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DEPARTMENT OF DEFENSE
STANDARD PRACTICE

IDENTIFICATION METHODS FOR BULK PETROLEUM PRODUCTS SYSTEMS INCLUDING HYDROCARBON MISSILE FUELS

AMSC N/A FSC 91GP

FOREWARD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DOD).

2. Certain provisions of this standard are the subject of international standardization agreements. When amendment, revision, or cancellation of this standard is proposed that will affect or violate the international agreement concerned, the preparing activity will take appropriate coordinating action through international standardization channels, including departmental standardization offices, if required.

3. Comments, suggestions, or questions on this document should be addressed to AF 68, DET 3, WR-ALC/AFTT, 2430 C Street, Bldg 70, Area B, Wright-Patterson AFB OH 45433-7632 or e-mailed to AFPET.AFTT@wpafb.af.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

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1. SCOPE

1.1 Scope. This standard provides a uniform method for the identification of liquid petroleum products and hydrocarbon missile fuels stored in and dispensed from Government-owned or operated bulk storage facilities. The employment of this standard promotes greater safety to personnel and reduces the potential for error, confusion, and inaction in times of emergency by providing uniformity in the identification of products and product groups.

1.1.1 Mixing. The mixing of different grades and types of petroleum products and hydrocarbon missile fuels is a constant problem in field operations and can be disastrous to the operation of aircraft, ships, ground vehicles, and support equipment. Improper identification, carelessness, and eradication of markings are often causes of such inadvertent mixing of different grades and/or dissimilar products.

1.1.2. Color assignments. MIL-STD-101, Color Code for Compressed Gas Cylinders and Pipelines, has assigned a color to each of six classes of materials. Five classes have been selected to represent universally recognized types of hazards involved in the handling of dangerous gases or liquids. The sixth class has been assigned exclusively for the use of fire protection materials and equipment. This basic color code requires the identification marking on compressed gas cylinders and piping systems and should be applied in a distinctive manner.

1.1.3. Identifying color. The method prescribed in this standard implements that portion of MIL-STD-101 pertaining to petroleum products and hydrocarbon missile fuels and is intended to reduce the chances of accidental mixing of products during operation of permanently installed military bulk storage and dispensing systems. MIL-STD-101 permits only the use of "yellow" as the identifying color for petroleum products and hydrocarbon missile fuels. All other colors will be removed or obliterated.

1.2 Applicability. The method of identification is applicable to all DoD activities. It is NOT applicable to aircraft and ships. If desired by the cognizant activity and acceptable to the contractor, this identification method may be employed at Government-leased facilities.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

INTERNATIONAL STANDARDIZATION AGREEMENTS

STANAG 1135	Interchangeability of Fuels, Lubricants, and Associated Products Used By the Armed Forces of NATO

(Copies of these documents are available online at http://www.nato.int/ or from the North Atlantic Treaty Organization (NATO), Military Agency for Standardization (MAS), Blvd Leopold III, 1110 Brussels, Belgium.

FEDERAL STANDARDS

FED-STD-595	Colors Used In Government Procurement

COMMERCIAL ITEM DESCRIPTIONS

A-A-52530	Gasohol, Automotive, Unleaded
A-A-59693	Diesel Fuel, Biodiesel Blend (B20)

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-M-43719	General Specification for Marking Materials and Markers, Adhesive, Elastomeric, Pigmented

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-101	Color Code for Pipelines and for Compressed Gas Cylinders

(Copies of these documents are available online at http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Bldg 4D, Philadelphia PA 19111-5094.)

2.3 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS, INC. (ASTM)

ASTM D975	Oils, Diesel Fuel
ASTM D4814	Fuel, Automotive Spark-Ignition Engine
ASTM D4956	Sheeting, Retroreflective, for Traffic Control
ASTM D5798	Fuel, Ethanol (Ed 75-Ed 85) for Automotive Spark-Ignition Engines
ASTM D6751	Biodiesel Fuel Blend Stock (B100) for Distillate Fuels

(Copies of these documents are available online at http://www.astm.org or the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken PA 19428-2959)

SOCIETY OF AUTOMOTIVE ENGINEERS

SAE-J1899	Oil, Lubricating, Aircraft Piston Engine (Ashless Dispersant)

(Copies of these documents are available online at http://www.sae.org or the Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA USA 15096-0001.

