability and designed for installation in non-landing areas such as weather decks, walkways, bridge wings and similar areas. The high surface profile damages steel arresting cable and is not used in aircraft landing or cable run-out areas.

This system is high in wear resistance, has standard durability, excellent adhesion to steel and resists rust creeping if a fracture ever occurs. It is available in both a high and low volatile organic content.

Provides safe footing for personnel and a non-slip surface for flight mobile equipment and aircraft. Resists fire, jet blasts and chemical spillage of jet fuel, hydraulic fluid and other chemicals, and is applied by roller or brush.

### 2. FEATURES

Provides standard durability and life expectancy.

High abrasion resistance provides excellent non-slip properties.

Resists blast from jets and is fire retardant.

Excellent adhesion and weathering qualities.

Corrosion resistance protects against rust creep, if system ever develops a crack.

Resists jet fuel, gasoline, hydraulic fluids and similar chemicals.

### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE

DOD-C-24667 Type IA/1B

Composition G, Grade B, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
<u>Type 1A High Volatile</u>	
MS-350G	American Safety Technologies, Inc.
Phillyclad 3 00	Philadelphia Resins Corporation
<u>Type 1B Low Volatile</u>	
MS-350G	American Safety Technologies, Inc.
Devgrip 237 HR	Devoe Coatings Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Hangar decks  
Weather decks  
Walking and working traffic areas  
Passageways  
Where rolling equipment is used  
Helicopter pads and vertical take-off areas  
Aircraft elevators  
Bridge wings  
Carrier flight deck, but not in landing and cable run-out areas.  
Where material of standard durability satisfies use requirements.

6. LIMITATIONS OF USE

Not to be installed in aircraft landing areas or cable run-out areas.  
Deck surface must be grit-blasted to near white metal (SA 2.5).  
Do not use on ammunition carrying ships to avoid any sparking of hard surface by any kind of impact.  
Do not install in areas where a smooth easy to clean surface is required.  
Must use manufacturer's recommended primer.  
Material is applied by roller or notch trowel, cannot be sprayed.

Non-Landing/Standard Durability (continued)

7. COST COEFFICIENT 2.21

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to fire test requirements set forth in MIL-STD-1623.

Resistance to Impact- Resist series of 2 pound steel balls dropped from 8 foot height in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade B 70% in 4 days  
90% in 14 days

Resistance to Wear - Tests run on U.S. Government wear testing machine in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade B 40%

Resistance to Accelerated Corrosion -

No loss of adhesion, separation between layers or corrosion of steel beyond 3/8 inch radius from center of impact area when tested in accordance with procedures set forth in DOD-C-24667.

Resistance to Immersion -

Sample shall not soften, lose adhesion, separate, lose color or show signs of deterioration when tested in accordance with procedures set forth in DOD-C-24667.

Weather Resistance - No cracking, checking, loss of adhesion or separation with a maximum chalking rating of 6 when tested in accordance with procedures set forth in DOD-C-24667.

9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surfaces to receive non-skid decking.

## Non-Landing/Standard Durability (continued)

If work time is not available to do preparation and installation according to full instructions, do not start the job as it will fail and need to be redone.

The deck cannot be “good enough” - it must be clean enough to withstand the white glove test.

Grit blast surface to SA 2.5 (near white metal).

Do not use grinding machine as it polishes the steel deck and the primer will peel off the polished surface, use grit blast machine.

In corners a deck crawler, if in proper condition to clean, can be used.

Make certain the steel around the catapult is as hard as the deck steel, otherwise the grit blast unit will tear it up.

### B. Prime Coat

Use primer recommended by non-skid manufacturer.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted to protect against corrosion.

Primer must always be applied a minimum of 1 mil thicker than the depth of the grit blast. If 2.5 mils blast is used, the primer must be installed 3.5 mils to cover high points.

Mix base material and hardener in accordance with manufacturer's instructions. Do not thin material but apply in consistency received from manufacturer. Apply with roller or notched trowel.

Deck temperature can only be a minimum of 50° F. and a maximum of 120° F.

If anyone walks on primer or spills coffee, soda or anything else, the deck must be reblasted and reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a 1 mil thick coat of primer.

Mix base material and hardener and apply to properly cured prime coat in accordance with manufacturer's instructions.

Deck temperature must be between 50° F. and 120° F. Temperatures below 70° F. lengthen the cure time and above 70° F. speed up the cure time.

Apply using the recommended notched trowel or a roller.

## Non-Landing/Standard Durability (continued)

A hard core phenolic roller allows the majority of the non-skid aggregate to be visible and produces a high profile.

A short nap mohair roller produces a lower profile surface which is not as rough.

### D. Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety markings.

## 10. CAUTIONARY NOTES

This material must only be installed by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise an improperly mixed material will result in a decking failure.

Never install when minimum temperature range is not available, in high humidity, in inclement weather or when there is a high probability of rain. These conditions interfere with the chemical interaction and poor adhesion results which lead to traffic failure and loss of bond.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

When applying by roller, eliminate ridges caused by roller but do not overwork the non-skid.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

LANDING AREA, HIGH DURABILITY

DOD-C-24667 TYPE 1A/1B

COMPOSITION L, GRADE A, CLASS 1

### 1. PRODUCT DESCRIPTION

This system is a non-skid deck coating designed for use on carrier landing decks that provides high traction for the aircraft and low abrasion resistance to the arresting cable.

System is designed to provide high durability, excellent adhesion to steel and to withstand the high abuse of many aircraft landings. It prevents rust and rust creepage if material is ever fractured.

Can be installed in both exterior and interior spaces, is fire retardant and is available in both high and low volatile organic content.

### 2. FEATURES

Designed for use in aircraft landing and cable run-out areas.

Provides high durability and extended life expectancy under aircraft landing activity.

High solids resin system.

Excellent non-skid protection for rolling equipment, aircraft and personnel.

Resists blasts from jet airplanes and is fire retardant.

Excellent adhesion and weathering qualities.

High corrosion resistance, protects against rust creep, if surface ever cracks.

Resists jet fuel, hydraulic fluid, oil, grease and similar chemicals.

### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

DOD-C-24667 Type 1A/1B

Composition L, Grade A, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
<u>Type 1A High Volatile and Type 1B Low Volatile</u>	
MS-400L	American Safety Technologies, Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Landing deck areas of aircraft carrier

Cable run-out areas

Hangar decks and all other non-skid areas, if higher cost permits its selection

Helicopter landing areas

6. LIMITATIONS OF USE

Material is applied by roller or notch trowel, cannot be sprayed.

Must use manufacturer's recommended primer.

Surface to be covered must be grit-blasted to near white metal (SA 2.5).

Higher price often restricts use in areas other than landing deck and cable run-out areas.

7. COST COEFFICIENT 2.91

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to fire test requirements set forth in MIL-STD-1623.

Resistance to Impact - Resist series of 2 pound steel balls dropped from 8 foot height in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade A      95% in 4 days  
                  100% in 14 days

## Landing/High Durability (continued)

Resistance to Wear - Tests run on U.S. Government wear testing machine in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade A 10%

Resistance to Accelerated Corrosion - No loss of adhesion, separation between layers or corrosion of steel beyond 3/8 inch radius from center of impact area when tested in accordance with procedures set forth in DOD-C-24667.

Resistance to Immersion - Sample shall not soften, lose adhesion, separate, lose color or show signs of deterioration when tested in accordance with procedures set forth in DOD-C-24667.

Weather Resistance - No cracking, checking, loss of adhesion or separation with a maximum chalking rating of 6 when tested in accordance with procedures set forth in DOD-C-24667.

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surfaces to receive non-skid decking.

If work time is not available to do preparation and installation according to full instructions, do not start the job as it will fail and need to be redone.

The deck cannot be "good enough" - it must be clean enough to withstand the white glove test.

Grit blast surface to SA 2.5 (near white metal).

Do not use grinding machine as it polishes the steel deck and the primer will peel off the polished surface, use grit blast machine.

In corners a deck crawler, if in proper condition to clean, can be used.

Make certain the steel around the catapult is as hard as the deck steel, otherwise the grit blast unit will tear it up.

## Landing/High Durability (continued)

### B. Prime Coat

Use primer recommended by non-skid manufacturer.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted to protect against corrosion.

Primer must always be applied a minimum of 1 mil thicker than the depth of the grit blast. If 2.5 mils blast is used, the primer must be installed 3.5 mils to cover high points.

Mix base material and hardener in accordance with manufacturer's instructions. Do not thin material but apply in consistency received from manufacturer. Apply with roller or notched trowel.

Deck temperature can only be a minimum of 50°F. and a maximum of 120°F.

If anyone walks on primer or spills coffee, soda or anything else, the deck must be reblasted and reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a 1 mil thick coat of primer.

Mix base material and hardener and apply to properly cured prime coat in accordance with manufacturer's instructions.

Deck temperature must be between 50° F. and 120° F. Temperatures below 70 F. lengthen the cure time and above 70 F. speed up the cure time.

Apply using the recommended notched trowel or a roller.

A hard core phenolic roller allows the majority of the non-skid aggregate to be visible and produces a high profile.

A short nap mohair roller produces a lower profile surface which is not as rough.

### D. Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety markings.

## 10. CAUTIONARY NOTES

This material must only be installed by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise an improperly mixed material will result in a decking failure.

## Landing/High Durability (continued)

Never install when minimum temperature range is not available, in high humidity, in inclement weather or when there is a high probability of rain. These conditions interfere with the chemical interaction and poor adhesion results which lead to traffic failure and loss of bond.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

When applying by roller, eliminate ridges caused by roller but do not overwork the non-skid.

### 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

### 12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

### LANDING AREA, STANDARD DURABILITY

#### DOD-C-24667 TYPE IA/IB

#### COMPOSITION L, GRADE B, CLASS 1

### 1. PRODUCT DESCRIPTION

This system is a non-skid deck coating designed for use on carrier landing decks that provides high traction for the aircraft and low abrasion resistance to the arresting cable.

It provides standard durability, excellent adhesion to steel and withstands the high abuse of many aircraft landings. It prevents rust and rust creepage if material is ever fractured.

Can be installed in both exterior and interior spaces, is fire retardant and is available in both high and low volatile organic content.

### 2. FEATURES

Designed for use in aircraft landing and cable run-out areas.

Provides standard durability and life expectancy under aircraft landing activity.

Provides excellent non-skid protection for rolling equipment, aircraft and personnel.

Excellent adhesion and weathering qualities.

Resists blasts from jet airplanes and is fire retardant.

Resists jet fuel, hydraulic fluid, oil, grease and similar chemicals.

High corrosion resistance, protects against rust creep, if surface ever cracks.

High solids resin system.

### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE

DOD-C-24667 Type IA/IB

Composition L, Grade B, Class 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Landing/Standard Durability (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
<u>Type 1A High Volatile</u>	
MS-350L	American Safety Technologies, Inc.
<u>Type 1B Low Volatile</u>	
MS-350L	American Safety Technologies, Inc.
Devgrip 237AR	Devoe Coatings Co.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Landing deck areas of aircraft carrier.

Cable run-out areas.

Hangar decks and all other non-skid areas, if higher cost permits its selection.

Helicopter landing areas.

6. LIMITATIONS OF USE

Material is applied by roller or notch trowel, cannot be sprayed.

Must use manufacturer's recommended primer.

Deck surface to be covered must be grit-blasted to near white metal (SA 2.5).

Higher price often restricts use in areas other than landing deck and cable run-out areas.

7. COST COEFFICIENT 2.68

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to fire test requirements set forth in MIL-STD-1623.

## Landing/Standard Durability (continued)

Resistance to Impact - Resist series of 2 pound steel balls dropped from 8 foot height in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade B 70% in 4 days  
90% in 14 days

Resistance to Wear - Tests run on U.S. Government wear testing machine in accordance with procedures set forth in DOD-C-24667 and wear shall not exceed

Grade B 40%

Resistance to Accelerated Corrosion -

No loss of adhesion, separation between layers or corrosion of steel beyond 3/8 inch radius from center of impact area when tested in accordance with procedures set forth in DOD-C-24667.

Resistance to Immersion -

Sample shall not soften, lose adhesion, separate, lose color or show signs of deterioration when tested in accordance with procedures set forth in DOD-C-24667.

Weather Resistance - No cracking, checking, loss of adhesion or separation with a maximum chalking rating of 6 when tested in accordance with procedures set forth in DOD-C-24667.

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surfaces to receive non-skid decking.

If work time is not available to do preparation and installation according to full instructions, do not start the job as it will fail and need to be redone.

The deck cannot be "good enough" - it must be clean enough to withstand the white glove test.

Grit blast surface to SA 2.5 (near white metal).

## Landing/Standard Durability (continued)

Do not use grinding machine as it polishes the steel deck and the primer will peel off the polished surface, use grit blast machine.

In corners a deck crawler, if in proper condition to clean, can be used.

Make certain the steel around the catapult is as hard as the deck steel, otherwise the grit blast unit will tear it up.

### B. Prime Coat

Use primer recommended by non-skid manufacturer.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted to protect against corrosion.

Primer must always be applied a minimum of 1 mil thicker than the depth of the grit blast. If 2.5 mils blast is used, the primer must be installed 3.5 mils to cover high points.

Mix base material and hardener in accordance with manufacturer's instructions. Do not thin material but apply in consistency received from manufacturer. Apply with roller or notched trowel.

Deck temperature can only be a minimum of 50°F. and a maximum of 120°F.

If anyone walks on primer or spills coffee, soda or anything else, the deck must be reblasted and reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a 1 mil thick coat of primer.

Mix base material and hardener and apply to properly cured prime coat in accordance with manufacturer's instructions.

Deck temperature must be between 50° F. and 120° F. Temperatures below 70 F. lengthen the cure time and above 70 F. speed up the cure time.

Apply using the recommended notched trowel or a roller.

A hard core phenolic roller allows the majority of the non-skid aggregate to be visible and produces a high profile.

A short nap mohair roller produces a lower profile surface which is not as rough.

### D. Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety markings.

10. CAUTIONARY NOTES

This material must only be installed by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise an improperly mixed material will result in a decking failure.

Never install when minimum temperature range is not available, in high humidity, in inclement weather or when there is a high probability of rain., These conditions interfere with the chemical interaction and poor adhesion results which lead to traffic failure and loss of bond.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

When applying by roller, eliminate ridges caused by roller but do not overwork the non-skid.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

GENERAL PURPOSE, NON-LANDING AREA AND HELO PADS

MIL-D-23003, TYPE III

### 1. PRODUCT DESCRIPTION

A high abrasive, non-skid deck covering material designed for exterior and interior use in non-landing areas of carrier. It is used in work and walking areas of carrier decks, on weather decks and helicopter landing areas.

Finished material provides high, non-slip traction, has excellent adhesion, wear resistance and weathering qualities. Surface has non-slip properties designed for personnel and flight mobile equipment and other aircraft servicing equipment.

Can be applied by roller or notched trowel.

### 2. FEATURES

Excellent abrasion resistance and adhesion.

Fire retardant.

Resists spillage of aircraft fluids.

Exterior and interior areas.

Resists rust creepage if coating is ever fractured.

Resists heat and blast of jets.

### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE      MIL-D-23003 A

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Non-Landing, Type III (continued)

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
MS300C	American Safety Technologies, Inc.
MS300A	American Safety Technologies, Inc.
Devgrip 237HR	Devoe Marine Coatings Co.
Devgrip 237AR	Devoe Marine Coatings Co.
Phillyclad 3 00	Philadelphia Resins Corporation
PR-1139-R	Products Research & Chemical Corporation
589-F-7	The Valspar Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

#### 5. AREAS OF GENERAL USE

Weather decks  
Exterior walkways  
Hanger decks  
Aircraft elevators  
Under rolling service equipment  
Exterior signal and work stations  
Helicopter landing areas.

#### 6. LIMITATIONS OF USE

Do not install in aircraft landing or cable run-out areas.  
Must use manufacturer's recommended primer and color topping.  
Deck must be grit blasted to SA 2.5, near white metal.  
Do not install in areas where a smooth easy to clean surface is required.  
PR-1139-R tends to produce a large amount of static electricity. Treating with anti-static material reduces static electricity but causes deck slipperiness.

#### 7. COST COEFFICIENT General Purpose 1.74 Helo Pads 4.63

Note: See Section on Cost Coefficients for explanation of use.

## 8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to requirements in MIL-STD-1623.

Resistance to Wear - When tested in accordance with wear test in MIL-D-23003 material shall not show a maximum reduction in thickness of 30 mils.

Resistance to Impact - Material to withstand 25 impacts of a 2 pound solid steel ball dropped from height of 8 feet, with no chipping, cracking or peeling.

Resistance to Immersion - Material must resist 24 hour exposure to oil, grease, jet fuel JP-5, hydraulic fluid, ethyl alcohol and detergent, as set forth in MIL-D-23003, and shall not soften, lose adhesion, discolor or deteriorate in any other manner.

Non-slip Properties - The coefficient of friction to be 0.90 for a dry, wet and oily surface condition.

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Surface should be grit blasted to SA 2.5, near white metal profile. Where a grit blaster cannot be used, prepare surface with power tool that will abrade the steel, but do not leave a polished surface as that is difficult to adhere to.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surface to receive non-skid decking. Keep all traffic off deck except the installers of the non-skid decking. If the cleaned surface or prime coat is contaminated by dirt, oil, grease, food, beverage or other liquid or solid materials, re-shotblast the surface and prime.

In corners, a deck crawler, if in proper condition to clean, can be used.

### B. Prime Coat

Use prime coat recommended by manufacturer of non-skid.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted, to protect against corrosion.

## Non-Landing, Type III (continued)

Prime coat to be applied a minimum of one mil thicker than the depth of the grit blast.

Mix the two components in accordance with manufacturer's instructions. Apply with roller or notch trowel

Deck temperature should range between 50°F. and 120° F.

If anyone walks on primer or spills something on it, the primer must be removed and deck reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a one mil thick coat of primer.

Mix two components thoroughly and apply to properly cured prime coat in accordance with manufacturer's instructions.

Deck temperature to be between 50°F. and 120° F.

#### (a) Roller Application

Use a phenolic, hard core roller and apply in uniform manner so the majority of the non-slip aggregate is visible. This will produce a heavy, non-slip profile.

A short nap roller provides a lower profile or a less coarse surface.

Use an experienced mechanic trained in the application of non-skid systems and apply material so the best visible appearance is obtained with the least amount of rolling.

#### (b) Notched Trowel

For a high profile finish, used in landing of hummer type airplane, apply with notched trowel, about 1/4" x 1/4" x 3/8" and the point of the notch is straight across.

