



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEERING SUPPORT AGENCY

AD-A280 566



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JUN 24 1994

10 JUN 1994

FROM: HQ AFCEA/ENM
139 Barnes Drive
Tyndall AFB FL 32403-5319

SUBJECT: Engineering Technical Letter (ETL) 94-3: Air Force Carpet Standard

1. Purpose. This standard addresses acquisition, selection, technical requirements, installation, and maintenance of carpet and carpet tiles for all approved installations.

2. Application. This standard applies to all Air Force facilities (except family housing) regardless of fund source.

2.1. Authority. Reference *AFPD 32-10, Installations and Facilities*; and *AFI 32-1023, Design and Construction Standards and Execution of Facility Construction Projects*.

2.2. Effective Date: Immediately.

2.3. Ultimate Recipients. Civil Engineer (CE) staff, project managers (PM), in-house interior designers, facility managers, design consultants and design agents should use this standard.

3. Technical Assistance and Waivers.

3.1. Technical Assistance. Contact the installation or MAJCOM interior designer for assistance. Otherwise, the Air Force Center for Environmental Excellence (AFCEE) Design Group will provide guidance.

3.2. Waivers. Waivers to this standard require MAJCOM approval.

4. Specific Requirements.

4.1. Authorized Areas (See Table 1).

4.1.1. Carpet may be used in most areas as a floor finish. Exceptions are service, maintenance and industrial areas, food preparation areas, toilets and bathrooms, and areas requiring frequent cleaning. Carpet should not be used in areas of extremely heavy traffic, such as malls.

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4.1.2. Use carpet tiles in open office areas with furniture systems and areas with raised flooring or flat cable electrical systems.

4.2. Sources.

4.2.1. NAF. Carpet provided from NAF resources may be purchased from an AFNAF contract, GSA contract, or open market.

4.2.2. Other. Carpet procured with Appropriated Funds and furnished as Government furnished material (GFM) may be acquired through a GSA Contract or open market. Open market acquisition must be in accordance with the Federal Acquisition Regulation (FAR). If a construction contractor acquires carpet and furnishes it as contractor-furnished material (CFM), the contractor may purchase from non-Government sources.

4.3. Selection Criteria.

4.3.1. Primary Considerations. When selecting carpet, consider:

- Factors which affect performance and retention of original appearance such as location; type of use; color and pattern; construction methods; and maintenance.
- Adherence to life safety and federal accessibility standards.

4.3.2. Pattern Carpet. Use pattern carpet in all facilities except as noted in paragraph 4.3.3. Pattern carpet falls into two categories:

- Multi-colored bold tweeds.
- Random or repetitive distinguishable designs.

4.3.3. Solid colors. Solid colors are approved for use in General Officer suites and designated Distinguished Visitor (DV) lodging facilities. The installation or MAJCOM interior design office should make these selections.

4.3.4. Carpet Tiles. Carpet-tiles must meet the design and technical requirements outlined herein.

4.3.5. Final Selections. Use large samples to best illustrate how the final product will appear.

4.4. Technical Specifications.

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4.4.1. Fibers:

- nylon 6,6 or nylon 6 branded by the fiber manufacturer
- wool and wool/nylon blends

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- polypropylene/olefin

Because performance data for installed recycled carpet fibers is not currently available, use recycled materials in moderation.

4.4.2. Pile Density (Minimum):

- 3500 for woven or bonded construction
- 4000 for tufted construction

See Table 2 for wear classifications and Table 1 for specific applications.

4.4.3. Gauge (Minimum): 1/8 inch as tested by ASTM D418.

4.4.4. Tuft Bind (Minimum):

- 20 pounds-force for loop, cut and loop, and tip shear pile broadloom only
- 15 pounds-force average for carpet tile, as tested by ASTM D-1335

4.4.5. Construction: Tufted, woven, or bonded.

4.4.6. Backings: Both primary and secondary backings must be a synthetic material. Jute back is not authorized.

4.4.7. Dimensional Stability (Maximum): ± 0.027 inches for carpet tiles as tested by ISO 2551 Aachen Test.

4.4.8. Pile Weight (Minimum):

- 30 ounce for cut pile
- 26 ounce for bonded
- 24 ounce for loop pile.

4.4.9. Electrostatic Propensity (Maximum):

- 3.5 kV or less for general commercial areas
- 2.0 kV or less for critical environments (such as equipment/technical rooms of communication facilities) as tested by the American Association of Textile Chemists and Colorists Test Method-134 (AATCC-134)

4.4.10. Fire Resistance.

4.4.10.1. Carpet for all areas except corridors shall conform to Federal Flammability Standard FF1-70 (Pill Test) (Office of the Secretary, Consumer Product Safety Commission, Washington, D.C. 20207).