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Piping system. A piping system consists of any pipelines or part thereof used to convey liquid petroleum products including heating fuel and hydrocarbon missile fuels. This may be classified as tank car and tank truck loading and unloading connections; storage tank valves; pump manifold and valves; cross-country pipelines and their points of tie in with pumping stations; oil tanker connections and manifolds and other similar dispensing outlets.

3.2 Storage system. All exposed fixed storage tanks not specifically exempted in 1.2.

3.3 Title. A title is the identification required on piping systems listed in 3.1. A title should identify the contents by complete nomenclature type/grade of product and military symbol (if established), such as Gasoline, Aviation, Grade 100LL. Generally recognized abbreviations may be used in lieu of the title such as AVGAS 100LL for Gasoline, Aviation, 100LL. Refer to the appropriate specification for approved military symbols for petroleum and related products used by the Department of Defense. North Atlantic Treaty Organization (NATO) symbols can be found in Annex C to STANAG 1135.

3.4 NATO symbol. A NATO symbol number indicates that the product is interchangeable for its intended use with a particular product produced in one or more of the NATO participating nations.

4. GENERAL REQUIREMENTS

4.1 Identification method. Bulk petroleum products and hydrocarbon missile fuels generally used in the military system have been classified and segregated by groups to facilitate the ready identification of product groups. This method establishes, defines, and assigns a yellow band or series of bands for recognition to each of eight groups of similar type products in a distinctive and conspicuous manner, as a visual aid and a supplement to written identification. These groups are aviation gasolines, automotive gasolines, jet fuels, distillates, heavy fuel (black) oils, lubricating oils, Thermally Stable Jet Fuels, and missile fuels as shown on Figures 1 through 8, and Table I. The written identification consists of the exact title as defined in 3.3; the NATO symbol as prescribed and defined in 4.5 and figure 9; the color band(s) will be as indicated in 5.1.3. The NATO symbol of a product (if established) is required on piping and storage systems located in the United States, as well as other NATO nations.

4.1.1 Application of markings. Markings, (titles, bands, and arrows), will be applied by painting and stenciling or, if desired, by means of decals, elastomeric film or reflectorized sheeting. If decals, film, or sheeting are used, material shall conform to specification MIL-M-43719 or ASTM-D4956 as applicable. In addition to the locations indicated in the subsequent paragraphs, markings shall be applied at all receiving connections; where line connections are made to manifolds, and at any other location necessary to assure ready identification of the product in the system. For single product, isolated systems, only the line into a manifold shall be marked. For multiproduct systems, product identification markings shall be placed on the inlet multiproduct line and all manifold outlet lines.

4.2 Color Specification. The colors assigned in the standard shall conform in hue and chroma to the requirements identified by numbers specified in FED-STD-595.

4.3 Employment of colors.

4.3.1 Warning color. The color Yellow No. 13655 is assigned as a primary warning for all flammable materials in accordance with the provisions of the basic color code, MIL-STD-101. Petroleum products and hydrocarbon missile fuels are considered falling within this classification of materials.

4.3.2 Use of black and white colors. The colors Black No. 17038 and White Gloss No. 17875 are assigned, WITHOUT SIGNIFICANT MEANING, for general use as indicated in this standard.

TABLE I. Product groups[1].

Product Group	Number of Yellow Bands		Examples	
	Wide	Narrow	Grade	Symbol
Aviation Gasolines (AVGAS)	0	1	LL100	---
Automotive Gasolines (MOGAS)	0	2	ASTM-D4814 A-A-52530 ASTM-D5798 (E-85)	--- --- ---
Turbine Fuels	0	3	JP-8 JP-5	--- ---
Distillates	0	4	ASTM D975/ ASTM D6751 ASTM D975 A-A-59693	 DL-1/2 BDI BDI
Heavy Fuel (Black) Oils	0	5	Intermediate Fuel Oil 180 Fuel Oil, No. 6	 IFO180
Lubricating Oils	Sign or Flag		J 1899, Grade 60	--- ---
Thermally Stable Jet Fuels	2	1	Jet Fuel JPTS	--- ---
Missile Fuels	1	1	Rocket Fuel RP-1	---
Note 1. Refer to the appropriate specification for approved military symbols for petroleum and related products used by the Department of Defense. NATO symbols can be found in Annex C of STANAG 1135.				

4.3.3 Color limitations. UNDER NO CIRCUMSTANCES will colors other than yellow for Warning and black and white for Identification be assigned to petroleum products and hydrocarbon missile fuels. Special attention is invited to the color RED which is assigned exclusively for the use of fire protection materials and equipment. All other piping systems not carrying products within the scope of this standard will employ the warning colors assigned in MIL-STD-101 to the particular material.