Hold trowel at a **60°** angle and apply material uniformly.

#### (c) Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety *markings*.

10. CAUTIONARY NOTES

Material to be applied by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise, an improperly mixed material will result in a decking failure.

Never install when recommended temperature range cannot be maintained, in high humidity, in inclement weather or when there is a high probability of rain. These conditions interfere with the chemical interaction and poor adhesion results which leads to traffic failure and loss of bond.

High deck temperatures shorten drying and working time and lower temperatures and high humidity lengthens drying and working time.

When spraying this material it is critical to clean out equipment with solvents for epoxies every one to two hours to prevent build-up and hardening within the equipment.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

Do not allow material to build up too thickly at the deck welds. Apply material across welds and not along them.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

### LANDING AND CABLE RUN-OUT AREAS

#### MIL-D-23003, TYPE IV

#### 1. PRODUCT DESCRIPTION

This system is a non-abrasive type of non-skid deck covering for use on aircraft carrier landing and cable run-out areas. Can be used on exterior and interior decks.

The material provides a very high coefficient of friction that produces positive stopping of aircraft landing at high speeds.

Material has excellent adhesion to properly prepared steel decks, is fire retardant, resists very high heats of the jet blasts and is resistant to organic liquids and other chemicals encountered in aircraft carrier landing areas.

Can be applied by roller or notched trowel.

#### 2. FEATURES

Performs well in landing and cable run-out areas.

Excellent non-skid properties.

Good weathering qualities.

Good resistance to spillage of hydraulic fluids and other chemicals encountered in aircraft areas.

Withstands high heats generated by blasts of jets.

Material is fire retardant.

Approved for use on all classes of navy ships.

Can be used on aircraft elevators and interior storage spaces but it must be understood it is higher in price than other non-skids, such as Type III.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE MIL-D-23003 A

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
MS-300A	American Safety Technologies, Inc.
Devgrip 237AR	Devoe Marine Coatings Co.
589-F-7	The Valspar Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Aircraft carrier landing decks

Cable run-out areas

Helicopter landing areas

6. LIMITATIONS OF USE

Surface must be grit blasted to SA 2.5, near white metal.

Must use manufacturer's recommended primer and color topping.

Can be applied by roller or notched trowel.

High cost generally prohibits its use on weather decks and interior spaces.

7. COST COEFFICIENT 2.21

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Shall conform to requirements in MIL-STD-1623.

Resistance to Wear - When tested in accordance with wear test in MIL-D-23003 material shall not show a maximum reduction in thickness of 30 mils.

Resistance to Impact - Material to withstand 25 impacts of a 2 pound solid steel ball dropped from height of 8 feet, with no chipping, cracking or peeling.

Resistance to Immersion - Material must resist 24 hour exposure to oil, grease, jet fuel JP-5, hydraulic fluid, ethyl alcohol and detergent, as set forth in MIL-D-23003, and shall not soften, lose adhesion, discolor or deteriorate in any other manner.

Non-slip Properties - The coefficient of friction to be 0.90 for a dry, wet and oily surface condition.

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Surface should be grit blasted to SA 2.5, near white metal profile. Where a grit blaster cannot be used, prepare surface with power tool that will abrade the steel, but do not leave a polished surface as that is difficult to adhere to.

The harsh use conditions and extreme exposure to all types of weather demand meticulous preparation of the surface to receive non-skid decking. Keep all traffic off deck except the installers of the non-skid decking. If the cleaned surface or prime coat is contaminated by dirt, oil, grease, food, beverage or other liquid or solid materials, re-shotblast the surface and prime.

In corners, a deck crawler, if in proper condition to clean, can be used.

### B. Prime Coat

Use prime coat recommended by manufacturer of non-skid.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted, to protect against corrosion.

Prime coat to be applied a minimum of one mil thicker than the depth of the grit blast.

Mix the two components in accordance with manufacturer's instructions. Apply with roller or notch trowel

Deck temperature should range between 50° F. and 120° F.

If anyone walks on primer or spills something on it, the primer must be removed and deck reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck. Body coat must be applied to prime coat within 24 hours of the installation of the prime coat. If more than 24 hours, reprime with a one mil thick coat of primer.

Mix two components thoroughly and apply to properly cured prime coat in accordance with manufacturer's instructions.

## Landing, Type IV (continued)

Deck temperature to be between 50° F. and 120° F.

### (a) Roller Application

Use a phenolic, hard core roller and apply in uniform manner so the majority of the non-slip aggregate is visible. This will produce a heavy, non-slip profile.

A short nap roller provides a lower profile or a less coarse surface.

Use an experienced mechanic trained in the application of non-skid systems and apply material so the best visible appearance is obtained with the least amount of rolling.

### (b) Notched Trowel

For a high profile finish, used in landing of hummer type airplane, apply with notched trowel, about 1/4" x 1/4" x 3/8" and the point of the notch is straight across.

Hold trowel at a 60° angle and apply material uniformly.

### (c) Color Topping

Apply color topping in accordance with manufacturer's instructions. The function of the color topping is for a visual landing aid and safety markings.

## 10. CAUTIONARY NOTES

Material to be applied by a trained and qualified mechanic.

The person mixing the materials must be thoroughly trained and dedicated to following mixing instructions completely, otherwise, an improperly mixed material will result in a decking failure.

Never install when recommended temperature range cannot be maintained, in high humidity, in inclement weather or when there is a high probability of rain. These conditions interfere with the chemical interaction and poor adhesion results which leads to traffic failure and loss of bond.

High deck temperatures shorten drying and working time and lower temperatures and high humidity lengthens drying and working time.

Do not attempt to install while ship is underway as weather and humidity conditions are not favorable and waves hitting the ship cause material to vary in thickness which results in failure of the non-skid.

Do not allow material to build up too thickly at deck welds. Apply material across welds and not along them.

Landing, Type IV (continued)

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## NON-SKID DECK COVERING

### SPRAY APPLIED, LIGHTWEIGHT, NON-LANDING AREA

MIL-D-24483, TYPE I

#### 1. PRODUCT DESCRIPTION

A spray applied, lightweight, non-slip deck covering system for use in all exterior passageways and interior decks and can be used in all types of ships. Provides non-slip surface and safe footing for personnel and is highly non-slip.

Can be installed on both exterior and interior areas. It has excellent adhesion, wear resistance, weathering qualities and is fire retardant.

#### 2. FEATURES

Heavy duty, high abrasive, non-skid surface.

Material is fire retardant and has excellent weathering qualities.

Applied by spray application.

High in chemical resistance.

Approved for use on all classes of Navy ships.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE MIL-D-24483, TYPE I

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
MS-2000 Epoxy 2000 XA	American Safety Technologies, Inc.
Devgrip 237 H	Devoe Marine Coatings Co.
PM 1066 PM 1066A	Palmer International, Inc.
PR-1139-HP PR-1139-HP, Type II	Products Research & Chemical Corp.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Non-Landing Spray (continued)

5. -AREAS OF GENERAL USE

Exterior passageways

Interior decks.

6. LIMITATIONS OF USE

Must be applied by spray application.

Manufacturer's approved primer and color topping must be used.

Flammable mixture with some hazardous ingredients. Use recommended safety equipment and provide proper ventilation.

Must only be used in an area that allows for spray application procedures.

Do not install where a smooth, easy to clean, surface is required.

7. COST COEFFICIENT 1.81

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Must not exceed 4 ounces per square foot.

Fire Resistance - Shall conform to fire test requirements set forth in MIL-STD-1623.

Resistance to Impact - Sample shall be subjected to 25 impacts of a 2 pound steel ball dropped from height of 5 feet. Sample must have a minimum rating of 95% dry and 30% after sample has been immersed in sea water for 15 days.

Resistance to Wear - Sample to have maximum reduction in thickness of 25 mils when tested on Federal Government wear test equipment.

Resistance to Accelerated Corrosion - Three samples coated as per test requirements shall undergo 15 day immersion test in sea water, having previously been subjected to impact test. Deck covering material shall not become detached.

Resistance to Immersion - No softening, loss of adhesion, discoloration or other form of deterioration when immersed for 24 hours in 6 different organic fluids and a detergent.

9. APPLICATION METHODS

**The manufacturer's Application Instructions must be strictly followed.**

## Non-Landing Spray (continued)

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

The extreme weather exposure demands meticulous preparation of the surfaces to receive non-skid decking.

If work time is not available to do preparation and installation according to full instructions, do not start the job as it will fail and need to be redone.

The deck cannot be "good enough" - it must be clean enough to withstand the white glove test.

Grit blast surface to SA 2.5 (near white metal).

Do not use grinding machine as it polishes the steel deck and the primer will peel off the polished surface, use grit blast machine.

In corners a deck crawler, if in proper condition to clean, can be used.

### B. Prime Coat

Use primer recommended by non-skid manufacturer.

Prime the grit blasted surface as soon as possible, but always the day the steel was blasted to protect against corrosion.

Primer must always be applied a minimum of 1 mil thicker than the depth of the grit blast. If 2.5 mils blast is used, the primer must be installed 3.5 mils to cover high points. It must be coated with body coat within 24 to 48 hours, otherwise surface must be cleaned and reprimed.

Mix base material and hardener and apply by spray application in accordance with manufacturer's instructions.

Deck temperature can only be a minimum of 50° F, and a maximum of 120° F.

If anyone walks on primer or spills coffee, soda or anything else, the deck must be reblasted and reprimed.

### C. Non-Skid Body Coat

Install only over properly blasted and primed steel deck.

Mix base material and hardener and apply to properly cured prime coat in accordance with manufacturer's instructions.

Using recommended equipment and air pressure, spray apply mixed material at recommended coverage per gallon, to provide 1/32" to 1/16" thickness in accordance with manufacturer's instructions.

## Non-Landing Spray (continued)

### D. Color Topping

Spray apply color topping in accordance with manufacturer's instructions as required.

### 10. CAUTIONARY NOTES

Deck temperature at time of application should be between 50°F and 120° F. Temperatures below 70° F. lengthen the cure time and above 70 F. speed up the cure time.

Apply primer immediately after cleaning deck and before corrosion has a chance to get started.

Surface preparation is most important in success of non-skid systems.

Full cure requires 4 to 5 days at 70° F.

Mechanic must wear safety equipment recommended by manufacturer, particularly rubber gloves and goggles.

Solvents in formulation are flammable in wet state so follow all standard procedures to prevent a fire during mixing and installing.

### 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

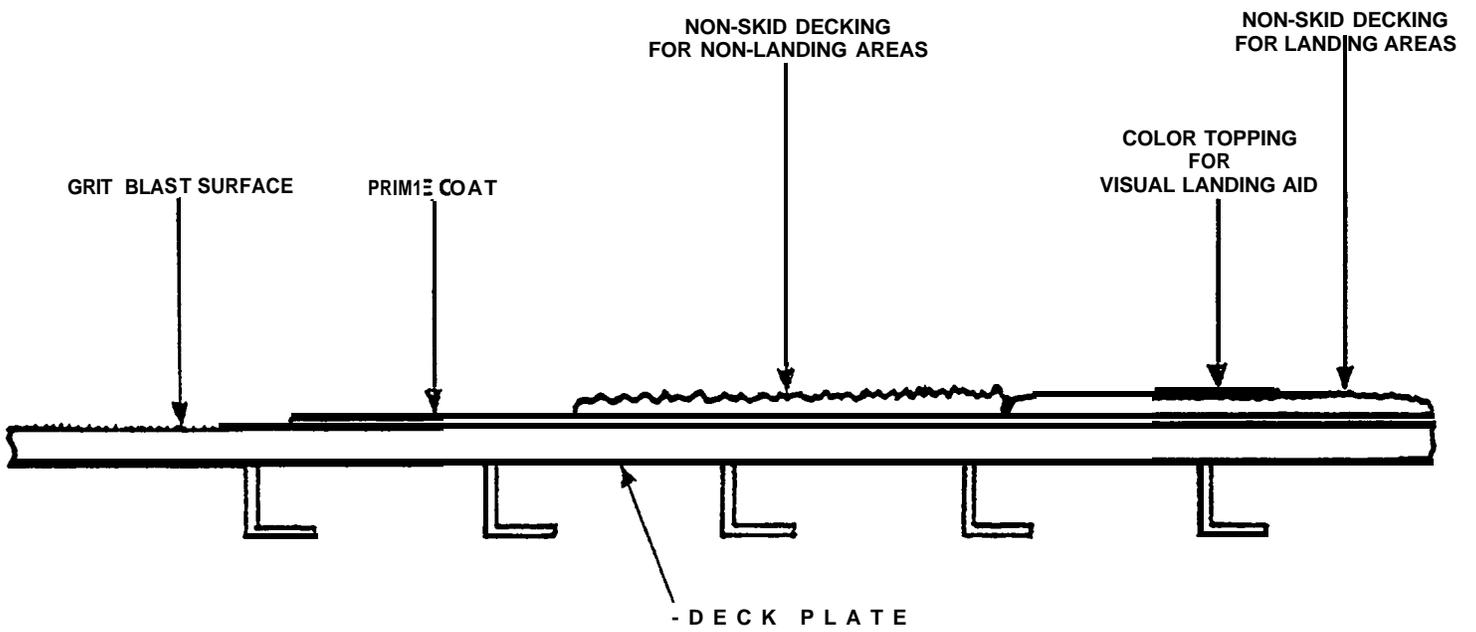
### 12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# NON-SKID DECKING





## REEFER BOX SYSTEM

### LATEX MASTIC DECK COVERING

#### 1. PRODUCT DESCRIPTION

Reefer boxes are used for storage of food used in consumption by crew and passengers. The decking must withstand rough usage and meet the insulation requirements established by the ship designers.

Heavy duty reefer boxes are very large and must withstand heavy foot and fork lift truck activities.

General purpose reefer boxes are generally smaller and are subjected to foot traffic and hand cart traffic.

The type and thickness of the insulation selected is the responsibility of the Naval Architect or Marine Engineer.

#### **IMPORTANT: TEMPERATURE REDUCTION PROCEDURES**

The "Pull Down" procedure is most important to follow to avoid physical stress damage to reefer box. The recommended procedure is described in Section 10 "Installation Cautions."

#### 2. FEATURES

Provides sufficient insulation to preserve food contained therein from spoiling.

Utilizes "rat proofing" on the exterior perimeter of the reefer box to prevent vermin entry and protect food and health of all concerned.

Incorporates a troweled waterproof membrane to prevent moisture from getting into the insulation.

Has a finished surfacing that withstands the traffic load that reefer box will **receive**.

Styrofoam is often specified because it does not absorb moisture. It is generally 4 inches thick in cooler boxes and 6 to 8 inches in freezers.

#### 3. SPECIFICATION REFERENCE

No current specification **in use**.

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Selbatuf/Promdek W.P. Membrane - High Density Insulation Block	Selby, Battersby & Co.
Dex-0-Tex P61/Neoprene Membrane - High Density Insulation Block	Crossfield Products Corp.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Reefer Boxes (continued)

5. AREAS OF GENERAL USE

Reefer boxes, freezer boxes and cooler boxes.

6. LIMITATIONS OF USE

**Do not use in areas where this type insulation is not required.**

“Pull Down” procedure to reach temperature to be maintained in reefer box is a **slow** procedure taking 9 to 10 days, so do not install decking in this area unless sufficient total installation and “Pull Down” time is available.

7. COST COEFFICIENT **6.10**

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Weight - Approximately 10 to 20 pounds per square foot depending on which system is selected.

Fire Rating - Fire retardant.

Toxicity - Non-Toxic.

Other properties are based on system selected and would be similar to properties off Latex Mastic, MIL-D-3134 Type II, Deck Covering.

Non-slip Properties - When tested in accordance with MIL-D-3134 the deck covering must exhibit a factor of friction equal to or higher than those shown.

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	<b>Dry</b>	Wet	Oily	Dry	Wet	Oily
Leather	<b>0.6</b>	<b>0.5</b>	-	<b>0.3</b>	<b>0.4</b>	-
Rubber	<b>0.6</b>	<b>0.7</b>	<b>0.3</b>	<b>0.4</b>	<b>0.7</b>	0 . 1

9. APPLICATION METHODS

The **Manufacturer’s Application Instructions must be strictly followed,**

I. General Application steps for heavy duty type reefer boxes:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

## Reefer Boxes (continued)

### B. Insulation Blocks

Generally a high density thermal insulation, similar to Styrofoam, is installed with a special adhesive for this insulation. It is installed to the type, thickness and method set forth by the specifier. Blocks generally installed in two layers in 90° direction to each other.

### C. Concrete Course

Install 1-1/2 to 2 inches of reinforced, Portland Cement over the insulation.

### D. Waterproof Membrane

Install neoprene waterproof membrane, reinforced with non-directional fibreglas mat (212 x Type), over the concrete, to prevent moisture from getting in the insulation.

### E. Traffic Surface

Directly over the membrane install 3/8 to 1/2 inch latex mastic deck covering, MIL-D-3134, Type II.

## II. General Applications steps for general purpose reefer boxes

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

### B. Insulation Application

Weld steel pins every 9 to 12 inches on center. Set insulation between pins. Place asphalt saturated paper over insulation with pins coming through paper. Place plasterer's metal lath over pins and bend them into pace to secure lath. Blocks generally installed in two layers in 90 directions to each other.

### C. Underlayment Fill

Install 1/4 inch underlayment, similar to MIL-D-3135, Type II into the lath and thick enough to cover the lath. Allow 2 days drying time.

### D. Waterproof Membrane

Install neoprene waterproof membrane, reinforced with non-directional fibreglas mat (212 x Type), over the concrete, to prevent moisture from getting in the insulation.

### E. Traffic Surface

Directly over the membrane install 3/8 to 1/2 inch latex mastic deck covering, MIL-D-3134, Type II.

III. Rat Proofing Procedure

Exterior of the reefer boxes must be "Rat Proofed."

- A. Fasten 1/2 inch wire mesh to outside wall of box up the wall 6 to 9 inches and fasten out onto deck 6 inches.
- B. Fill wire mesh with underlayment similar to MIL-D 3135, Type I.
- C. Install a fluid, trowel applied, neoprene waterproof membrane, reinforced with fibreglas mat.
- D. Install latex mastic decking material, 1/4 inch thick, similar to MIL-D-3134, Type II.

10. CAUTIONARY NOTES

Temperature to be 60° to 75° F. during installation and during drying.

Set time is directly affected by temperature and humidity.

Air flow can cause erratic drying and possibly surface fissure cracks that must be grouted.

Temperature Reduction Procedure:

When a reefer box is being put into service, the temperature must be reduced slowly to eliminate potential structural failure of deck, ceiling and bulkhead materials through stresses created by temperature changes. If a reefer box is ever put out of service for repairs, or other reasons, temperatures must be raised in the reverse order.

