

METRIC

MIL-DTL-24631/7(SH)  
6 June 1997

DETAIL SPECIFICATION SHEET

PAINT, POLYESTER URETHANE, BLACK, NAVY FORMULA 187,  
TYPE II (METRIC)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of MIL-DTL-24631 listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation.

Formula: This formula covers polyester urethane paint, MIL-DTL-24631/7, type II, Navy Formula 187, Black RW 1.8, Type II for exterior use as a highly flexible, weather resistant topcoat. The paint shall consist of the ingredients specified in the quantities specified. Notes are indicated by \_/ numbers.

AMSC N/A FSC 8010  
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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TABLE I. Navy Formula 187 Component A.

Ingredient	Kilograms	Pounds	Liters <u>1</u> /	Gallons <u>1</u> /
Polyester resin solution <u>2</u> /	182.91	403.23	184.82	43.83
Black paste <u>3</u> /	28.32	62.42	25.47	6.73
Fumed silica pigment <u>4</u> /	53.30	117.50	24.26	6.41
Flow agent <u>5</u> /	1.78	3.92	1.85	0.49
Urethane catalyst <u>6</u> /	2.30	5.08	2.38	0.63
UV Absorber <u>7</u> /	2.31	5.10	1.97	0.52
UV light stabilizer <u>8</u> /	2.31	5.10	2.35	0.62
Bubble breaker (defoamer) <u>9</u> /	0.49	1.07	0.57	0.15
Dispersing agent <u>10</u> /	3.38	7.44	3.33	0.88
Diisobutyl ketone <u>11</u> /	34.47	76.00	42.81	11.31
Acetate solvent <u>12</u> /	27.81	61.31	31.91	8.43
White tinting color <u>13</u> /	A.R.	A.R.	A.R.	A.R.
Component A totals	339.37	748.17	302.79	80.00

TABLE II. Navy Formula 187 Component B.

Ingredient	Kilograms	Pounds	Liters <u>1</u> /	Gallons <u>1</u> /
HDI reactor <u>14</u> /	79.13	174.44	68.05	17.98
Acetate solvent <u>12</u> /	6.66	14.69	7.65	2.02
Component B totals	85.79	189.13	75.70	20.00

1/ Provided for guidance only. Actual volumes will depend on raw materials actually used.

2/ The polyester resin solution shall be Desmophen 670A80, available from Miles Inc., Mobay Road, Pittsburgh, PA 15205 or equivalent. See 3.5.7 of MIL-DTL-24631A(SH).

3/ Black paste shall consist of the following ingredients milled to a minimum fineness of grind of Hegman 4:

TABLE III. Black Paste.

Ingredient	Parts by weight
Polyester resin solution <u>1</u> /	28.45
Black pigment <u>3a</u> /	21.29
Dispersing agent <u>10</u> /	1.83
Acetate solvent <u>15</u> /	48.43
Black paste total	100.00

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- 3a/ The black pigment shall be Raven 450 Black, available from Columbian Chemicals Co., 1600 Parkwood Circle, Atlanta, GA 30339, or equivalent.
- 4/ The amorphous fumed silica pigment shall be Syloid LV6, available from W.R. Grace, Davidson Chemical Division, Baltimore, MD 21202, or equivalent.
- 5/ The flow agent shall be CAB 551-0.01, dissolved 33% in PMA, available from Eastman Chemical Co., P.O. Box 431, Kingsport, TN 37662, or equivalent.
- 6/ The urethane catalyst shall be T-12 (10% in PMA), available from Air Products and Chemicals Co., 7201 Hamilton Blvd., Allentown, PA 18195, or equivalent.
- 7/ The UV absorber shall be Tinuvin 1130, available from Ciba-Geigy Co., 7 Skyline Drive, Hawthorne, NY 10532, or equivalent.
- 8/ The UV light stabilizer shall be Tinuvin 292, available from Ciba-Geigy Co., 7 Skyline Drive, Hawthorne, NY 10532, or equivalent.
- 9/ The bubble breaker (defoamer) shall be Troykyd AFL, available from Troy Chemical Co., 72 Eagle Rock Ave., East Hanover, NJ 07936, or equivalent.
- 10/ The dispersing agent shall be Disperbyk 110, available from Byk-Chemie Co., 524 S. Cherry St., Wallingford, CT 06492, or equivalent.
- 11/ The diisobutyl ketone shall have a specific gravity of 0.807 to 0.811 and a flash point greater than 48°C (118°F) (when measured by ASTM D 56 [Tag Cpen Cup {TOC}]).
- 12/ The acetate solvent shall be Exxate 700, available from Exxon Chemical Co., P.O. Box 3272, Houston, TX 77253, or equivalent.
- 13/ The white tinting color shall be UCD 6010V white pigment media, available from Morton Thiokol, Inc., Lansing, IL., or equivalent. A. R. = AS REQUIRED FOR MEETING CAMOUFLAGE COLOR REQUIREMENT. FOR INFORMATION AND GUIDANCE ONLY: It is estimated that approximately 2.268 Kg (5 lbs) of titanium dioxide white pigment is needed per 45.63 Kg (100 lbs) of black iron oxide.
- 14/ The polyisocyanate (HDI) reactor resin shall be Desmodur N-3300, available from Miles Inc., Mobay Road, Pittsburgh PA 15205. (See 3.5.7 of the basic specification.) There is no substitute for this polyisocyanate resin which provides the flexibility property of this paint.
- 15/ The acetate solvent shall be Propylene Glycol Monomethyl Ether Acetate (2-Methoxypropyl Acetate) and shall have a specific gravity of 0.964 and a flash point greater than 47°C (114°F) as measured by ASTM D 56 (TCC).