4.4.10.2. Carpet and carpet systems (carpet and pad) for corridors must meet ASTM E648 (available from Naval Publications and Forms Center, 5801 Tabor Ave, Philadelphia, PA 19120) and the following criteria:

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- minimum average critical radiant flux of 0.45 watts per square centimeter or greater in unaccompanied personnel housing, lodging facilities, and hospitals.
- minimum average critical radiant flux of 0.22 watts per square centimeter , or greater in all other facilities.

4.5. Installation.

4.5.1. Follow manufacturer's recommendations when installing carpeting to protect warranties. Never install carpeting over existing carpet or existing pad.

4.5.2. Provide a soil walk-off area (mats) for carpet in entry areas.

4.5.3. Provide adequate ventilation during installation, and 48 to 72 hours thereafter, to reduce indoor air pollutants.

4.5.4. Order an additional 10 percent of replacement tiles and roll goods to allow for cutting and matching of carpet pattern repeats.

4.6. Maintenance.

4.6.1. Care and cleaning should be according to Follow the manufacturer's recommendations for care and cleaning. Perform preventive and corrective maintenance to preserve original appearance.

4.6.2. Remove stains and spills immediately.

4.6.3. Schedule periodic vacuuming and cleaning.

4.6.4. Before cleaning carpet, remove furniture or place plastic or aluminum foil under and around furniture legs to prevent rust and stains. Leave in place until carpet has completely dried.

5. Point Of Contact: Ms Sandy Warner, CFID, HQ AFCEE/DGA, DSN 240-4201, commercial (210)536-4201, or FAX 240-4254.



Dennis M. Firman, P.E.

Director, Systems Engineering

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1. Distribution List

2. ETL Index

Table 1. Areas Of Use And Wear Classification.

Facility	Minimum Carpet Wear Classifications	
	Heavy	Severe
Administrative Facilities (Including areas in other facility types)		
Open plan offices		X
Closed private offices	X	
Corridors		X
Conference rooms	X	
Bowling Centers		
Converse (Excluding food service working and storage areas)	X	X
Chapels and Other Religious Facilities		
Worship areas	X	
Education areas	X	
Child Development Centers	X	
Clubs - Officers and Enlisted	X	X
Dining Facilities (Excluding work spaces, serving areas, and toilets)		X
Exchange Facilities		
Sales areas		X
Offices (see Admin Facilities)	X	
Restaurant and cafeteria dining areas		X
Firehouses		
Sleeping rooms	X	
Day rooms	X	
Offices (see Admin Facilities)	X	
Golf Course Club House (Spike Proof)		
Pro shop		X
Dining area		X
Libraries	X	
Lodging Facilities (Includes VAQ, VOQ, and TLF)		
Rooms/suites (Except kitchens and baths)	X	
Corridors (Except vending and laundry areas)		X
Billeting lobby		X
Music and/or Drama Centers	X	
Passenger Terminals		
Waiting Areas		X
Offices (see Admin Facilities)	X	

Table 1. Areas Of Use And Wear Classification (Continued).

Facility	Minimum Carpet Wear Classifications	
	Heavy	Severe
Research Facilities		
Bio-optics Laboratories	X	
Theaters, Auditoriums	X	X
Training Buildings, Educational Facilities Including Dependent Schools		
Staff Offices	X	
Classrooms	X	X
Corridors		X
Medical Facilities		X
Unaccompanied Personnel Housing		
Sleeping Rooms	X	
Public Areas (Corridors, lobbies, lounges, TV rooms)		X
Offices (see Admin Facilities)	X	
Youth Centers	X	X

*Use lower wear classification only where applicable based on expected wear.

Table 2. Average Density Factor.