The National Association of Cold Storage Insulation Contractors has established the "Temperature Pull Down" Procedure as follows:

<u>Time Period</u>	<u>Temperature Drop</u>	<u>Room Temperature</u>
<b>Assumed Initial Temperature</b>		85° F
1st 24 hours	15° F	70° F
2nd 24 hours	15° F	55° F
3rd 24 hours	15° F	40° F
4th 24 hours	Hold until moisture is eliminated from the room	40° F
5th 24 hours	10° F	30° F
6th 24 hours	10° F	20° F
7th 24 hours	10° F	10° F
8th 24 hours	10° F	0° F
9th 24 hours	10° F	-10° F

Reefer Boxes (continued)

11. MAINTENANCE

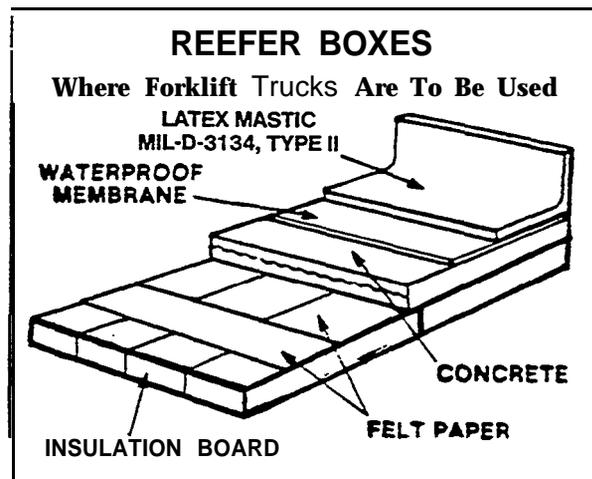
Manufacturer's Maintenance instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.





## VITREOUS TILE DECKING

### CERAMIC TILE

#### 1. PRODUCT DESCRIPTION

Ceramic tile, as used in the marine industry, is generally 1/4 inch thick, and 1 x 1 or 1 x 2 inches unglazed ceramic mosaic tiles, with or without abrasive added to provide a non-slip surface and should be sheet mounted.

When used it is generally installed on the deck of showers or heads. In some cases ceramic tile is installed on bulkheads in either the ceramic mosaic or wall tile types.

Ceramic tile is a dense material that withstands, hard use and is long wearing. Its hardness generally dictates the use of a more flexible underlayment such as MIL-D-3135, Type I, which also is installed to provide the proper pitch to drains.

#### 2. FEATURES

Hard, dense surface withstands much abuse.

Low maintenance costs during life span.

A 4 inch or 6 inch ceramic cove base material, in glazed or matt finish is available.

#### 3. SPECIFICATION REFERENCE

American National Standard Institute, Inc.

Tile Specification ANSI - A 137.1

Thin-set Mortar Specification ANSI - A 118.4

Chemical Resistant and Water Cleanable  
Adhesive and Grout ANSI - A 118.3

U.S. Department of Defense

Tile Specification SS-P-308

Underlayment - Latex Type MIL-D-3135, Type I

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

#### 4. TRADE NAMES AND MANUFACTURERS

American Olean Tile Company           Lansdale, PA

Daltile Corporation                       Dallas, TX

Summitville Tiles, Inc.                 Summitville, OH

U.S. Ceramic Tile Co.                   Canton, OH

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Ceramic Tile (continued)

5. AREAS OF GENERAL USE

Heads

Showers

Locker rooms

Commissary spaces

Sometimes on beach area around swimming pools.

6. LIMITATIONS OF USE

If sand and cement setting bed is selected, it adds weight of about 12, or more, pounds per square foot. Latex or thin-set mortar reduces this by one-half or more.

Restricted use on weight critical ships and those with highly flexible deck systems.

Generally not easily repaired by ship's crew, if needed to be done.

7. COST COEFFICIENT 5.14

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Thickness	1/4 inch
Abrasive Content	Maximum of 7-1/2%, by weight, in 1 x 1 inch tiles
Moisture Absorption	None when tested in accordance with ASTM-C 373
Bond Strength	50 pounds per square inch when tested as in ASTM C-482
Abrasive Hardness	Index of 50 or higher when tested as in ASTM C-501
Breaking Strength	250 pounds or greater when tested in accordance with ASTM-C-648
Weight	Approximately 3 pounds per square foot plus the weight of setting bed, adhesive or mortar
Flammability	None - material totally inorganic.

- 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

If installing over clean, bare steel, apply 2 to 4 mils, dry film thickness of Formula 150, MIL-P-24441, or an underlayment with good adhesion to properly prepared white metal steel.

B. Underlayment

Use material that meets MIL-D-3135, Type I underlayment. Mix according to manufacturer's recommendations and apply a thin prime coat with the body coat troweled into the wet prime coat to the thickness required.

Apply a minimum 1/8 inch of underlayment in flat areas and thickness required for proper pitch to drain in wet areas. Allow a minimum of overnight drying, more for thicker installations or in wet or high humid conditions. In shower stalls minimum thickness of underlayment to be 1/4 inch and areas within 18 inches should be sloped to drain.

C. Installation of Tile

After underlayment is sufficiently dry, the tile can be installed.

Tile can be set using latex mastic adhesive, similar to underlayment material, the thin-set mortar system, a solvent based adhesive or sand bed mortar. Most marine installations use the latex mastic or thin-set mortar systems.

Mix adhesive in accordance with manufacturer's instructions and using recommended trowel, apply adhesive to proper thickness. Imbed tile into adhesive, making all necessary cuts at corners and projections and seat tile firmly into adhesive with beating block.

Cove base to be 4 inch high ceramic tile or troweled mastic or epoxy material, also 4 inch high.

D. Grouting

Allow tile 24 hours to set fully in adhesive and remove paper from the face with a wet sponge. It is best to work on kneeling boards so as not to disturb tiles.

Grout in the open joints using one of the available grout materials - latex mastic, conventional cement grout or an epoxy grouting material - using a rubber faced trowel. Clean film left on surface within 30 minutes after applying grout.

## Ceramic Tile (continued)

### E. Protection

Cover newly installed tile with a heavy building paper for a minimum of 3 days to protect the grout. In wet spaces, keep water off the deck for 2 weeks.

### 10. CAUTIONARY NOTES

If using water based adhesive, the certain temperatures, in area receiving tile, are kept well above freezing prior **to**, during and **for 72 hours after** installation is completed.

Area must be kept out of service and **free** of traffic for 72 hours **after** completion.

When installed **in** a wet space, keep water off floor for two weeks.

Pitch to drain to be done in underlayment and not with adhesive or thin-set material.

If solvent based adhesive is used, be certain to use required ventilation and fire precautions.

For good drainage underlayment needs to be pitched 1/8 to 1/4 inch per foot.

Ceramic tile can be installed over existing, well-adhered terrazzo or trowel applied decking system. Clean and abrade existing material and apply recommended adhesive or bonding material.

### 11. MAINTENANCE

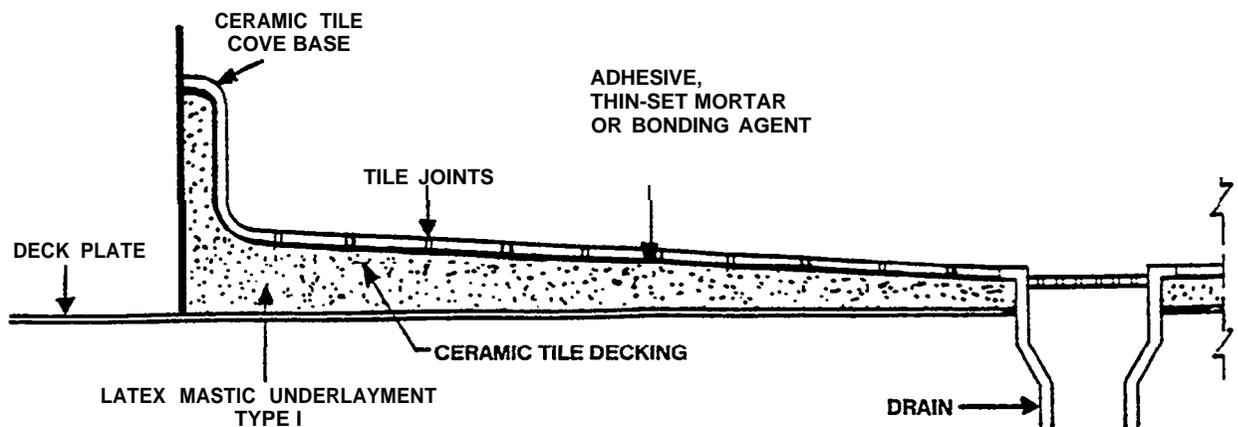
Manufacturer's Maintenance Instructions to be followed.

### 12. WARRANTY

Decking contractor, having installed product in **accordance** with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion **of** installation.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## VITREOUS TILE DECKING

### QUARRY TILE

#### 1. PRODUCT DESCRIPTION

Quarry tile is an extrusion process of natural clay or shale into various shapes but as used in the marine industry it is mostly 6 x6 inches square and 1/2 inch thick. The usual tile selected is standard grade with abrasive.

Quarry tile has a high resistance to oils, fats, grease and many chemicals which makes it a good choice for use in the galley and food preparation areas. It is available in various shapes and can be installed on bulkheads as a cove base. The quarry tile is generally available in a red color only.

It is a hard, dense material with very high compressive strength, a flexible neoprene latex underlayment, such as MIL-D-3134, Type I, providing a cushioned subsurface.

Can be set using thin-set mortar, a dry pack sand and cement setting bed or an epoxy adhesive similar to American Olean's AO 2000 epoxy.

The grout joint material can be of latex mastic material, epoxy grout, high chemical resistant furane resin or Portland cement. Most marine installations utilize latex mastic or epoxy grout material.

#### 2. FEATURES

Hard, dense material that withstands much abuse.

Maintenance cost is low.

Easily repairable by skilled mechanic with little down time.

#### 3. SPECIFICATION REFERENCE

American National Standard Institute, Inc.

Tile Specification ANSI-A 137.1

Thin-set Mortar Specification ANSI-A 118.4

Chemical Resistant and Water Cleanable  
Adhesive and Grout ANSI - A 118.3

U.S. Department of Defense

Underlayment - Latex Type MIL-D-3135, Type I

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Quarry Tile (continued)

4. TRADE NAMES AND MANUFACTURERS

American Olean Tile Company	Lansdale, PA
Summitville Tiles, Inc.	Summitville, OH
Quarry Tile Company	Spokane, WA
Universal Ceramics, Inc.	Adairsville, GA

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

- Galleys
- Scullery areas \_
- Food preparation areas
- Bakery areas
- Butcher shop
- Laundry area
- Service pantry

6. LIMITATIONS OF USE

- Generally not used on weight critical ships.
- Not used on flexible designed decking structures.
- Generally not used in areas other than food service section in marine installations.

7. COST COEFFICIENT '5.51

Note: See Section on Cost Coefficients for Explanation of Use.

8. PHYSICAL PROPERTIES

- Abrasive Hardness - 35 pounds per square inch when tested in accordance with ASTM C-501.
- Breaking Strength - 250 pounds or greater when tested in accordance with ASTM C-648.
- Bond Strength - 50 pounds per square inch when tested in accordance with ASTM C-482.

## Quarry Tile (continued)

Moisture Absorption -	Average of 5% when tested in accordance with ASTM c-373.
Compressive Strength -	27,000 pounds per square inch when tested in accordance with ASTM C-773.
Flammability -	None - material totally inorganic.
Weight -	3/4 inch tile weighs approximately 8 - 8.5 pounds per square foot. Setting bed of latex adds approximately 3 pounds per square foot. 1 inch cement setting bed adds approximately 12 pounds per square foot.

### 9. APPLICATION METHODS

**The Manufacturer's** Application Instructions must be strictly followed.

General Application steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

#### B. Underlayment

When installing the quarry tile with adhesive or thin-set mortar, and pitching to a drain is required, a latex mastic underlayment such as MIL-D-3135, Type I, should be installed to the thickness required. Prime with a wet mixture of the latex mastic and install the full thickness into the wet primer. Allow underlayment to dry overnight or longer in wet or high humid conditions.

#### C. Dry Pack Sand and Cement Setting Bed

This system is generally installed a minimum of one inch in thickness and either expanded metal lath, 3" x 8" x 13" gauge, or butterfly clips must be welded to the deck to anchor the cement bed. The anchoring material should be coated with a bituminous emulsion to protect from corrosion.

The quarry tile should be set in the wet mortar and beat into the bed with a block to anchor the tile into the bed.

#### D. Latex Mortar, Thin-set or Adhesive Method

After the underlayment has dried, mix the adhering material selected in accordance with manufacturer's instructions. Apply mixed material on the underlayment and/or the deck and set the tile into the material while it is still wet.

The quarry tile should be beat into the adhesive with a rubber faced trowel to be certain the total area of the tile is in contact with the adhesive.

## Quarry Tile (continued)

### E. Grouting

Allow quarry tile to set 24 hours before grouting. Mix grout selected in accordance with manufacturer's instructions. Force grout material into the joints using a rubber faced trowel or float. Clean film left on surface of the quarry tile within 30 minutes of applying the grout, depending on manufacturer's instructions.

### F. Protection

Protect newly installed quarry tile from traffic for three days to allow for drying or setting time. In wet spaces keep water off floor for 2 weeks.

## 10. CAUTIONARY NOTES

If water based underlayment or adhesive is used, temperatures must be kept well above freezing, 72 hours before and after, as well as during the installation.

Keep traffic off floor for 3 days after completion.

When installed in a wet space, keep water off floor **for** two weeks.

If pitch to a drain is required, establish amount of pitch in the underlayment or cement setting bed.

## 11. MAINTENANCE

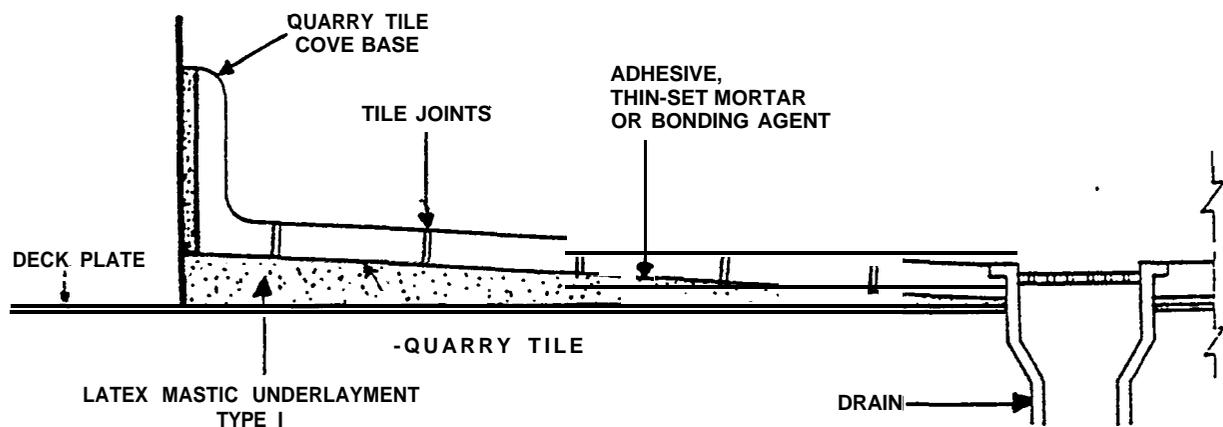
Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

## 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**Resilient Decking**

## RESILIENT DECKING

### VINYL COMPOSITION TILE

#### 1. PRODUCT DESCRIPTION

Vinyl Composition Resilient Tile is the most widely used decking material in the shipbuilding industry. All tiles must be free of any asbestos content.

Material is a composition of polyvinyl chloride, resin binder, pigments and fillers. The widest used tiles are 12" x 12" by 1/8 inch thick, although some manufacturers offer 3/32 inch thickness.

Vinyl composition tiles are available that meet the standards set forth in MIL-T-18830 B for use in U.S. Navy ships and tiles that do not meet those standards are sometimes used in commercial vessels that do not require the military standards.

Available in large variety of colors and patterns from plain color to marbled or textured. The finish is a dense surface that provides easy cleaning.

#### 2. FEATURES

No asbestos content in these tiles.

Color and pattern through the full thickness.

Economically priced.

Tiles contain no asbestos.

Easy to install.

Performance proven wear qualities.

Good alkali, grease and oil resistance.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

MIL SPEC. MIL-T-18830 B

Fire Test MIL-STD-1623 D

ASTM-F 1066, Composition 1, Class 2

FED SPEC SS-T-312 B (1), Type IV, Composition 1

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

VCT (continued)

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Excelon Supreme	Armstrong World Industries
Excelon Standard	"
Medintech	"
Genera Marble	Azrock Floor Products
Pebbled Onyx	"
Vinyl Composition Tile	Kentile Floors Inc.
Expressions Collection	Tarkett
Basics Vinyl Composition	"
Signals Collection	"

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced;

#### 5. AREAS OF GENERAL USE

Mess rooms

Lounges

Staterooms

Photographic labs

Recreation areas

Ship stores

Squadron ready room

Offices

Passageways

In most habitability areas.

#### 6. LIMITATIONS OF USE

Do not install on exterior areas.

Material can be stained by cigarette burns.

Do not use in commercial kitchens.

Indentation marks can remain when material is subjected to high point loading by high heel traffic use.

VCT (continued)

Can be installed over a well adhered existing resilient deck material but never install more than one layer.

Do not install in galley or food preparation areas.

**7. COST COEFFICIENT 1.00**

Note: See Section on Cost Coefficients for explanation of use.

**8. PHYSICAL PROPERTIES**

Fire Resistance - Must conform to MIL-STD-1623.

Indentation - Maximum indentation of 0.032 inch at 115°F. for 30 seconds (MIL-T-18830B)

Flexibility - Not less than 1.0 inches, without breaking, both with and across the grain (MIL-T-18830B).

Dimensional Stability - Maximum change is plus or minus 0.024 inch per linear foot (MIL-T-18830B).

Wear Resistance - Not greater than 0.045 inch after 1500 revolutions of wear test machine as specified in MIL-T-18830B.

Fire Test ASTM-E 648 - Radiant panel test must exhibit 0.45 watts/square centimeter, critical radiant flux.

Smoke Density Test - ASTM-E 662 - Average smoke optical density 450 or less.

**9. APPLICATION METHODS**

The **Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

**A. Preparation**

Follow instructions under DECK PREPARATION as contained in this Manual.