Use of alternative ingredients in this formula must have prior approval by the Naval Sea Systems Command. Approval will be based on review of data showing equivalent physical and chemical characteristics to the specified ingredient. It will be necessary to demonstrate that the paint compound made using the alternative ingredient will conform to all requirements of this specification.

QUANTITATIVE REQUIREMENTS. The paint shall meet the quantitative requirements of table III and the qualitative requirements of Section 3 of the MIL-DTL-24631 general specification. Tests shall be performed in accordance with the general specification. Four parts of components A shall be mixed with one part of component B for mixed paint tests.

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TABLE III. Quantitative requirements.

Requirements	Component A		Component B		Mixed components	
	Min	Max	Min	Max	Min	Max
Pigment content, percent (%) by weight (wt)	20.4	28.2	0.0	0.0	---	---
Volatiles content, %wt	29.6	33.6	5.8	9.8	---	---
Nonvolatile vehicle content, %wt	42.0	46.0	90.3	94.3	---	---
Consistency, KU	95	105	85	95	95	105
Sag resistance, mils	---	---	---	---	7	---
Fineness of grind, Hegman	4	---	4	---	4	---
Set-to-touch time, hours at 23°C (73°F)	---	---	---	---	---	2
Set-to-touch time, hours at 4°C (40°F)	---	---	---	---	---	12
Dry hard time, hours at 23°C (73°F)	---	---	---	---	---	18
Dry hard time, hours at 4°C (40°F)	---	---	---	---	---	24
Gloss, 60° specular, %	---	---	---	---	5.0	15.0
Contrast ratio	---	---	---	---	0.98	---
Course particles, %	---	0.3	---	0.3	---	0.6
Flash pt, °C (°F)	46 (115)	---	46 (115)	---	46 (115)	---
Mass per unit volume, grams per liter (g/L) [pounds/gallon (lb/gal)]	1096 (9.15)	1144 (9.55)	1108 (9.25)	1156 (9.65)	---	---
Pot life, hours	---	---	---	---	1	---
Wet green reflectance ( $R_w$ ), %	---	---	---	---	0.40	0.80
Color fastness, ( $\Delta E$ )	---	---	---	---	---	4.0
Volatile organic content (VOC), g/L (lb/gal)	---	---	---	---	---	340 (2.8)

1/ Calculation includes weights for all ingredients not covered by notes 2 and 3. White tinting paste weight is not included in the calculation since it will be unique to each manufacture. Manufacturers shall calculate pigment %WT before tinting weight is included. Minimum pigment %WT was calculated as 100%-maximum %WT volatiles-maximum %WT nonvolatile vehicle. Maximum pigment %WT was calculated as 100%-minimum %WT volatiles-minimum %WT nonvolatile vehicle.

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- 2/ Calculation includes weights for following ingredients of components A: solvent in polyester resin solution, solvent in black paste, solvent in flow control agent, solvent in urethane catalyst, Diisobutyl Ketone and Acetate solvent. Calculation includes weights for following ingredients of components B: Solvent in HDI reactor solution and acetate solvent. Minimum-maximum range was  $\square$  2% from volatile weight %.
- 3/ Calculation for component A includes only weight of polyester in polyester solution. Calculation for component B includes only weight of HDI in HDI solution. Minimum-maximum range was  $\square$  2% from nonvolatile vehicle weight %.

Preparing activity:  
Navy - SH  
(Project 8010-N805)