Type & Wear Level	Nylon Fibers	Polypropylene Filament	Wool & Wool/Nylon
Surface Texture	Oz/SqYd - Density	Oz/SqYd - Density	Oz/SqYd - Density
Tufted Carpet/Carpet Tile - Heavy			
a. Loop Pile	24 - 4500	28 - 6000	42 - 6000
b. Plush-cut Pile	32 - 4500	NR	46 - 4300
c. Twist (Frieze)	32 - 4500	NR	50 - 4000
d. Cut and Loop	26 - 4500	NR	50 - 4800
Tufted Carpet/Carpet Tile - Severe (Extra Heavy)			
a. Loop Pile	32 - 6000	32 - 8000	NR
b. Plush-cut Pile (Heat-set only)	36 - 6000	NR	NR
c. Twist (Frieze)	36 - 6000	NR	NR
d. Cut and Loop	30 - 6000	NR	NR
Woven or Bonded Carpet/Carpet Tile - Heavy			
a. Loop Pile	24 - 4500	28 - 6000	42 - 6000
b. Plush-cut Pile	30 - 4500	NR	46 - 4300
c. Twist (Frieze)	30 - 4500	NR	50 - 4000
d. Cut and Loop	26 - 4500	NR	50 - 4800
Woven or Bonded Carpet/Carpet/Tile - Severe (Extra Heavy)			
a. Loop Pile	30 - 5500	NR	NR
b. Plush-cut Pile	36 - 5500	NR	NR
c. Twist (Frieze)	36 - 5000	NR	NR
d. Cut and Loop	30 - 5500	NR	NR

See Table 2 for wear classification by facility type and area.

Density calculated as:
$$\text{Density} = \frac{36 \times \text{Pile Weight}}{\text{Pile Height (Thickness)}}$$

NR - Not recommended for use in this type wear area.

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ENGINEERING TECHNICAL LETTERS (ETL)

SECTION A - CURRENT ETLs

ETL Number	Title	Date Issued
82-2	Energy Efficient Equipment	10 Nov 82
83-1	Design of Control Systems for HVAC Change No. 1 to ETL 83-1, U.S. Air Force Standardized Heating, Ventilating & Air Conditioning (HVAC) Control Systems	16 Feb 83 22 Jul 87
83-3	Interior Wiring Systems, AFM 88-15, Para 7-3	2 Mar 83
83-4	EMCS Data Transmission Media (DTM) Considerations	3 Apr 83
83-7	Plumbing, AFM 88-8, Chapter 4	30 Aug 83
83-8	Use of Air-to-Air Unitary Heat Pumps	15 Sep 83
83-9	Insulation	14 Nov 83
84-2	Computer Energy Analysis Change 1 Ref: HQ USAF/LEEEU Msg 031600Z MAY 84	27 Mar 84 1 Jun 84
84-7	MCP Energy Conservation Investment Program (ECIP)	13 Jun 84
84-10	Air Force Building Construction and the Use of Termiticides	1 Aug 84
86-2	Energy Management and Control Systems (EMCS)	5 Feb 86
86-4	Paints and Protective Coatings	12 May 86
86-5	Fuels Use Criteria for Air Force Construction	22 May 86
86-8	Aqueous Film Forming Foam Waste Discharge Retention and Disposal	4 Jun 86
86-9	Lodging Facility Design Guide	4 Jun 86
86-10	Antiterrorism Planning and Design Guidance	13 Jun 86
86-14	Solar Applications	15 Oct 86
86-16	Direct Digital Control Heating, Ventilation, and Air Conditioning Systems	9 Dec 86
87-1	Lead Ban Requirements of Drinking Water	15 Jan 87
87-2	Volatile Organic Compounds	4 Mar 87
87-4	Energy Budget Figures (EBFs) for Facilities in the Military Construction Program	13 Mar 87
87-9	Prewiring	21 Oct 87
88-2	Photovoltaic Applications	21 Jan 88
88-3	Design Standards for Critical Facilities	15 Jun 88
88-4	Reliability & Maintainability (R&M) Design Checklist	24 Jun 88
88-6	Heat Distribution Systems Outside of Buildings	1 Aug 88
88-9	Radon Reduction in New Facility Construction	7 Oct 88
88-10	Prewired Workstations Guide Specification	29 Dec 88

ENGINEERING TECHNICAL LETTERS (ETL)

SECTION A - CURRENT ETLs (Cont)