Material to be installed should be maintained at 65°F. to 70°F. for a minimum of 24 hours prior to installation.

Temperature in spaces being installed to be maintained at 65°F. to 70°F., 24 hours before, after and during installation.

Grind weld seams flush with deck or fair them out with underlayment, such as MIL-D-3135, Type IL This underlayment is also used to level uneven deck surfaces.

Deck must be dry before installing adhesive.

E. Installation of Tile

Lay out area to be tiled so as to obtain balanced tile sizes around the perimeter of the space as much as possible.

Apply approved adhesive using a fine-toothed trowel in an amount which allows mechanic to do installation without kneeling in adhesive or on newly laid tile.

Tiles are to be laid tight to each other and pushed down into adhesive. Tiles should be rolled in both directions to obtain full contact with adhesive. Remove excess adhesive from face of tile while wet.

Where tiles do not fit tight against bulkhead or built-in furniture or meet against weld lines, the areas are filled in with sealant or caulking compound. In some instances weld beads prevent resilient material from fitting tight to the bulkhead and this can be overcome by cutting (or chinking) the edge that goes against bulkhead on a 45 degree angle.

Allow tile to set about 1 day before allowing traffic on the deck and do not wash for one week.

10. CAUTIONARY NOTES

After laying out tile pattern, start placing the tiles at the middle of the room.

Store materials at 65°F. to 70°F. prior to starting job.

Maintain temperature in the area being tiled at 65°F. to 75°F. 24 hours before starting and after completion and during the installation.

Subfloor must be dry and free of dirt, paint, grease, wax, oil and any residue.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

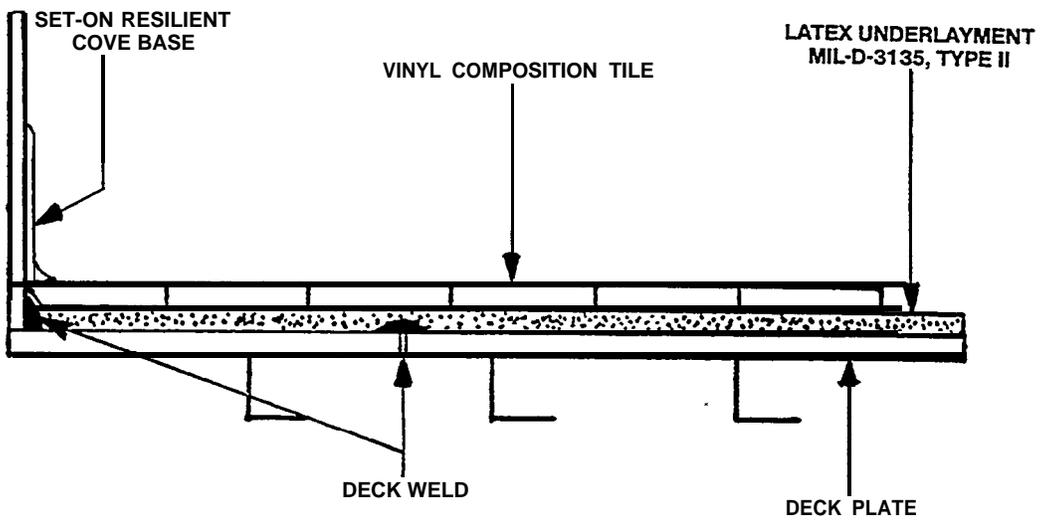
12. WARRANTY

Contact individual manufacturer and installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# VINYL COMPOSITION TILE



## RESILIENT DECKING

### HOMOGENEOUS VINYL TILE

#### 1. PRODUCT DESCRIPTION

These tiles are solid vinyl with color and pattern carried throughout the full thickness of the tile. Material has good flexibility and a non-porous finish which keeps maintenance to a minimum.

Homogeneous vinyl tile is in limited use in the shipbuilding industry currently. This material is often installed in wood and plastic boats because it is more flexible than vinyl composition tile. It can be installed in many spaces but budget constraints often limit its wider use.

Most vinyl tiles are made of a polyvinyl chloride resin with pigments, plasticizers and fillers. Most vinyl tiles are available in 12" x 12" and 1/8 inch thick. Some manufacturers produce tiles as large as 36" x 36".

#### 2. FEATURES

Good flexibility and indentation resistance.

Product is free of asbestos.

Can be installed over wood and fibreglas decking.

Tiles available in a good range of colors and patterns.

General size of tiles are 12" x 12" and 1/8 inch thick.

High wearing qualities allowing it to be used in areas of heavy traffic.

Good resistance to a variety of chemicals.

#### 3. SPECIFICATION REFERENCE.

U.S. DEPARTMENT OF DEFENSE

FED SPEC SS-T-312, Type III

Fire Test MIL-STD-1623D

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Homogeneous Vinyl (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Century Marble	Azrock Industries, Inc.
Contract Vinyl Tile	Flexco Company
Appeal Vinyl Tile	
Solid Vinyl Tile	Kentile Floors
Vynylast Vinyl Tile	Vinyl Plastics, Inc.
Travertino Vinyl Tile	

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

- Most habitability areas
- Over wood decks and plastic hull boats
- Medical facilities
- Chart room
- Chapels
- Recreation areas
- Passageways

6. LIMITATIONS OF USE

- Do not install on exterior areas.
- Do not install in galley, food preparation spaces or areas exposed to animal fats or excessive moisture.
- Material can be stained by cigarette burns.
- Install on dry and clean decks.
- Can be installed over a well adhered existing resilient deck material but never install more than one layer.
- Installed price higher than vinyl composition tile and restricts wider use.

7. COST COEFFICIENT 1.95

Note: See Section on Cost Coefficients for explanation of use.

Homogeneous Vinyl (continued)

## 8. PHYSICAL PROPERTIES

Fire Resistance - Must conform to MIL-STD 1623  
ASTM E-84 rating of 25 or less

Indentation - Maximum residual indentation not to exceed 10% when tested in accordance with Fed Spec SS-T-312, Type III.

Flexibility - Before and after heating, tile shall not crack or break when tested in accordance with Fed Spec SS-T-312, Type III.

Dimensional Stability - Maximum change in linear dimension of 0.20 inch per linear foot when tested in accordance with Fed Spec SS-T-312, Type III.

Fire Test ASTM-E 648 - radiant panel test must exhibit a 0.45 watts/square centimeter critical radiant flux.

Abrasive Resistance ASTM - D 1044, using a CS-10-F wheel at 500 grams weight, for 5000 cycles, shall exhibit a maximum loss of .008 inch.

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Material to be installed should be maintained at 65°F. to 70°F. for a minimum of 24 hours prior to installation.

Temperature in spaces being installed to be maintained at 65° F. to 70° F., 24 hours before and after and during installation.

Grind weld seams flush with deck or fair them out with underlayment, such as MIL-D-3135, Type II. This underlayment is also used to level uneven deck surfaces.

Deck must be dry before installing adhesive.

### B. Installation of Tile

Lay out area to be tiled so as to obtain balanced tile sizes around the perimeter of the space as much as possible.

Apply approved adhesive using a fine-toothed trowel in an amount which allows mechanic to do installation without kneeling in adhesive or on newly laid tile.

## Homogeneous Vinyl (continued)

Tiles are to be laid tight to each other and pushed down into adhesive. Tiles should be rolled in both directions to obtain full contact with adhesive. Remove excess adhesive from face of tile while wet.

Where tiles do not fit tight against bulkhead or built-in furniture or meet against weld lines, the areas are filled in with sealant or caulking compound. In some instances weld beads prevent resilient material from fitting tight to the bulkhead and this can be overcome by cutting (or chinking) the edge that goes against bulkhead on a 45 degree angle.

Allow tile to set about 1 day before allowing traffic on the deck and do not wash for one week.

### 10. CAUTIONARY NOTES

After laying out tile pattern, start placing the tiles at the middle of the room.

Store materials at 65°F. to 70°F. prior to starting job.

Maintain temperature in the area being tiled at 65°F. to 70°F. 24 hours before, starting, after completion and during the installation.

Subfloor must be dry and free of dirt, paint, grease, wax, oil and any residue.

### 11. MAINTENANCE

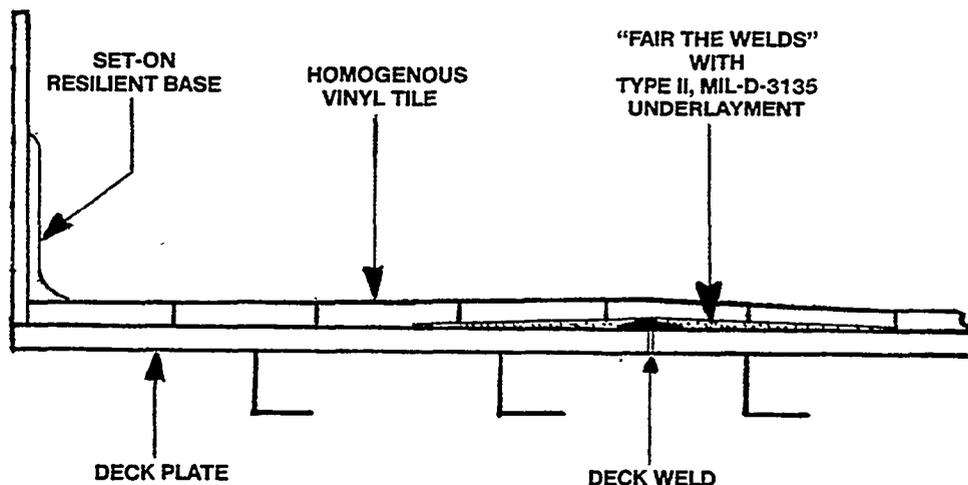
Manufacturer's Maintenance Instructions to be followed.

### 12. WARRANTY

Contact individual manufacturer and installer for specific warranty on product selected.

### 13. CONSTRUCTIONS DETAILS

Construction Details are included in each Section, where applicable.



## RESILIENT DECKING

### VINYL SHEET DECKING

#### 1. PRODUCT DESCRIPTION

These products are vinyl composition sheet decking and can be with color and pattern throughout the sheet or a pattern only on the wearing surface over a backing material. This product is used in both commercial and naval vessels.

Some products in this Section meet the requirements of FED SPEC L-F-475, Grade A, and also the fire requirements of the Fire Test MIL-STD-1623.

The material is approved for use in general shipboard areas and those conforming to the Fire Test MIL-STD-1623 may be used in lieu of vinyl composition deck tile.

The material can be installed up the bulkhead as a cove base and all seams in deck and cove base can be fused chemically or with a heat gun, where desired.

Some manufacturers offer vinyl sheet decking with raised, non-slip buttons or studs with mineral aggregate which provides longer wear life and a high surface coefficient of friction for safer walking. The raised buttons allow water to drain away which further reduces the surface slippability.

The buttons are approximately one inch in diameter and are generally raised 0.025 to 0.050 inch above the surface of the tile. These button type systems do not have any federal or military specification standards.

#### 2. FEATURES

Good wearing qualities.

Meet specification requirements for flexibility, indentation resistance and solvent resistance.

Product **is** free of asbestos.

Can be installed over properly primed metal decks and over wood or plastic decks.

Material can be heat or chemically fused to provide a seamless surface.

Sheets are generally .080 inch thick and in 6 to 12 foot widths.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

FED SPEC L-F-475, Grade A

Fire Test MIL-STD-1623

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Vinyl Sheets (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Medintech 6 foot wide, .080" gauge	Armstrong World Industries
Classic Corlon " .085" gauge	
Crosswalk    .100" gauge	
Coordinates	Tarkett
Images	

Note: Organizations listed are representative but not necessarily - a total list of manufacturers. of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

State rooms  
Medical facilities  
Passageways  
Library  
Lounge  
Mess room  
Habitability areas.

6. LIMITATIONS OF USE

Do not use in galleys or food preparation areas.

Do not install on exterior areas.

Can be installed over a well adhered existing resilient deck material but never install more than one layer.

Materials can be stained by cigarette burns.

7. COST COEFFICIENT 1.75

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Resistance - Must conform to MIL-STD-1623.

Fire Radiant Panel Test - ASTM - E 648 - Must exhibit a 0.45 watts/square centimeter, critical radiant flux.

Smoke Density Test - ASTM - E 662 - Average smoke optical density 450 or less

ASTM E-84 - Flame spread 75 or less

FED SPEC L-F-475, Grade A includes standards for composition, flexibility, indentation, and solvent resistance.

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

-Material to be installed should be maintained at **65° F.** to 70° F. for a minimum of 24 hours prior to installation.

Temperature in spaces being installed to be maintained at **65° F.** to 70° F., 24 hours before, after and during installation.

Grind weld seams flush with deck or fair them out with underlayment, such as MIL-D-3135, Type II. This underlayment is also used to level uneven deck surfaces.

Deck must be dry before installing adhesive.

### B. Installation of Sheet Material

Lay out the area to receive the sheet material and cut sheets to proper length.

Overlap the edges of the sheets and double cut the sheets so a tight fit is obtained.

Roll back one-half of the sheets and apply the adhesive to the deck, as approved by the manufacturer of the vinyl sheet material, by using a notched trowel. The entire surface should be uniformly covered.

Allow adhesive to dry until it is tacky, then roll sheet back into the adhesive. Follow the same procedure for the other half of the sheet.

Roll tile with a standard 150 pound roller going in both directions to be certain the sheet is fully adhered and all air bubbles have been rolled out.

## 10. CAUTIONARY NOTES

Always double cut the sheets for a tight fit.

Subfloor must be dry and clean and free of dirt, grease, paint, wax, oil and any residue.

Store material at **65° F.** to 70° F. prior to using and maintain temperature in area to the same levels before, during and after installation.

Vinyl Sheets (continued)

11. MAINTENANCE

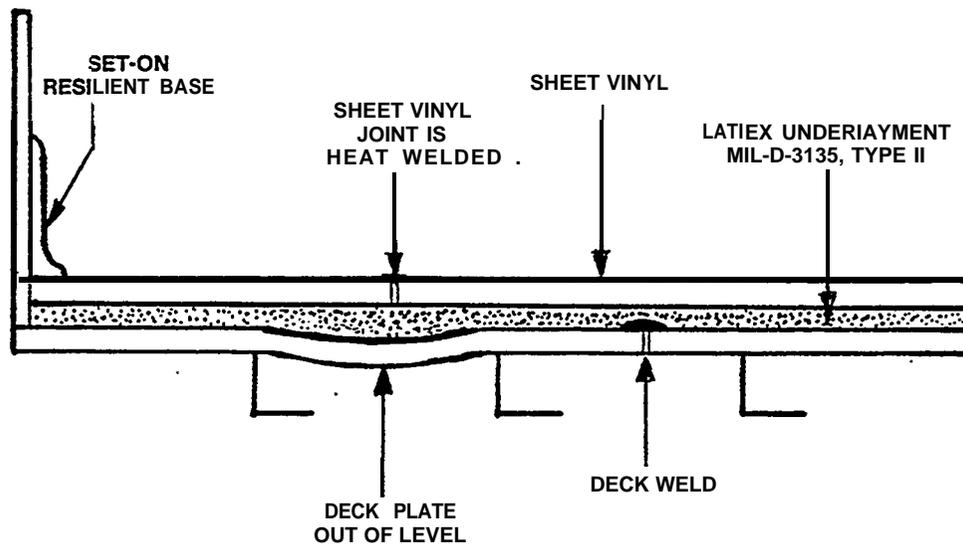
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contact individual manufacturer and installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## **RESILIENT DECKING**

### **RUBBER TILE**

#### **1. PRODUCT DESCRIPTION**

Rubber tiles shall be made of natural or synthetic rubber, alone or in combination. Rubber tile decking provides high comfort underfoot, is resilient and thereby reduces leg fatigue, has good non-slip traction and is quiet.

These tiles possess very high dimensional stability, have good spill resistance to many liquids and exhibit very long wearing capabilities because colors are molded throughout the full thickness of the tiles.

The common thickness of the tiles is 1/8 inch, however, tiles can be obtained in 3/16 inch and 3/32 inch sizes from some manufacturers, and from 12" x 12" as well as 36" x 36".

Rubber tiles can be used in both commercial and Navy ships in most habitability spaces. The Navy generally use rubber tile only in wood and plastic hull ships. The initial cost is higher than vinyl composition tile but its long life expectancy provides a good return on the investment.

Raised disc surfaces on rubber tiles provide higher coefficient of friction and better non-slip traction and longer life expectancy. There are some manufacturers that offer these tiles in 1/8" and 3/16" thickness and in sizes up to 18" x 18".

The raised discs or buttons allow water to drain away and reduces wet surface slipability. The discs are generally 0.025 to 0.050 inch above the surface of the tile. They are available in both Class I and Class II fire rating. These raised disc systems do not have any federal or military specification standard.

#### **2. FEATURES**

Product is free of asbestos.

Material has good flexibility.

Rubber tiles have high abrasion resistance and provide economical life cycle cost results.

Available in a moderate number of colors.

Color throughout the full thickness of the tile provides long wear durability.

Rubber Tile (continued)

3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE  
FED SPEC SS-T-312, Type II  
Fire Test MIL-STD-1623D

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Burke Argonaut Rubber Tile	Burke Floor Products
Burke Rouleau Rubber Tile (raised discs)	
Radial II Rubber Tile (raised discs)	Flexco Company
Flexco Rubber Tile	
Flexi-Flor Marbleized Tile	The R.C.A. Rubber Company

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Use on wood and plastic hull boats  
Vestibule  
Theatre  
Stairway  
Passageway  
Radio room  
In many of the habitability areas.

6. LIMITATIONS OF USE

Do not install in galley, food preparation spaces or areas exposed to animal fats or excessive moisture.

On naval vessels rubber tile is only used on wood or plastic hull boats and ships.

Do not install on exterior areas.

## Rubber Tile (continued)

Material can be installed over an existing resilient deck material provided it is well adhered, but never install more than one layer over existing material.

Always install on deck surface that is clean and dry.

The installed price of rubber tile is considerably higher than vinyl composition tile which restricts the amount of rubber tile used in shipbuilding.

### 7. COST COEFFICIENT 3.05

Note: See Section on Cost Coefficients for explanation of use.

### 8. PHYSICAL PROPERTIES

Fire Resistance - Must conform to MIL-STD-1623  
ASTM E-84 rating of 25 or less.

Hardness - Type II material shall have a durometer hardness of not less than 90 as tested under FED SPEC SS-T-312, Type II.

Elongation - The tensile stress at 10% elongation shall be 400 pounds per square inch, or greater.