4.3.3.1 Color of piping systems and storage systems. It is not the intent of this Standard to imply that the colors mentioned herein be used for coatings of piping or storage systems. The overall color shall be in accordance with departmental instructions.

4.4 Use of color bands. The use of color bands on all dangerous piping systems as established in MIL-STD-101 has been recommended as an aid to color-blind personnel since the use of bands will indicate that hazards are present. Identifying titles and bands on pipelines must be clearly legible at all times and should be frequently inspected to insure legibility through cleanliness of the marked area.

4.5 NATO symbol marking. Piping systems handling products for which a NATO Symbol has been established, and are located in an area subject to servicing ground, sea, or air equipment of NATO countries will, in addition to the NATO symbol, include the appropriate U.S. Military Symbol (if established) as a part of the title in accordance with 5.1.1.

5. DETAILED REQUIREMENTS

5.1 Liquid petroleum and hydrocarbon missile fuels facilities system identification.

5.1.1 Titles. Exact identification on rigid piping systems and above ground fixed storage tanks is mandatory. If identification of tank trucks, semi-trailers or tank cars is desired or specified by departmental directives, the system described herein may be used.

5.1.1.1 Application of titles. Titles will be applied in such a manner as to be clearly visible from operating positions. The use of stencils with standard size markings specified in Table II is recommended. The black background will have a minimum border three-fourths inch wider than the lettered area. For piping smaller than three inches in diameter, metal flags or signs securely fastened to the pipe may be used with the appropriate title and products group band(s) lettered on the tag.

5.1.2 Color of NATO symbol marking. The appropriate NATO symbol and the broken line enclosure shall be of yellow color.

5.1.3 Product group band(s). The yellow band(s) will be separated and distinguish the various groups of products. Except for lubricating oil lines (5.1.4) and multiproduct lines (5.1.5), petroleum products other than Thermally Stable Jet fuels and missile fuels are identified with one or more narrow bands. Thermally stable jet fuels are identified with a wide band, twice the width of a narrow band, followed by a narrow band, followed by another wide band. Hydrocarbon missile fuels are identified with one wide band, twice the width of the narrow band, followed by one narrow band. See Table II. It must be re-emphasized that the title is the principal identifying feature and the band(s) is not to be relied upon to identify a particular product.

5.1.4 Lubricating oil lines. Because of the infrequency of its use, bands have not been assigned to lubricating oils. A flag or sign may be employed as illustrated in figure 6. Each flag or sign shall have a yellow border of a minimum of three-fourths inch in width.

5.1.5 Multiproduct lines. When a single pipeline is used for transporting more than one product, a flag or sign identifying the product currently in transit may be used in lieu of or as a supplement to the wide yellow identification band and nomenclature shown in figure 10. Identification of the product will be made at the time of transfer. The yellow band in these instances will be a minimum of thirty-six inches in width.

5.1.6 Use of arrows. An arrow painted in yellow may be used to indicate the direction of flow of the product in the line. It will appear adjacent to the title and band(s) as shown in figure 11.

5.1.7 Application of flags. In instances where a piping system or tankage is buried or inaccessible, and only a valve stem and a wheel or gauging hatch are exposed, a metal flag or brass disc will be used as an aid identifying the product in the facility. The flag post may be permanently fixed to the pipeline or tank or in concrete adjacent to the structure. The brass identification disc will be placed on top of the valve wheel or gauging hatch.

5.1.8 Concrete valve and refueling pits. In concrete pits and similar conditions where space will not permit banding and stenciling of the pipe, the vertical band(s) will be painted on the wall adjacent to the pipe to represent a product group. The title of the product will be stenciled horizontally in white across the band(s). Where pit covers are installed, markings may be applied to the top of the covers.

TABLE II. Sizes of letters and bands[1].