Abrasive Resistance - ASTM-D 1044, using a CS-10-F wheel at 500 grams weight, for 5000 cycles, shall exhibit a maximum loss of .008 inch.

### 9. APPLICATION METHODS

**The Manufacturer's Application Instructions- must be strictly followed.**

General Application steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Material to be installed should be maintained at 65° F. to 70° F. for a minimum of 24 hours prior to installation.

Temperature in spaces being installed to be maintained at 65° F. to 70° F., 24 hours before, after and during installation.

Grind weld seams flush with deck or fair them out with underlayment, such as MIL-D-3135, Type II. This underlayment is also used to level uneven deck surfaces.

Deck must be dry before installing adhesive.

Rubber Tile (continued)

B . Installation of Tile

Lay out area to be tiled so as to obtain balanced tile sizes around the perimeter of the space as much as possible. Apply approved adhesive using a fine-toothed trowel in an amount which allows mechanic to do installation without kneeling in adhesive or on newly laid tile.

Tiles are to be laid tight to each other and pushed down into adhesive. Tiles should be rolled in both directions to obtain full contact with adhesive. Remove excess adhesive from face of tile while wet.

Where tiles do not fit tight against bulkhead or built-in furniture or meet against weld lines, the areas are filled in with sealant or caulking compound. In some instances weld beads prevent resilient material from fitting tight to the bulkhead and this can be overcome by cutting (or chinking) the edge that goes against bulkhead on a 45 degree angle.

Allow tile to set about 1 day before allowing traffic on the deck and do not wash for one week.

10. CAUTIONARY NOTES

After laying out tile pattern, start placing the tiles at the middle **of** the room.

Store materials at 65°F. to 70° F. prior to starting job.

Maintain temperature in the area being tiled at 65°F. to 70°F. 24 hours before starting, after completion and during the installation.

Subfloor must be dry and free of dirt, paint, grease, wax, **oil** and any residue.

11. MAINTENANCE

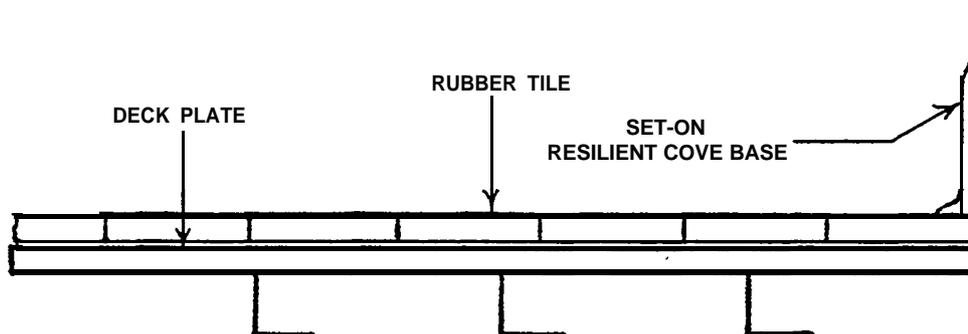
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contact individual manufacturer and installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



## High Dielectric Strength

# HIGH DIELECTRIC STRENGTH MATITNG - FOR ELECTRONIC SPACES

## SHEET RUBBER DECKING, TYPE I

### 1. PRODUCT DESCRIPTION

A sheet rubber, resilient decking with high dielectric strength for use in shipboard electrical equipment areas.

Designed to prevent accidental electric shock to persons who might contact energized, ungrounded circuits while standing on uninsulated decks.

Material is classified as Type I, is 1/8 inch thick and is generally installed from bulkhead to bulkhead using a recommended adhesive but can also be installed as a mat.

### 2. FEATURES

High dielectric strength, exceeding 30,000 volt resistance, when tested in accordance with MIL-M15562 F, Type I.

Fire resistant rating when tested in accordance with MIL-STD-1623. Flexi-Flor borders on incombustible rating with a damage of only 3 to 5 inches and no after burns.

100% synthetic rubber with color and marblization throughout the full thickness and containing no laminated layers.

No emission of toxic gases, such as phosgene or hydrochloric acid gas when subjected to high temperatures or fire.

Areas fully covered with sheet material are easier to maintain than those with portable mats.

Dimensionally stable and will not shrink, creep or grow, and does not require chemical or heat welding.

Excellent wearability and low maintenance requirement.

Available in five marblized colors: green, gray, red, blue and brown.

### 3. SPECIFICATION REFERENCE

U.S. Department of Defense MIL-M-15562F, Type I

Electrical grade sheet rubber

Federal Specification L-F-00450 (COM, NBS)

Internal Amendment 2 of Jan. 29,1960 (Type II)

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Dielectric Sheet Rubber (continued)

4. TRADE NAMES AND MANUFACTURERS

Trade Name

Manufacturer

Flexi-Flor

The R.C.A. Rubber Co., an Ohio corporation of Akron, Ohio

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

All power, lighting, testing, fire control and electronic switchboard areas.

Around workbenches servicing and repairing of electronic and electrical equipment.

CryptO room, flag radio center, radar room, sonor room and radio room.

Non-electrical areas where long life and superior wearability is desired, such as staterooms, passageways and similar spaces.

6. LIMITATIONS OF USE

Generally not used where electrical insulation characteristics are not needed.

Cannot be heat welded, but can be fully insulated with #51 Scotchrap 20 mil thick polyvinyl chloride tape manufactured by 3M Company, if any seam is within three feet of an electrical hazard, otherwise tape is not required.

7. COST COEFFICIENT 4.12

Note: See Section on Cost Coefficients for Explanation of Use.

8. PHYSICAL PROPERTIES

Minimum 30,000 volt dielectric strength when tested in accordance with MIL-M-15562F.

Fire retardant when tested by MIL-STD-1623 tunnel test.

Fire retardant in meeting test requirements of "Radiant Panel Fire" test, ASTM-E-162-67 with a rating of 25 or less.

Tensile strength - 800 pounds per square inch when tested in accordance with MIL-M-15562 E.

Using Taber Abraser Test - use two CS-17 wheels, 1000 gram load on each wheel, for 1000 revolutions. The thickness loss not to exceed 10 mils.

Dimensional stability - maximum change of plus or minus 0.020 inch per linear foot.

Weighs 1.05 pounds per square foot at 1/8 inch thickness.

Elongation - ultimate elongation to be not less than 75 percent.

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed;**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

- . One layer of sheet material may be installed over existing resilient material provided it is adhered tightly to the deck.

### B. Prime Coat or Underlayment

Can apply directly over a primer such as epoxy primer 150 MIL-P-24441, or a recommended underlayment such as latex mastic, Type II.

### C. Sheet Rubber

Temperature of area to be 70° F. from 48 hours prior to installation starting and until 48 hours after completion.

Lay out spaces and cut sheets to desired length.

Alternate sheets should be run in reverse direction for better appearance.

Use water base adhesive, such as Armstrong S-235, meeting MIL-A-21016 properties or a solvent based adhesive meeting MMM-A-121 properties;

If solvent base adhesive is used, be certain to provide adequate ventilation and fire precautions.

To provide a tight fit, overlap rubber sheets and using a steel straight edge, double cut both sheets.

Apply adhesive with notch trowel, allow adhesive to dry to tack free state (about an hour) and adhere sheet rubber to surface. Use chalk line to keep straight runs. To obtain full surface contact, roll with a 100 pound sectional roller.

Remove any adhesive from the surface while it is still wet.

Rubber can be applied up the bulkhead to form a cove base continuous with the decking.

Dielectric Sheet Rubber (continued)

10. CAUTIONARY NOTES

Seams within three feet of an electrical hazard must have a 3 to 4 inch wide strip of #51 Scotchrap, 20 mil thick polyvinyl chloride tape (manufactured by Minnesota Mining and Manufacturing Company) installed under the seam to prevent a direct to ground contact through the seam.

All sheet material should be overlapped and double cut to provide a tight fit.

Do not adhere sheet rubber over removable deck covers. Cut sheets to size and lay in portable deck covers.

Decking should be inspected, at least once a year, to be certain surface has not cracked or been punctured which would cause the loss of the insulation features required. If thickness of this sheet rubber wears to less than 1/32 inch, material must be removed and replaced.

11. MAINTENANCE

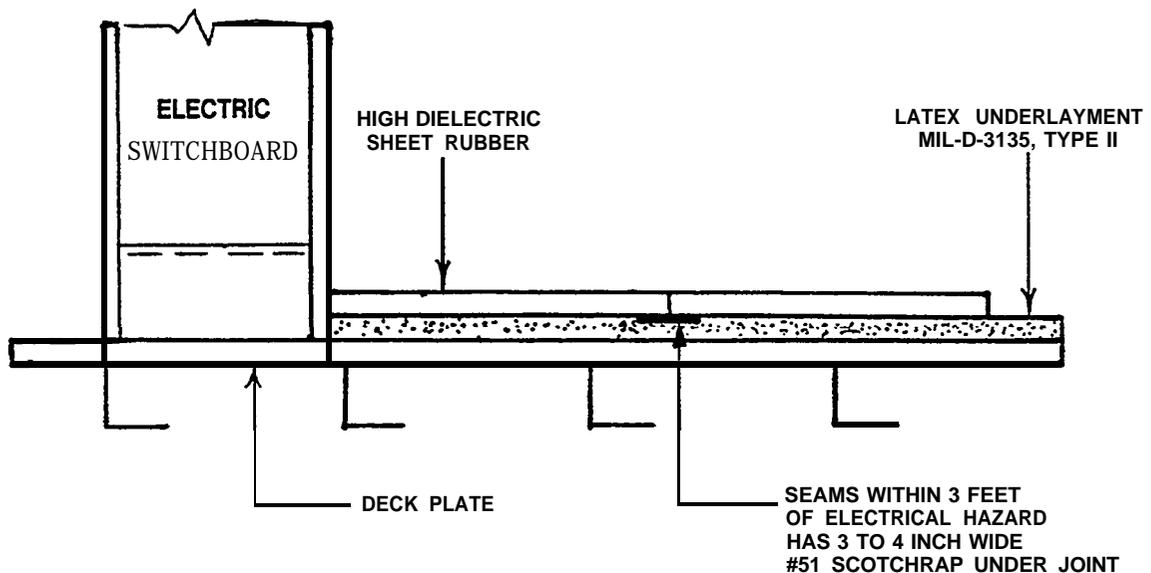
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contractor who installs or distributor who supplies sheet rubber guarantees that mats meet all conditions set forth in manufacturer's published literature and/or conditions set forth in specification.

13. CONSTRUCTION DETAILS

Construction details are included in each Section, where applicable.



## **HIGH DIELECTRIC STRENGTH MATTING - FOR ELECTRONIC SPACES**

### **SHEET VINYL DECKING, TYPE I**

#### **1. PRODUCT DESCRIPTION**

A sheet vinyl, electrical grade flooring with high dielectric strength for use in shipboard electrical equipment areas.

Designed to prevent accidental electric shock to persons who might contact energized, ungrounded circuits while standing on uninsulated decks.

Material is, classified as Type I, is 1/8 inch thick and is generally installed from bulkhead to bulkhead using a recommended adhesive, but can also be as a Type II, portable mat.

Some products, meeting this specification, offer a foam backing to provide additional comfort underfoot and light weights of less than 0.9 pounds per square foot for weight critical installations.

One product offers a high gloss finish through the use of a high performance coating. Patterning in high traffic areas is a possibility.

#### **2. FEATURES**

High dielectric strength must exceed 30,000 volt resistance, when tested in accordance with MIL-M-15562 A, Type I.

Fire retardant when tested as in MIL-STD-1623.

Polyvinyl chloride elastomeric sheet.

Very good wearability.

Available in matte or high gloss finish.

Lightest weight system is available for weight critical installations.

Areas fully covered with sheet material are easier to maintain than those with portable mats.

Generally available in four colors: blue, gray, green and beige.

#### **3. SPECIFICATION REFERENCE**

U.S. DEPARTMENT OF DEFENSE MIL-M-15562F, Type I

Electrical Grade Sheet Rubber

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>Trade Name</u>	<u>Manufacturer</u>
Lonmat UV	Lonseal, Inc.
Salute	Tarkett, Inc.

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

All power, lighting, testing, fire control and electronic switchboard areas.

Around workbenches, servicing and repairing of electronic and electrical equipment.

Crypt0 room, flag radio center, radar room, sonar room and radio room.

Non-electrical areas such as passageways, staterooms and similar spaces.

Where seams are required to be heat welded.

6. LIMITATIONS OF USE

Not generally used where electrical insulation characteristics are not required.

Dimensional stability allowed is 0.020 inch per lineal foot and material should only be used where this growth can be tolerated. The use of chemical or heat welding can reduce this movement.

These are laminated systems and marblization is not designed to go through the entire thickness.

Weight of rolls vary from 180 pounds to 250 pounds per roll.

Possible emission of toxic fumes in a fire situation.

7. COST COEFFICIENT 2.15

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Minimum 30,000 volt dielectric strength when tested in accordance with MIL-M-15562 F.

Fire resistant when tested in accordance with MIL-STD 1623.

Tensile Strength - 800 pounds per square inch when tested in accordance with MIL-M-15562 E.

## Dielectric Sheet Vinyl (continued)

Abrasion Resistance.

Using Taber Abraser Test

Two CS-17 wheels, 1000 gram load on each wheel, for 1000 revolutions.

Thickness loss not to exceed 10 mils.

Dimensional Stability - Maximum of plus or minus 0.020 inch per linear foot.

Weight varies from 0.90 to 1.50 pounds per square foot at 1/8 inch thickness.

Elongation - Ultimate elongation not less than 75 percent.

### 9. APPLICATION METHODS

**The Manufacturer's Application Instruction must be strictly followed.**

General Application Steps include:

#### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

One layer of sheet material may be installed over existing resilient material provided it is adhered tightly to the deck.

#### B. Prime Coat or Underlayment

Material can be applied over primer such as epoxy primer 150, MIL-P-24441 or latex mastic, Type 11 underlayment.

#### C. Sheet Vinyl

Temperature of space to be 70° F. 48 to 72 hours prior to starting job, through installation and 48 to 72 hours after completion.

Roll out sheet vinyl and allow it to set until flat.

Lay out spaces and cut to desired length.

Utilize manufacturer and/or governmental agency approved adhesive, allowing for adequate ventilation and fire precautions where required.

Keep runs straight by using chalk lines. Overlap all sheets and double cut both sheets using a steel straight edge. Apply adhesive except where double cuts are to be made and apply adhesive on those areas after cuts are made.

Roll seams and floor with a 100 pound sectional roller to get tight bond.

If sheet vinyl is to be heat welded, cut a "V" groove two-thirds of the way through the material at all joints, using a hand grooving tool.

Apply the vinyl welding thread through a heat gun and into the "V" joints. Trim the excess material from the surface with proper tool and finish joint per manufacturer's recommendations.

Dielectric Sheet Vinyl (continued)

10. CAUTIONARY NOTES

Seams within three feet of an electrical hazard must be heat welded to prevent a direct to ground contact through the seam.

All sheet material should be overlapped and double cut to provide a tight fit.

Decking should be inspected, at least once a year, to be certain surface has not cracked or been punctured which would cause the loss of the insulation features required. If thickness of the sheet vinyl wears to less than 1/32 inch, material must be removed and replaced.

Caution is required during heat welding to avoid discoloration with some sheet vinyl flooring.

11. MAINTENANCE

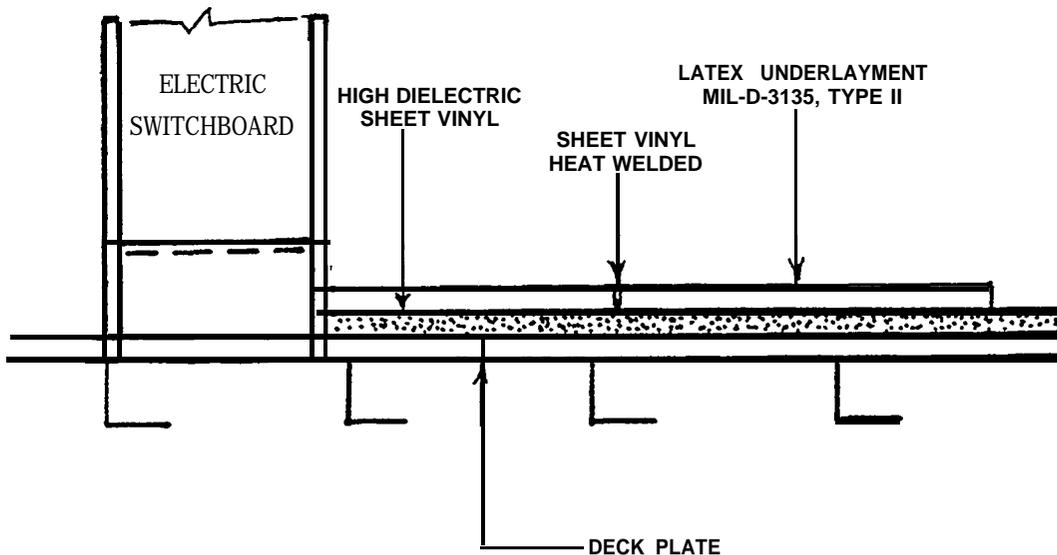
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Contractor who installs or distributor who supplies sheet vinyl guarantees that product meets all conditions set forth in manufacturer's published literature and/or conditions set forth in specification.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



# HIGH DIELECTRIC STRENGTH MATTING - FOR ELECTRONIC SPACES

## PORTABLE MATS

### TYPE II AND TYPE III

#### 1. PRODUCT DESCRIPTION

High dielectric strength portable mats are installed in areas that have electrical equipment but are not designated an electrical space and therefore do not require bulkhead to bulkhead electrical grade decking material. Products are available in both vinyl and rubber material.

Two types of mats are available:

Type II - Generally 1/8 inch thick, smooth surface material, 2 - 3 feet wide and laid loose or adhered to deck.

Type III - Generally 1/8 to 3/16 inch thick, with a textured surface, 3 feet wide and laid loose or adhered to deck.

Material is designed to prevent accidental electric shock to persons who might contact energized, ungrounded circuits while standing on uninsulated decks.

Vinyl composition mats are easier to clean and less expensive than rubber mats and available in several colors.

The rubber mats, while higher in cost, provide greater non-slip traction, are more comfortable underfoot and more quiet. Rubber mats are usually available in medium gray color only.

#### 2. FEATURES

Easy to install and to replace.

While material is generally more expensive, the use in small areas makes cost less than if a bulkhead to bulkhead installation were required.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE    MIL-M-15562F, Types II and III  
Electrical Grade Matting

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Portable Mats (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Type II	
Salute (1/8")	Tarkett, Inc.
Lonmat U V (1/8")	Lonseal, Inc.
Smooth Switchboard Vinyl Matting #67-1320 (1/8")	The Biltrite Corporation
Smooth Top Switchboard Matting #RM 10 (1/8")	U.S. Mat & Rubber Co., Inc.
Type III	
Navy Diamond Switchboard Vinyl Matting #67-9400 (3/16")	The Biltrite Corporation
Navy Diamond Switchboard Neoprene Matting (3/16")	
Lonmat Diamond (3/16")	Lonseal, Inc.
Unaflex Switchboard Matting	R. J. International

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

In front and back of all power, lighting, fire control and communication panels and switchboards.

Electrically insulated work benches.

Operating and servicing areas of electrical panels.

6. LIMITATIONS OF USE

Not used where bulkhead to bulkhead high dielectric strength decking is required.

Never adhere over removable deck plates.

Material generally not dimensionally stable.

Textured surfaces of Type III material harder to keep clean.

Life span generally less than bulkhead to bulkhead installations.

For interior use only.

Not recommended for use on U.S. Navy submarines.

Portable Mats (continued)

7. COST COEFFICIENT	Type II	1/8" vinyl matting	1.49
	Type III	3/16" vinyl matting	2.07
		3/16" rubber matting	2.72

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Minimum 30,000 volt dielectric strength when tested in accordance with MIL-M-15562 F.

Rated fire resistant when tested in accordance with MIL-STD 1623.

Tensile strength - when tested in accordance with MIL-M-15562F

Type II        **800** pounds per square inch

Type III       1200 pounds per square inch.

Abrasion Resistance - Using Taber Abraser Test

Two CS-17 wheels, 1000 gram load on each wheel,  
for 1000 revolutions.

Type II thickness loss not to exceed 20 mils

Type III test not practical and generally not conducted.

Dimensional Stability - When tested in accordance with MIL-M-15562 F Types II and III shall not change in dimension more than plus or minus 0.250 inch per linear foot.

Elongation - Ultimate elongation to be not less than

Type II    100%

Type III **350%**

9. APPLICATION METHODS

**The Manufacturer's application instructions must be strictly followed.**

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Mats may be installed over one layer of resilient material provided existing decking is tightly adhered to deck structure. Existing material to be cleaned of dirt, oil, grease or maintenance sealers or dressings.

B. Prime Coat or Underlayment

If mats are to be installed directly on steel decks, prime deck with 150 type primer, MIL-P-24441, 2 to 4 mils thick.

If deck requires leveling, install recommended underlayment, such as latex mastic, similar to MIL-D-3135, Type II, or equal.

## Portable Mats (continued)

### C. Portable Matting

Temperature of space to be 70° F. from 48 hours before, during and 48 hours after installation, especially when adhesive is being used.

Roll out mat and allow it to set until flat. Using a straight edge, cut to length required. Place mat in area designated.

If mat is to be spot cemented, use a latex type of adhesive such as Armstrong S-235 or other adhesive meeting MIL-A-21016 properties. Roll surface with 100 pound sectional roller for full contact with the surface.

Install mat so there are no seams within 3 feet of an electrical hazard. Where not possible, heat weld the seam of vinyl mats or apply \$51 Scotchtape, 30 mil thick polyvinyl chloride tape, 3 to 4 inches wide beneath the seam of mats that cannot be heat welded. In lieu of the tape a piece of sheet matting may be used under the seam instead of heat welding.

### D. Sealing

Apply 1 to 2 coats of floor sealer as recommended by the manufacturer.

## 10. CAUTIONARY NOTES

Do not adhere portable mats to removable deck plates. Cut to size and lay in portable deck covers.

Mats must always be a minimum of 3 feet wide, and exposed corners rounded off.

Inspect mats at least once a year to be certain there are no breaks in mat which would negate the insulation protection provided by the mats. If thickness wears to less than 1/32 inch, replace with new mats.

If mat is not adhered to the deck, stencil an outline wherein mat is to be placed and apply wording that states area must have electrical grade matting installed.

While mats do not need to be cemented to the deck, spot application of adhesive prevents accidental mat removal with loss of safety protection.

## 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

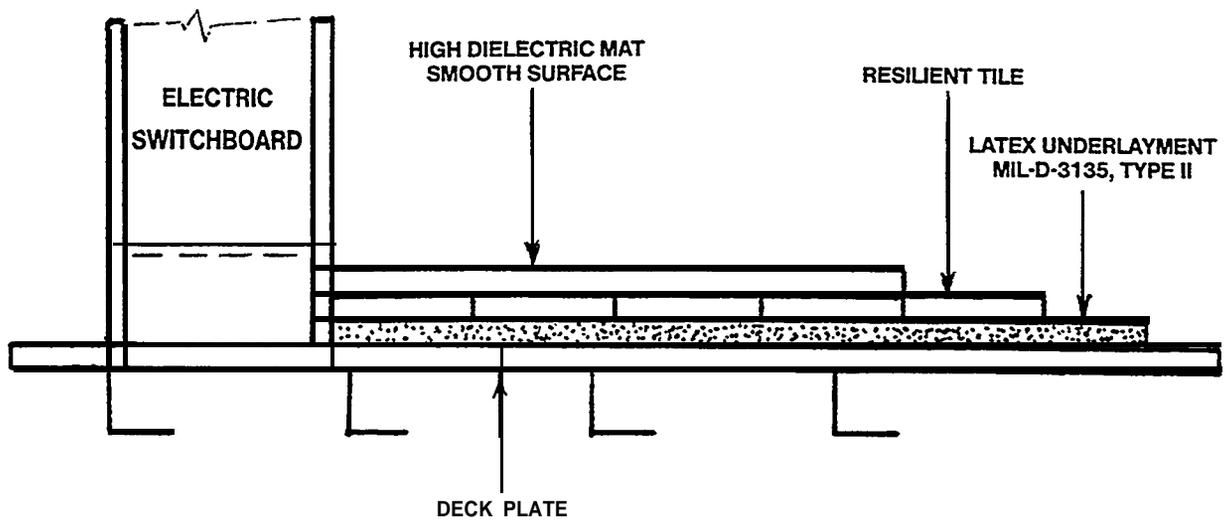
Contractor who installs or distributor who supplies mats guarantees that mats meet all conditions set forth in manufacturer's published literature and/or conditions set forth in specification.

## 13. CONSTRUCTION DETAILS

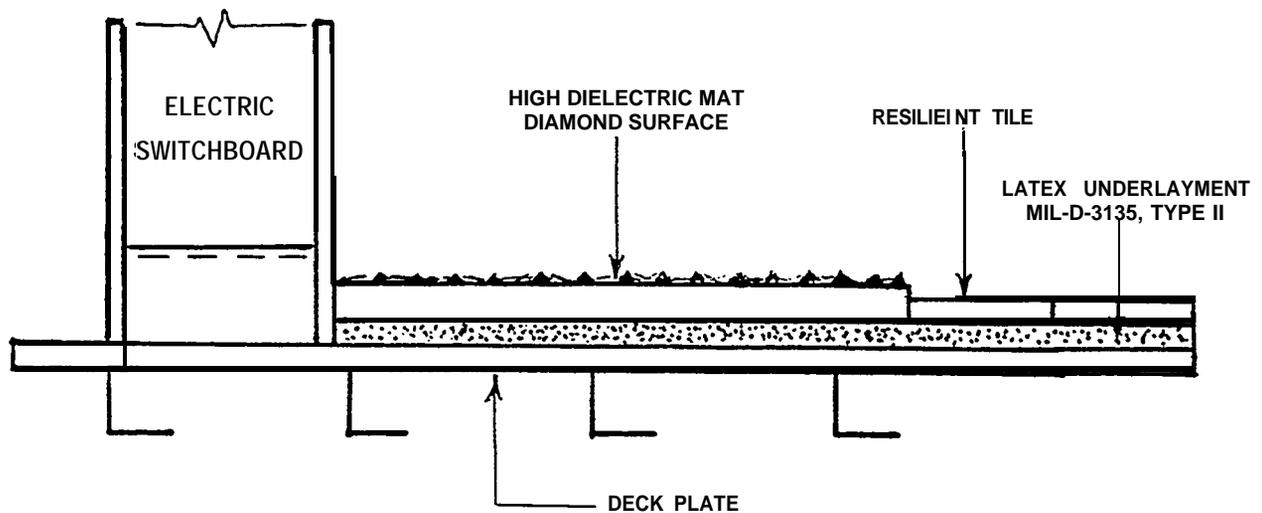
Construction details are included in each Section, where applicable.

# HIGH DIELECTRIC STRENGTH MATTING - FOR ELECTRONIC SPACES

TYPE II, SMOOTH SURFACE



TYPE III, DIAMOND SURFACE



**Acid and Oil Resistant  
Decking**

## ACID AND OIL RESISTANT DECKING

### SYNTHETIC RUBBER AND/OR ELASTOMERIC URETHANE DECKING

#### 1. PRODUCT DESCRIPTION

The entire deck of a submarine battery compartment, decks of acid storerooms and battery-charging storerooms on surface ships should be covered with an acid resisting decking material.

There are two systems currently in use:

Acid resistant sheet rubber

An alternate system of elastomeric urethane

#### Acid Resistant Sheet Rubber

This material conforms to MIL-S-2912, Type II, it is in rolls 36 inches wide and 1/16 inch thick sheet rubber and all areas to be covered should have a double layer. Seams should be staggered so there is a minimum distance of 6 inches between them. Material is used for acid resistance in battery rooms and for tank lining.

#### Alternative Method - Elastomeric Urethane

A 1/8 inch thick application of elastomeric urethane from Products Research Chemical Corporation, or equal, may be used as an alternative. The solvent content of the formulation restricts its use in submarine areas.

#### 2. FEATURES

Resistant to battery acid.

Resistant to hydrocarbon oils.

#### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

MIL-S-2912, Type II, Acid Resisting Rubber Sheeting

Alternate for PP-1539U/PR-1139R Elastomeric Urethane System  
MIL-D-23003

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Acid Resistant Decking (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
N-3 Black Neoprene Sheet Rubber	Haartz-Mason, Inc.
PP-1539U/PR-1139R	Products Research Chemical Corporation

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Battery compartment of submarines.

Acid storerooms

Battery charging storeroom of surface ships.

6. LIMITATIONS OF USE

It takes several days for rubber sheets to get full strength so batteries should not be placed in compartment for a minimum of 2 days.

Acid resisting rubber system is high in labor time of installation.

Solvents currently contained in elastomeric urethane restricts its use in submarine spaces.

Acid resisting rubber system is costly to install and should not be used in areas not requiring these special properties.

The volatile organic compound (VOC) content of these systems sometimes restricts the use of these products in some areas.

7. COST COEFFICIENT	Acid Resistant Sheet Rubber	5.13
	Elastomeric Urethane	5.15

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

As set forth in MIL-S-2912

Tensile Strength - 1400 pounds per square inch as tested under ASTM-D-412.

Elongation - 250% when tested as in ASTM-D-412

## Acid Resistant Decking (continued)

### Immersion in Acid

ASTM-D-471 Test

Immersion in 20% sulfuric acid solution for 46 hours

Weight change 2% maximum

Tensile and elongation strength 25% maximum from initial

### Immersion in Oil

ASTM-D-471 Test

Immersion in Number 3 oil for 46 hours

Volume change from initial 15% maximum

Tensile and elongation from initial 20% maximum

Hardness - Shore a durometer 50 to 70

Moisture Vapor Permeability

Perm-inch test method E-96 0.08

## 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

In submarine battery compartments cover entire area, up to a minimum of 9" high on side walls and 2 1/2 feet high at end walls.

On surface ships apply 4" high on bulkheads and stiffeners.

Establish a fire watch, provide adequate forced-draft ventilation, close off all areas and eliminate smoking and welding in the area.

Steel surface should be shot blasted to bright metal and compartment cleaned free of sand and dirt. Surface to be clean and dry with temperature maintained at 75°F. all during application, plus 8 hours before and after application.

### **Method I, Acid-Resisting Sheet Rubber**

#### B. Prime Coat

Immediately after shot blasting apply two coats prime coat allowing proper drying period between coats.

Apply bonding cement and putty to rough surfaces to make them smooth.

## Acid Resistant Decking (continued)

### C. Sheet Rubber

Cut to size, bevel edge, apply adhesive, such as N-29 Neoprene by Haartz-Mason, or similar, to primed area and to sheet rubber. Apply putty over welds and cove base juncture. Put down rubber, roll to eliminate air bubbles and apply putty on seams 1 1/2 inch wide.

Apply adhesive over first sheet and to underside of second sheet and install second sheet, making certain to stagger joints a minimum of 6 inches. Brush all joints, edges and corners with accelerated bonding cement and allow to dry.

### Method II, Elastomeric Urethane

#### B. Prime Coat

Apply manufacturer's prime coat, such as PR 420, a minimum of 2 mils, dry film thickness.

#### C. Base Coat

Apply polyurethane base coat, PP 1539U, to a thickness of 1/8 inch, using a straight edge or notch trowel or a roller.

#### D. Color Topping

In areas under the battery rack and the bulkhead area apply 3 to 5 mils dry film thickness of red color topping, PR-1120.

#### E. Non-Skid Coating

All other deck areas shall receive a 30 mil dry film thickness of dark gray, non-skid coating PR 1139R.

## 10. CAUTIONARY NOTES

A full fire-watch is to be established and maintained during installation.

No welding within 25 feet of area being installed.

Adequate forced-draft ventilation, preferably suction type, must be provided.

Temperature of area to be maintained at 75°F. all during the installation, and for 24 hours prior to starting and after completion.

Mechanics' shoes should be covered when installing sheet rubber to protect primed and cemented areas from dirt.

Acid Resistant Decking (continued)

11. MAINTENANCE

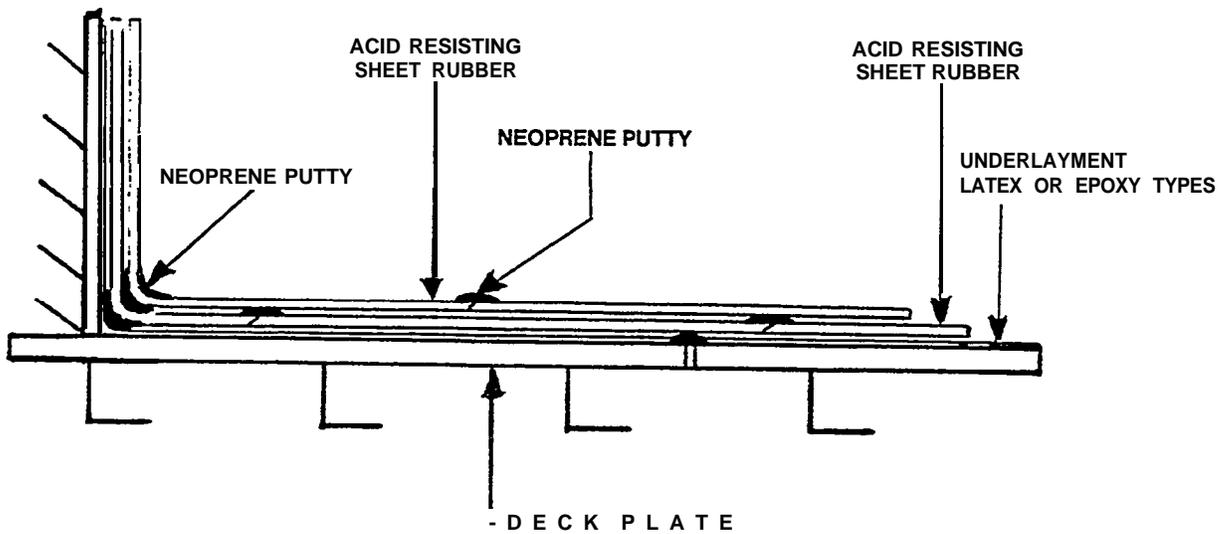
Manufacturer's Maintenance Instructions to be followed.

12. WARRANTY

Decking contractor, having installed product in accordance with manufacturer's instruction, is to provide a guarantee on material and workmanship for one year from completion of installation.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.



**Carpet**

## **FINISHED DECKING - CARPET**

### **CARPET, WOOL VELVET, FIRE RESISTANT TYPE**

#### 1. PRODUCT DESCRIPTION

This section describes a shipboard carpet that must meet NAVSEA specifications for naval vessels or USCG requirements for specific areas with regard to fire and-smoke properties.

The carpet that meets the requirements of NAVSEA and USCG is a wool, velvet, woven through the back, meeting Fed. Spec DDD-C-95, Type II

Class 1 Single level cut pile  
52 ounce per square yard pile  
Highest quality carpet

Class 2 Single level cut pile - twist  
42 ounce per square yard pile  
2 ply carpet, thickness about 1/16 inch

Class 4 Profile wire loop pile  
42 ounce per square yard pile  
4 ply carpet, thickness about 1/8 inch, wider weave.

In the case of commercial vessels, if the underlayment and carpet padding exceed 3/8 inch, the carpet must have a flame spread of less than 25 and smoke less than 100. In most installations the carpet is adhered directly to the steel deck or underlayment which keeps thickness under 3/8 of an inch.

Wool padding that provides fire resistance qualities are available. High price and water sensitivity have limited their use. Carpet is generally installed using adhesive directly to steel deck that has been primed or to an underlayment.

Woven through the back carpet construction provides superior dimensional stability and eliminates long snags. High quality, high price and longer wear most often provide the most economy when life cycle costs are evaluated.

#### 2. FEATURES

Meets very difficult Federal specifications, fire resistant conditions set forth in MIL-STD-1623 and FED SPEC DDD-C-95, Type II requirements.

Provides sound cushioning qualities.

Soft, comfortable, long-wearing decking material.

Available in a variety of colors, weights and patterns.

Carpet Wool Velvet (continued)

3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE  
Fed Spec DDD-C-95, Type II, Class 1, 2 or 4  
MIL-STD-1623 Fire Test.

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Caravan V-25 Type II, Class 2	Bloomsburg Carpet Industries
Gropoint Type II, Class 2	Bigelow-Sanford, Inc.
Gropoint Director Type II, Class 4	II
Richleigh Type II, Class 1	II
Karastan Wool Velour #323	Karastan-Bigelow Co.
Karastan Wool Check #321	II

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

Staterooms

Officers quarters

Public spaces

Stairways and passageways (should have highest degree of non-flammability)

Lounge Areas

Library and chapel

Dining Rooms

6. LIMITATIONS OF USE

Generally not installed in galleys, pantries or food preparation areas or in areas of high spillage of grease, oils or chemicals.

Generally not used in wet spaces.

Carpet is not to be continued through doorways.