	Width of Bands		Space Between Bands	Length of Bands	Title Letter Size
	Wide	**Narrow**			
a. Pipe Diameter: Under 7.62 cm (3”)	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	encircle	1.2 cm (½”)
7.62 cm (3”) to 15.2 cm (6”)	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	encircle	2.5 cm (1”)
15.2 cm (6”) to 22.8 cm (9”)	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	encircle	5 cm (2”)
Over 22.8 cm (9”)	20.3 cm (8”)	10.1 cm (4”)	10.4 cm (4”)	encircle	7.62 cm (3”)
b. Tank Capacity: 10,000 bbls (420,000 gal) and under	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	83.3 cm (33”)	15.2 cm (6”)
Over 10,000 bbls (420,000 gal)	20.3 cm (8”)	10.1 cm (4”)	7.62 cm (3”)	83.3 cm (33”)	30.4 cm (12”)
c. Tank Car, Trucks[1]: 7,570 Liters (2,000 gal) and under	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	60.9 cm (24”)	7.62 cm (3”)
Over 7,570 Liters (2,000 gal)	15.2 cm (6”)	7.62 cm (3”)	7.62 cm (3”)	83.3 cm (33”)	15.2 cm (6”)
Note 1. Applicable to tank cars, semi-trailers, and tank trucks only when specified by departmental directives and in sizes specified by such directives where space limitations necessitate smaller markings.					

5.2 Special requirements for camouflaged systems. Bulk petroleum product piping and storage systems which have been camouflaged for concealment shall have the contained product title, grade, and NATO Symbol stenciled at the locations indicated in 3.1 and 4.1.1. Use the color Gray No. 36622 or Black No 37038, whichever is most easily discernable against the background color. Standard size letters as specified in Table II should be used. Yellow color bands and markings which would detract from the camouflage effect shall not be utilized.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The pipe identification marking system method called out in this standard is intended to promote safety and to reduce confusion as to pipe contents in the event of an emergency and to facilitate maintenance. It is also intended to increase the level of standardization among NATO nations for pipe and conduit identification in facilities used in ground petroleum products handling.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this standard.

6.3 Exemptions from marking requirements. Department of Defense bulk petroleum product piping and storage systems can become targets for sabotage and other unlawful activities during times of civil strife. Facilities such as Defense Logistics Agency (DLA) fuel supply points and depots (GOCO's and COCO's) are particularly vulnerable because of their isolated locations and lack of security forces protection. The markings placed on large tanks (5.1.1 and Table II) in accordance with provisions of this standard can be readily seen from some distance and serve as an aid to persons contemplating destruction of government property. To preclude this possibility, exemptions from tank marking requirements will be approved upon written request of the cognizant agency or military department. The request/justification should be addressed to Det 3, WR-ALC/AFT, 2430 C Street, Building 70, Area B, WPAFB, OH 45433-7632.

6.4 Subject term (key word) listing.

Bands
Pipes
Product group bands
Warning colors

6.5 International standardization agreement implementation. This specification implements NATO STANAG 3149, Minimum Quality Surveillance of Petroleum Products. When changes to, revision, or cancellation of this standard are proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at http://assist.daps.dla.mil.

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

FIGURE 1. AVIATION GASOLINES--ONE NARROW BAND

FIGURE 2. AUTOMOTIVE GASOLINES--TWO NARROW BANDS

FIGURE 3. JET FUELS--THREE NARROW BANDS

FIGURE 4. DISTILLATES--FOUR NARROW BANDS

FIGURE 5. HEAVY FUEL (BLACK) OILS--FIVE NARROW BANDS

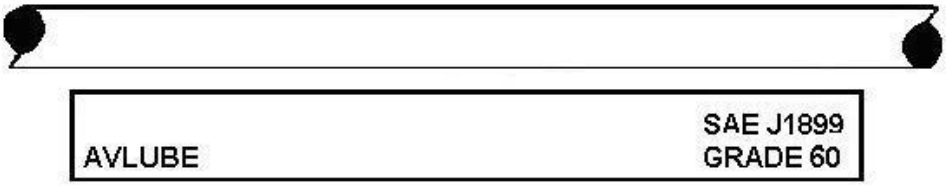

FIGURE 6. LUBRICATING OIL--SIGN

FIGURE 7. THERMALLY STABLE JET FUELS-
WIDE BAND--NARROW BAND--WIDE BAND

FIGURE 8. MISSILE FUELS--1 WIDE BAND--1NARROW BAND

FIGURE 9. NATO SYMBOL MARKING

FIGURE 10. MULITIPRODUCT LINES

FIGURE 11. DIRECTION OF FLOW

CONCLUDING MATERIAL

Custodians:
Army – MI
Navy – SA
Air Force – 68

Preparing activity:
Air Force – 68
(Project 91GP-1191)

Review activities:
Navy – YD
Air Force – 11, 99
DLA – PS, GS

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