Carpet Wool Velvet (continued)

7. COST COEFFICIENT	Class 1	<b>2.87</b>
	Class 2	<b>2.35</b>
	Class 4	<b>2.53</b>

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Performance - Material must meet all requirements set forth in MIL-STD-1623.

Flooring Radiant Panel Test - ASTM E 648 (Fed-Std 372)  
Test rating 0.5 watts per square centimeter or greater either over carpet pad or glued direct.

Specific Optical Density of Smoke - National Bureau of Standards - Smoke Chamber Test NFPA 258 (ASTM E 662)

NVLAP Code 03/F05

Maximum average specific optical density

Non-flaming **450** or less

Flaming **450** or less

Maximum average specific optical density at 4 minutes

Non-flaming **300** or less

Flaming **300** or less

9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

General Applications steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Grind down any weld seams which protrude more than 1/16 inch or fair the deck with an underlayment, similar to Latex Mastic, Type II, MIL-D 3135, to take out the raised areas that would cause premature wear of the carpet.

If an underlayment is not to be used, then steel deck must be properly abraded and primed using 150 primer, MIL-P-24441, or other approved primer.

B. Underlayment

Level decks through the use of an underlayment such as MIL-D-3135, 'Type II, generally installed 1/8 inch thick.

## Carpet Wool Velvet (continued)

An alternate underlayment of an elastomeric urethane, similar to Product Research Chemical Corporation's Type I, 1539U, can be installed to a maximum thickness of 1/4 inch, provides additional cushioning but is higher in installed cost.

Underlayment must be smooth and is to be sanded if necessary.

### C. Carpet Installation

Measure and cut carefully to fit from bulkhead to bulkhead. Abut carpeting to fixtures and furniture permanently installed.

Carpet is generally cemented directly to the underlayment or to the primed surface, using an approved adhesive which meets MIL-A-2106.

Carpet may be installed using tack strips by the "stretch-in" method.

Carpet may also be installed over padding which has fire resistant properties required by this specification.

### 10. CAUTIONARY NOTES

As in all quality carpet, slight variations in color may occur.

Carpet pads that meet Navy and USCG fire requirements are sometimes used. However, they are very expensive. All padding can get wet and "mushy" if subjected to water and will require replacement.

Select medium colors and/or tweed patterns for greater serviceability and less soiling appearance.

Tack strips are acceptable for fastening carpet but sometimes come loose and carpet bonding is lost.

Do not install in wet spaces as water saturating will cause shrinkage.

It is generally not necessary to bind the carpet edges even when installed with adhesive, except in submarine MCC control areas where it is mandatory.

Carpet should always be laid in the direction of the traffic flow.

### 11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

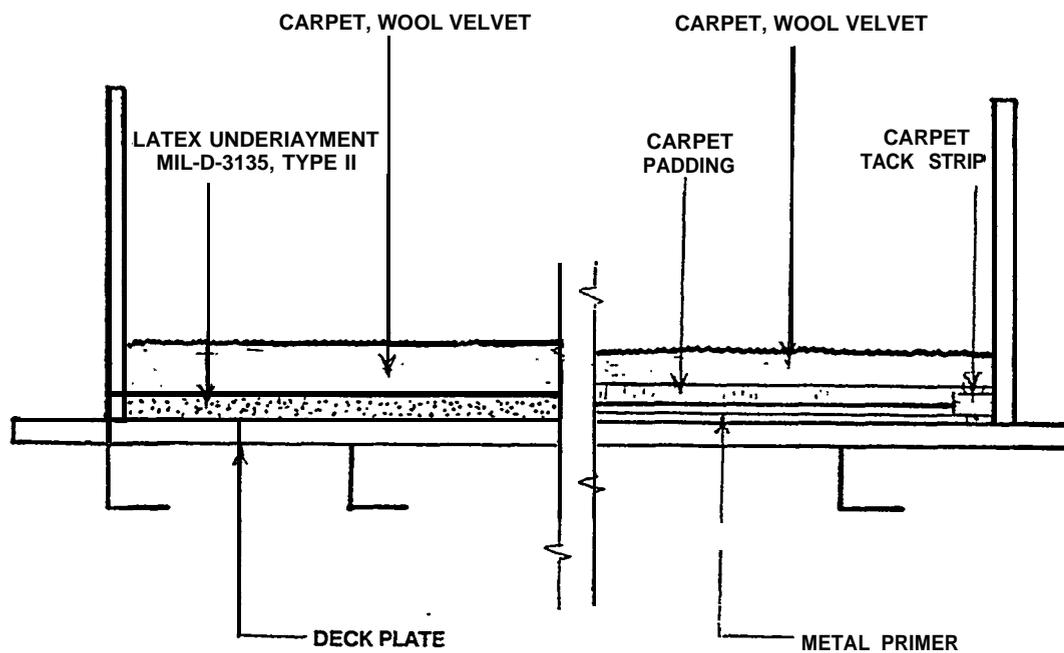
### 12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

# CARPET, WOOL VELVET, FIRE RESISTANT



## **FINISHED DECKING - CARPET**

### **CARPET - NYLON, WOOL AND ACRYLIC TYPES**

#### **1. PRODUCT DESCRIPTION**

The carpet described in this Section is used in commercial vessels in areas that do not require meeting the conditions of Federal Specification DDD-C-95, Type II or MIL-STD-1623D Fire Test.

These carpets generally consist of nylon, wool, acrylic or other fibres, are very serviceable and more economical than the wool, velvet carpet.

The carpet can be installed with adhesive directly to the primed steel deck, or by using tack strips or over carpet padding as recommended by the manufacturer.

Carpet, woven through the back type of construction, provides superior dimensional stability and eliminates long snags and pulls experienced with cushion back types.

There is a wide range of carpets available providing a large variation in pattern, colors and weave. The loop type shows less traffic pattern and the plush type look more silky and absorb sound a little better. Carpet that is solution dyed provides higher color retention to spills than those that are space dyed.

Cost of carpet is directly influenced by the weight per square yard, the tightness of the weave and the wearing features of the carpet. Longer wearing carpet is generally high in price initially but usually provides the most economy when life cycle costs are evaluated.

#### **2. FEATURES**

Provides sound cushioning qualities.

Less costly than wool velvet type.

Woven through the back construction provides superior dimensional stability and eliminates long snags.

Available in wide variety of colors, patterns and weights.

#### **3. SPECIFICATION REFERENCE**

ASTM E 648 Flooring Radiant Panel Test

ASTM E 662 Smoke Density Test

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Carpet Nylon (continued)

4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Cosmopolitan, 26 oz Loop Nylon	Aladdin Mills
Triumph, 32 oz Loop Nylon	
Zodiac, 30 oz or 36 oz Plush Nylon	
Embassy Suite V 380 46 oz Cut Pile Wool	Bloomsburg Carpet Industries, Inc.
Broken Sound V-450 54 oz Cut & Loop Wool	"
Cross Roads 40 oz Cut & Loop Nylon	
Legacy 42 oz Woven	Karastan Bigelow
Barathea 34 oz Loop Nylon	Mohawk Carpet Corporation
Color Theme 26 oz Loop Nylon	
Philadelphia	
Line - Capital 28 oz Loop Nylon	Shaw Industries
Vocation 26 or 28 oz Loop Nylon	
Equity 26 oz Loop Nylon	

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

5. AREAS OF GENERAL USE

- Staterooms
- Public spaces
- Lounge areas
- Passageways
- Dining areas.

6. LIMITATIONS OF USE

Does not have high fire resisting qualities required in MIL-STD-1623 Fire Test for Navy and USCG regulations.

Not installed in areas of grease or food spills such as galleys and food cooking areas.

Carpet is not to be run continuous through doorways but must have a stopping place.

Carpet Nylon (continued)

7. COST COEFFICIENT 1.50

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Fire Radiant Panel Test - ASTM-E 648

Class 1 - installed in direct glue down

Exhibits a 0.45 watts/square centimeter, critical radiant flux

Smoke Density Test - ASTM - E 662

Maximum average specific optical density

Non-flaming 450 or less

Flaming 450 or less

9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed;**

General Application steps include:

A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Welding seams should be ground down to 1/16 inch or less or can be taken out by using an underlayment such as latex mastic, Type II, MIL-D-3135, to eliminate premature wearing of the carpet.

If underlayment is not required, deck to be primed as recommended by carpet manufacturer.

B. Underlayment

If the deck needs leveling, use an underlayment such as latex mastic, Type II, MIL-D-3135, for smoothing weld seams. Generally a 1/8 inch, to a maximum of 1/4 inch, is all that is required.

An alternate underlayment of an elastomeric urethane, similar to Product Research Chemical Corporation's Type I, 1539 U, can be installed to a maximum thickness of 1/4 inch, which provides additional cushioning but is higher in installed cost.

The underlayment must be smooth and is to be sanded, if necessary.

C. Carpet Installation

Measure, and cut carefully, to fit the carpet from bulkhead to bulkhead. Abut carpet to fixtures and furniture permanently installed.

The carpet is generally cemented directly to the finished underlayment or primed metal surface, using manufacturer's recommended adhesive.

Carpet may be installed using tack strips or over padding that meets the physical properties required by the ship construction specifications.

10. CAUTIONARY NOTES

As in all quality carpet, slight variations in color may occur.

If padding is subjected to water, it will get mushy and generally must be removed and be replaced.

Tack strip can come loose from the deck and loss of adhesion of carpet occurs.

For greater serviceability select tweed patterns and/or medium colors.

Edges do not necessarily need to be bound unless specification mandates it.

Carpet should always be laid in the direction of the traffic flow.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

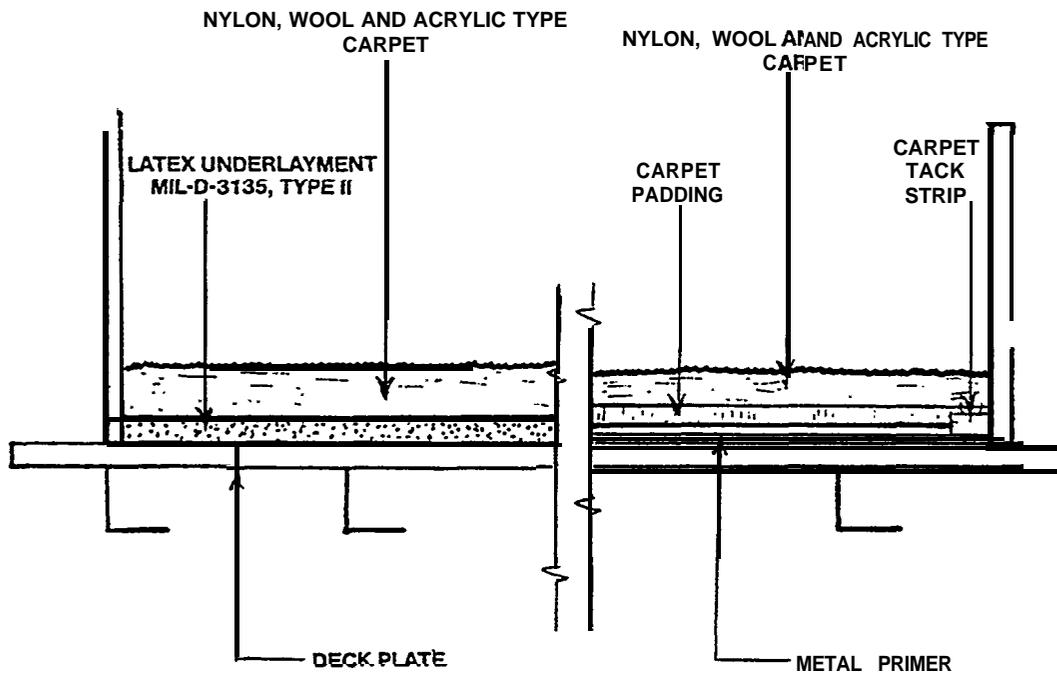
12. WARRANTY

Contact individual manufacturer and/or installer for specific warranty on product selected.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

## CARPET, NYLON, WOOL AND ACRYLIC TYPES





## **WOOD DECKING**

### **WOOD DECKS**

#### **1. PRODUCT DESCRIPTION**

Wood decks have been used in the past as an exposed weather deck to reduce the- high temperatures which are experienced by steel decks in hot climates. Wood also was widely used in mine sweepers to reduce the amount of metal in these ships and to protect against unexpected explosions.

At the current time the shipbuilding industry uses very little wood in construction of ships. Modern air cooling systems reduce the "hot deck" problem of past years. Mine sweepers generally are built of reinforced fibreglas and lighter weight materials have replaced wood in most applications.

Parquet wood floors are installed on dance floors and public spaces of Cruise Ships for its decorative effects; sometimes in the Ward Room, in some Well Decks of LPH and LHA's, and in the replacement of currently used wood decks on a few Battleship and on some Helo Decks.

Portable wood deck sections are often used in Steering Gear Rooms, especially in the areas with the forward machinery, as this allows the removal of the sections of large machinery, when needed.

In some submarine areas wood decks are used. These decks must be made of Doublas Fir and have been inspected and classified as "BAND BTR Industrial" by the West Coast Lumber Inspection Bureau."

#### **2. FEATURES**

Wood decks can be used for interior and exterior applications.

Possess good long term wear durability.

Easily repaired and/or replaced.

Comfortable walking surface.

#### **3. SPECIFICATION REFERENCE**

Highly limited use of wood has caused previous Fededal Specifications for wood decks to be discontinued. Various lumber associations have established standards for their particular type of wood and these standards should be followed in the specifying and selecting of a wood decking.

Wood (continued)

#### 4. TRADE NAMES AND MANUFACTURERS

Wood is identified by the type of wood rather than by a trade name. Wood is available through various local lumber distributors and in some cases can be purchased direct from lumber companies.

#### 5. AREAS OF GENERAL USE

Public spaces for decorative effects.

Dance floors.

Stage of theater area.

Ward rooms.

Well decks, LPH and LHA

Repair of wood decks currently in use.

#### 6. LIMITATIONS OF USE

High installed cost.

Potential fire threat.

Moisture decay and rotting.

High in maintenance cost.

In tropical climates is subject to termites and other insects.

Shrinkage, swelling and splitting.

#### 7. COST COEFFICIENT    Teak 10.3        White Pine 4.7

Note: See Section on Cost Coefficients for explanation of use.

#### 8. PHYSICAL PROPERTIES

Varies with type wood being used. National Lumber Association specifications provide technical characteristics of their type of lumber.

#### 9. APPLICATION METHODS

**The Manufacturer's Application Instructions must be strictly followed.**

## Wood (continued)

General Application steps include:

### A. Preparation

Install wood decking in as dry a condition as possible.

Plank is generally laid parallel to the center line of the ship.

Where possible, use narrow planks as they warp less than wider planks. Maximum widths established are 6 inches for teak and 5 inches for other woods.

The acceptable thicknesses are 2 inches for teak and 2-1/2 inches for other woods.

Decks are to be thoroughly cleaned and primed, as recommended by manufacturer.

### B. Installation

#### (1) Interior wood Decks

Parquet floors are generally set in adhesive over a preinstalled underlayment.

Currently the most widely used wood floors are the parquet type, which is generally set with adhesives, as recommended by the manufacturer.

After installing, a finish coat of varnish or wood sealer is applied, if required.

#### (2) Exterior Wood Decks

Generally exterior installations use wood planks. These planks are installed in a heavy rust preventative that is applied approximately 1/16 inch thick.

Planks are placed higher on the bulkhead side and lower at the outside area to provide water drainage.

Holes are bored in the planks to allow Nelson Stud fasteners to be used to hold planks in place. The stud holes are no more than 3 feet apart and are filled with an anti-corrosive compound.

All seams are caulked and surface finished per manufacturer's instructions.

Decks are to be cleaned regularly, oiled periodically and recaulked as required.

Wood (continued)

#### 10. CAUTIONARY NOTES

Check moisture content of wood before installing. The generally accepted maximum is 15%.

Exterior planks should be thoroughly seasoned and free from sap or rotting.

Protect decking from mechanical damage during construction period of the vessel.

#### 11. MAINTENANCE

The specific Wood Association, whose products have been installed, publishes maintenance instructions that should be followed.

General maintenance includes regular cleaning, refinishing with recommended varnish, sealer or oiling treatment and caulking as required.

#### 12. WARRANTY

Contact the manufacturer for warranty conditions on type wood selected.

#### 13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

**Ships Inclined Ladder  
Safety Treads**

## SHIPS INCLINED LADDER SAFETY TREADS

### EXTRUDED ALUMINUM, COMPOUND FILLED TREADS EXTRUDED AND CAST METAL, SKID RESISTANT TREADS RESILIENT, SKID RESISTANT TREADS

#### 1. PRODUCT DESCRIPTION

Products are available in full treads for ships ladders and in cap treads which are mounted over existing treads that have worn down.

The extruded aluminum, compound filled treads have a series of aluminum ribs across the width of the tread. The spaces in between are filled in with an epoxy or inorganic binder with an abrasive aggregate such as aluminum oxide or silicon carbide that has a hardness in the range of 9 on the MOHS scale. The filled abrasive is installed to a height of 1/16" to 1/8" above the top of the aluminum.

The ladder treads are used in both commercial and navy vessels and in drill rigs. Treads are available in 4, 6 and 9 inch depths. They are manufactured in 24" widths for the Type I, full width treads and in 18, 21 and 24 inch widths for the Type II cap treads. These new, high performance treads are designed to be reversible which provides 3 to 4 times longer life than the previous treads.

Treads are also available, and in wide use, with full abrasive surface and no aluminum ribs. These treads do not meet MIL-T-24634 qualifications at this writing.

Cast metal skid resistant treads with non-slip granules cast into the walking surface while in the molten state provide positive foot traction. Treads are generally cast iron or cast aluminum, but can also be obtained in bronze or nickel, from some suppliers. Installation procedures are the same as extruded aluminum. Treads must comply with conditions set forth in Federal Specification RR-T-650D.

Rubber and vinyl skid resistant treads, smooth or with abrasive, meeting Federal Specification RR-T-650D are also available for use where specified. These treads are for interior use only, but do not install over carpet or resilient decking.

#### 2. FEATURES

Cap treads are an easy way to recondition existing worn ladders.

New high performance treads provide improved safety, longer life span and lower costs.

Treads are reversible for extended tread life.

Use for interior and exterior ladders.

Treads are non-combustible.

Dovetail shaped grooves hold abrasive fill firmly in place.

Rib type treads provide more strength and withstand more stress than full abrasive tread without the ribs.

Treads, Inclined Ladder (continued)

### 3. SPECIFICATION REFERENCE

U.S. DEPARTMENT OF DEFENSE

MIL-T-24634

Type I Full Treads with End Plates

Type 1A Full Treads without End Plates

Type II Cap Treads

RR-T-650 D Cast Skid Resistant Treads

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
<b>Extruded Aluminum, Compound Filled and Cast Metal Skid Resistant Treads</b>	
Extruded Aluminum, Abrasive filled and Cast Skid Resistant Treads	American Safety Tread Co., Inc.
Extruded Aluminum, Abrasive filled and Cast Skid Resistant Treads	American Safety Technologies, Inc.
Cast Skid Resistant Treads	Granite State Casting Co.
Wooster Ladder Tread Type I, Full Tread Type II, Cap Treads Cast Skid Resistant Treads	Wooster Products, Inc.
<b>Rubber and Vinyl Treads</b>	
Armor-Treds	American Floor Products Co.
Marlin	
Heavy Duty Diamond Treads	Flexco Company
Heavy Duty Stair Treads	The Johnson Rubber Company
600 - Rubber Treads	Musson Rubber Co.
115 -Heavy Duty Diamond	The R.C.A. Rubber Company

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

Treads, Inclined Ladder (continued)

5. AREAS OF GENERAL USE

Steps of ladders.

Stairs.

Cap over worn treads.

Exterior and interior ladders.

Some cruise ships install treads directly **over** carpet.

Cast -metal treads are widely used in submarine ladder treads.

Navy and commercial ships.

Off shore drill rigs.

6. LIMITATIONS OF USE

Do not install over a structurally unsound ladder.

Aluminum treads cannot be installed directly over steel. Install a barrier protection in accordance with DOD STD 3128 System.

7. COST COEFFICIENT	Extruded Aluminum 6" depth	7.65 - 9" depth	8.53	
	Cast Metal	6" depth	14.08 - 9" depth	18.30
	Resilient	12" depth	3.12	

Note: See Section on Cost Coefficients for explanation of use.

8. PHYSICAL PROPERTIES

Treads meeting MIL-T-24634 Specifications

Slip Resistance . . . As tested under MIL-T-24634

After 50,000 strokes of contact wear surface the tread must exhibit these factors

<b>Dry</b>	1.50
Wet	1.25
Oily	1.00

After wearing, the coefficient is to be 0.75.

Resistance to Wear - Using test procedures of MIL-STD-2151 after 10,000 strokes a wear of 0.01 inches after 20 to 50,000 not to exceed another 0.008 inches.

Fire Resistance - Combustion plus ignition time shall not exceed 4.0 minutes with no more than light smoke density.

Deflection - Not to exceed 0.10 inch when tested in accordance with MIL-T-24634.

Moisture Absorption - 0.016% tested in accordance with MIL-D-3135.

Impact Resistance - Should withstand minimum of 12 impacts without cracking when tested in accordance with ASTM-D-2444.

Treads, Inclined Ladder (continued)

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

If there are low spots use a recommended underlayment similar to MIL-D-3135 Latex Mastic I or II or an epoxy underlayment.

### B. Installation

Extruded Aluminum, Compound Filled, and Cast Metal Skid Resistant Treads

When installing between stringers cut 1/8" to 1/4" less than stringer widths so tread can easily slide between stringers. Forcing tread with heavy hammer blow can rupture tread.

Full treads are fastened to stringers or to underside of ladder.

Countersunk holes are generally factory installed and treads are bolted to the step.

Installation methods to be in accordance with manufacturer's recommendations.

#### Rubber and vinyl Treads

Treads are installed using adhesive. Installation methods to be in accordance with manufacturer's recommendations.

## 10. CAUTIONARY NOTES

Do not allow steel and aluminum to come in direct contact as an elotrolytic reaction will take place. Apply a metal spray coating in accordance with DOD-STD-2138 or isolate surfaces by applying a dielectric barrier of vinyl tape, PC No. 25 in accordance with application instructions.

The use of mechanical fastening is preferred to the use of adhesive.

Use stainless steel screws and nuts to fasten.

## II. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

## 12. WARRANTY

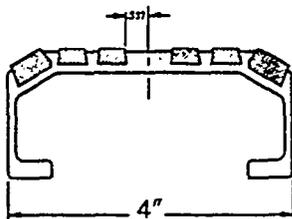
Check manufacturer for warranty information.

## 13. CONSTRUCTION DETAILS

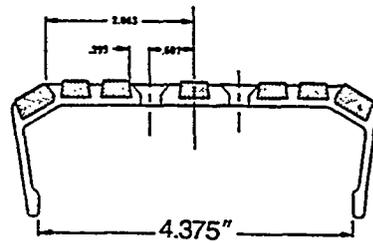
Construction Details are included in each Section, where applicable.

# SHIPS INCLINED LADDER, SAFETY TREADS

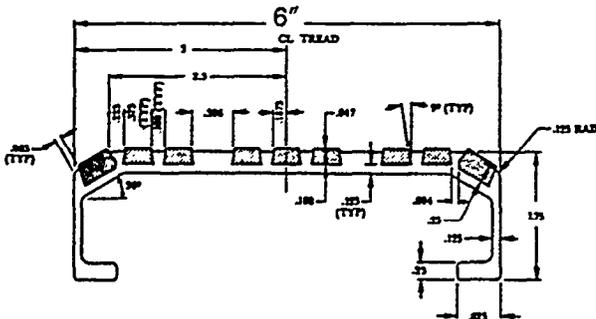
EXTRUDED ALUMINUM, COMPOUND FILLED



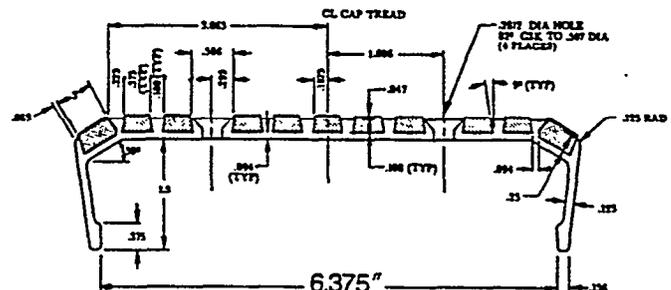
Type I and Type IA full tread, 4-inch size



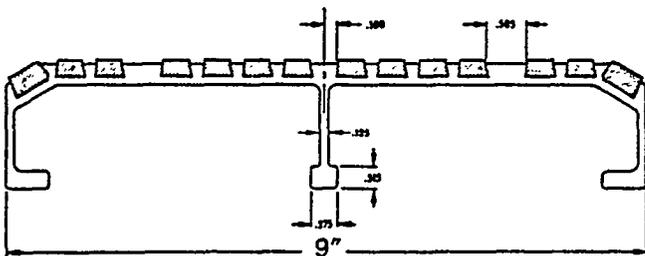
Type II cap tread, 4-inch size



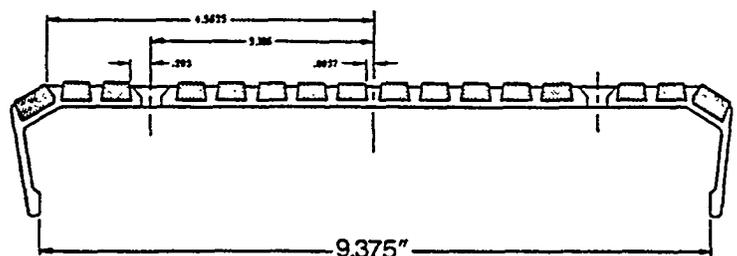
Type I and Type IA full tread, 6-inch size



Type II cap tread, 6-inch size



Type I and Type IA full tread, 9-inch size

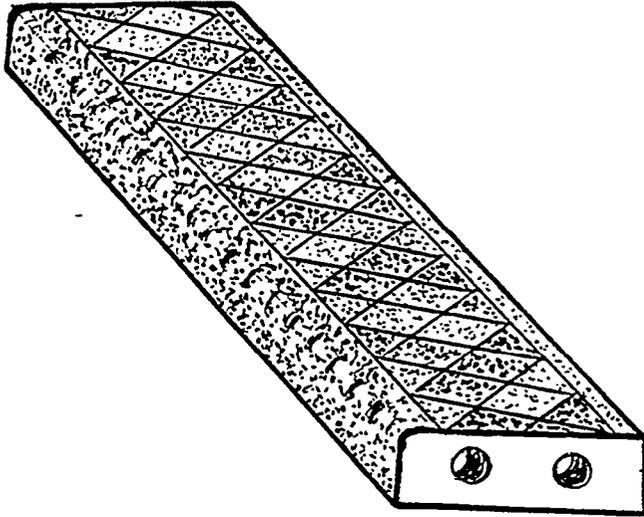


Type II cap tread, 9-inch size

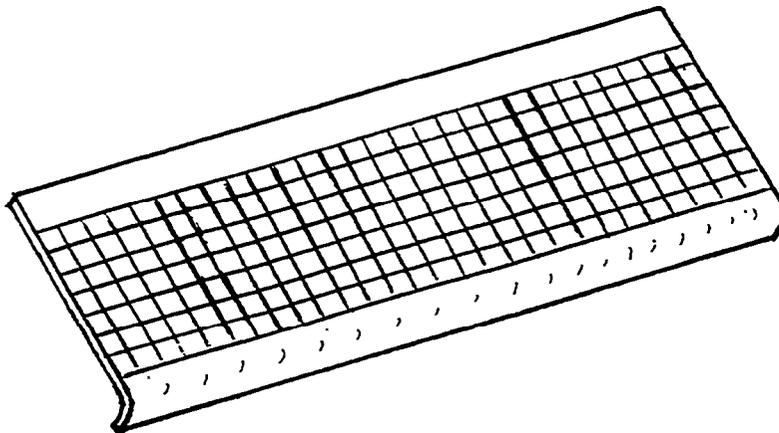
FULL TREADS, TYPE I

CAP TREADS, TYPE II

## SHIPS INCLINED LADDER, SAFETY TREADS



EXTRUDED AND  
CAST METAL,  
SKID RESISTANT  
TREADS



RESILIENT,  
SKID RESISTANT  
TREADS

**Stick Down, Non-Slip  
Treads**

## WALKWAY, NON-SLIP, STICK-DOWN TREADS

### FLEXIBLE, NON-SLIP TREADS

#### 1. PRODUCT DESCRIPTION

A flexible, non-slip tread with a pressure sensitive adhesive that bonds to most clean, dry and smooth surfaces.

They provide a safety surface, are easily installed, meet OSHA Safety Regulations and are used in both Navy and Commercial ships.

Backing to be flexible and surface to have Aluminum Oxide or Silicon Carbide, 60 grit and well bonded to backing material.

Most commonly used size is 6" x 24" treads and they can be installed over properly prepared steel, wood, deck **covering**, deck tile and cured paint.

#### 2. FEATURES

Provide positive traction with a non-slip surface.

Fast installation.

Manufactured applied pressure sensitive adhesive.

Withstand temperature **range** from 40° F. to 220° F.

Surface is a very hard, abrasive grit.

Available in many sizes, 6" x 24" most commonly used.

Resist most weather conditions.

Available in wide range of colors, with black being most used.

#### 3. SPECIFICATION REFERENCE

U. S. DEPARTMENT OF DEFENSE

MIL-D-17951C Deck covering, lightweight, non-slip

Note: Specifications listed are a reference for products in this Section but are not necessarily binding for all types of ships or drill rigs and are subject to change.

Treads, Stick-Down (continued)

#### 4. TRADE NAMES AND MANUFACTURERS

<u>TRADE NAME</u>	<u>MANUFACTURER</u>
Flex-Tread	Wooster Products, Inc.
Safety-Walk Anti-Slip Material	3M Building Service and Cleaning Products Division

Note: Organizations listed are representative but not necessarily a total list of manufacturers of product discussed herein nor does listing affirm that they are approved on specifications referenced.

#### 5. AREAS OF GENERAL USE

Three (3) treads shall be installed, with no space in between, at head and foot of ladders.

On both sides of doors used for continuous traffic.

On both sides of doors in crew's messing space.

In work shop areas.

On ramps, if desired.

Ammunition and missile storage spaces where fork lift trucks are used - space 3 inches apart - with 1 mil thickness of aluminum paint to bleed off the static electricity.

#### 6. LIMITATIONS OF USE

Over unsound deck surface.

Where a smooth walk surface is desired.

Over a wet decking surface.

Over oil soaked decking.

Can be installed over painted surface with good adhesion to deck, but is best to install over cleaned metal surface.

Do not paint or wax stick-down treads.

#### 7. COST COEFFICIENT 2.0

Note: See Section on Cost Coefficients for explanation of use.

Treads, Stick-Down (continued)

## 8. PHYSICAL PROPERTIES

Flexible surface and bends with movement of deck without cracking or loss of bond to deck.

Shear Strength - Minimum of 10 pounds pressure to remove without aging and up to 7 days of aging.

Strip Strength - After 48 hours drying time it will have a minimum of 0.75 pounds per square inch adhesive strength.

Detergent Resistance - Material to withstand 1 hour immersion in a 0.5% solution of detergent without softening, staining or objectionable loss of color.

Non-Slip Properties - When tested in accordance with MIL-D-17951 it shall have these minimum properties

	<u>Static Friction</u>			<u>Sliding Friction</u>		
	Dry	Wet	Oily	Dry	Wet	Oily
Leather	0.6	0.6	-	0.4	0.4	-
Rubber	0.6	0.6	0.6	0.5	0.6	0.3

## 9. APPLICATION METHODS

The Manufacturer's Application Instructions must be strictly followed.

General Application steps include:

### A. Preparation

Follow instructions under DECK PREPARATION as contained in this Manual.

Surface must be clean and dry before installing treads.

If surface is not level, install underlayment skim coat under area where treads are to be installed.

Deck temperature should be 50° F. to 90° F. for best results.

### B. Installation

Calculate position where tread is to be placed.

Remove protective covering from back.

Apply pressure sensitive adhesive backing to deck and use a weighted roller or object to provide full bonding to deck.

Apply a bead of edge sealer around all exposed edges for maximum wear and water resistance.

10. CAUTIONARY NOTES

Surface must be clean and dry.

Do not install over cold surface 40° F. or less.

11. MAINTENANCE

Manufacturer's Maintenance Instructions to be followed.

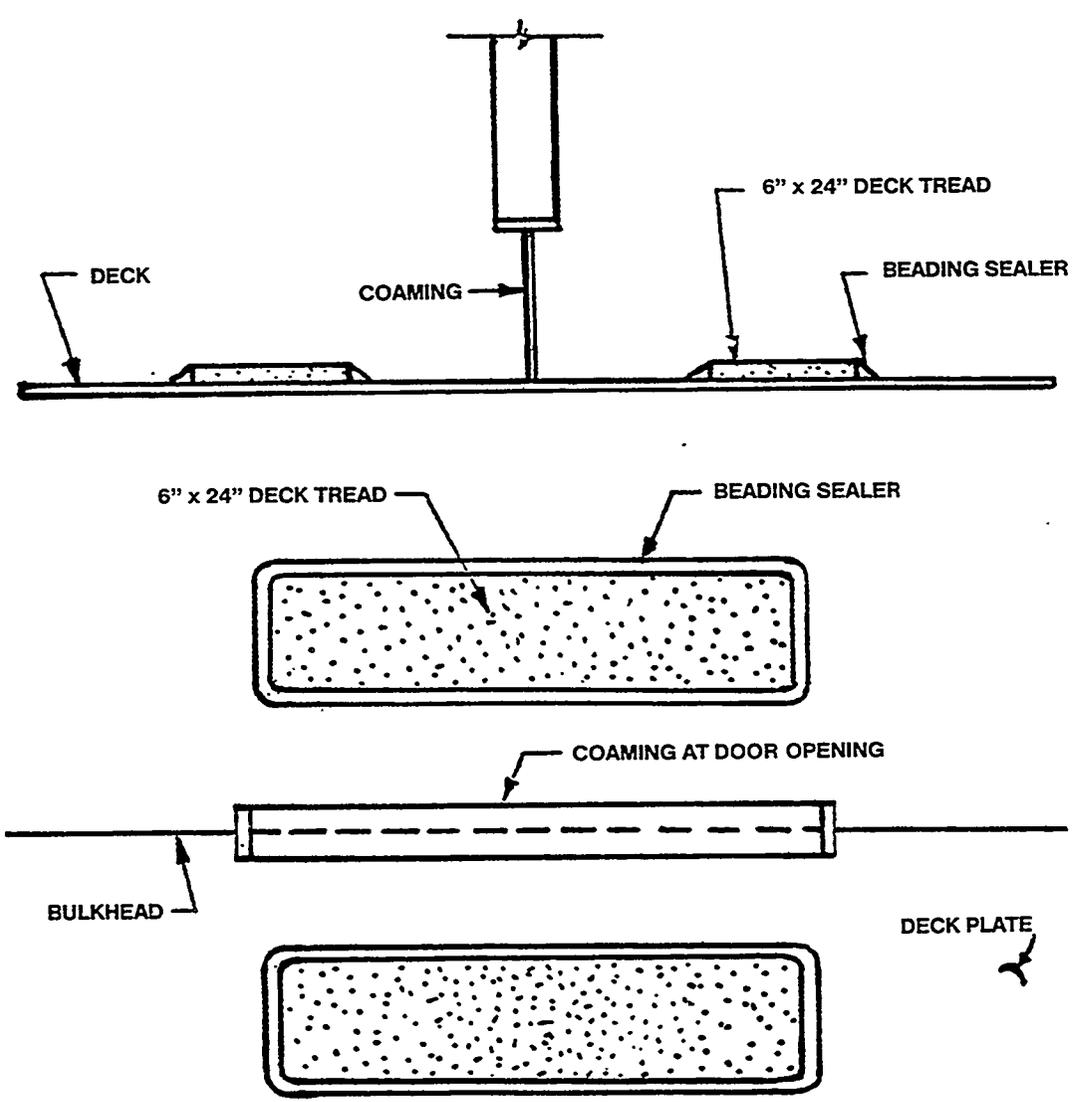
12. WARRANTY

Check manufacturer for warranty information.

13. CONSTRUCTION DETAILS

Construction Details are included in each Section, where applicable.

**WALKWAY, NON-SLIP, STICK-DOWN TREADS**



Additional copies of this report can be obtained from the National Shipbuilding Research Program Coordinator of the Bibliography of Publications and Microfiche Index. You can call or write to the address or phone number listed below.

**NSRP Coordinator**  
The University of Michigan  
Transportation Research Institute  
Marine Systems Division  
2901 Baxter Road  
Ann Arbor, MI 48109-2150  
Phone: (313) 763-2465  
Fax: (313) 936-1081