ETL Number	Title	Date Issued
89-2	Standard Guidelines for Submission of Facility Operating and Maintenance Manuals	23 May 89
89-3	Facility Fire Protection Criteria for Electronic Equipment Installations	9 Jun 89
89-4	Systems Furniture Guide Specification	6 Jul 89
89-6	Power Conditioning and Continuation Interfacing Equipment (PCCIE) in the Military Construction Program (MCP)	7 Sep 89
89-7	Design of Air Force Courtrooms	29 Sep 89
90-1	Built-Up Roof (BUR) Repair/Replacement Guide Specification	23 Jan 90
90-2	General Policy for Prewired Workstations and Systems Furniture	26 Jan 90
90-3	TEMPEST Protection for Facilities Change 1 Ref: HQ USAF/LEEDE Ltr dated 20 April 90, Same Subject	23 Mar 90
90-4	1990 Energy Prices and Discount Factors for Life-Cycle Cost Analysis	24 May 90
90-5	Fuel and Lube Oil Bulk Storage Capacity for Emergency Generators	26 Jul 90
90-6	Electrical System Grounding, Static Grounding and Lightning Protection	3 Oct 90
90-7	Air Force Interior Design Policy	12 Oct 90
90-8	Guide Specifications for Ethylene Propylene Diene Monomer (EPDM) Roofing	17 Oct 90
90-9	Fire Protection Engineering Criteria for Aircraft Maintenance, Servicing, and Storage Facilities	2 Nov 90
90-10	Commissioning of Heating, Ventilating, and Air Conditioning (HVAC) Systems Guide Specification	17 Oct 90
91-1	Fire Protection Engineering Criteria Testing Halon Fire Suppression Systems	2 Jan 91
91-2	High Altitude Electromagnetic Pulse (HEMP) Hardening in Facilities	4 Mar 91
91-4	Site Selection Criteria for Fire Protection Training Areas	14 Jun 91
91-5	Fire Protection Engineering Criteria - Emergency Lighting and Marking of Exits	18 Jun 91
91-6	Cathodic Protection	3 Jul 91

ENGINEERING TECHNICAL LETTERS (ETL)

SECTION A - CURRENT ETLs (Cont)

ETL Number	Title	Date Issued
91-7	Chlorofluorocarbon (CFC) Limitation in Heating, Ventilating and Air-Conditioning (HVAC) Systems	21 Aug 91
93-1	Construction Signs	11 Mar 93
93-2	Dormitory Criteria for Humid Areas	13 Jul 93
93-3	Inventory, Screening, Prioritization, and Evaluation of Existing Buildings for Seismic Risk	18 Aug 93
93-4	Fire Protection Engineering Criteria - Automatic Sprinkler Systems in Military Family Housing (MFH)	11 Aug 93
93-5	Fire Protection Engineering Criteria - Electronic Equipment Installations	22 Dec 93
94-1	Standard Airfield Pavement Marking Schemes	5 Apr 94
94-2	Utility Meters in New and Renovated Facilities	10 Jun 94
94-3	Air Force Carpet Standard	10 Jun 94

ENGINEERING TECHNICAL LETTERS (ETL)

SECTION B - OBSOLETE ETLs

No.	Date	Status
82-1	10 Nov 82	Superseded by ETLs 83-10, 86-1, 87-4
82-3	10 Nov 82	Superseded by ETLs 83-5, 84-2
82-4	10 Nov 82	Superseded by ETL 84-7
82-5	10 Nov 82	Superseded by ETLs 84-1, 86-13, 86-14
82-6	30 Dec 82	Cancelled
82-7	30 Nov 82	Cancelled
83-2	16 Feb 83	Superseded by ETL 84-3
83-5	5 May 83	Superseded by ETL 84-2
83-6	24 May 83	Cancelled
83-10	28 Nov 83	Superseded by ETL 86-1
84-1	18 Jan 84	Superseded by ETL 86-14
84-3	21 Mar 84	Cancelled
84-4	10 Apr 84	Superseded by ETLs 86-7, 86-15, 87-5
84-5	7 May 84	Superseded by ETLs 84-8, 86-11, 86-18, 88-6
84-6	Not Issued	Cancelled/Not Used
84-8	19 Jun 84	Superseded by ETL 86-11
84-9	5 Jul 84	Superseded by ETL 88-7
88-5	2 Aug 88	Superseded by ETL 91-6
86-1	3 Feb 86	Superseded by ETL 87-7
86-3	21 Feb 86	Superseded by ETL 86-4
86-6	3 Jun 86	Superseded by ETLs 86-11, 86-18, 88-6
86-7	3 Jun 86	Superseded by ETL 86-15
86-11	3 Jul 86	Superseded by ETL 88-6
86-12	3 Jul 86	Superseded by ETL 90-2
86-13	18 Aug 86	Superseded by ETL 86-14
86-15	13 Nov 86	Superseded by ETL 87-5
86-17	17 Dec 86	Superseded by ETL 89-6
86-18	18 Dec 86	Superseded by ETL 88-6
87-3	12 Mar 87	Superseded by ETLs 87-6, ETL 88-5
87-5	13 Jul 87	Superseded by ETL 94-2
87-6	21 Aug 87	Superseded by ETL-88-5
87-7	14 Oct 87	Superseded by ETL 89-1
87-8	19 Oct 87	Superseded by ETL 90-1
88-1	5 Jan 88	Superseded by ETL 89-2
88-5	2 Aug 88	Superseded by ETL 91-6
88-7	24 Aug 88	Superseded by ETLs 90-3, 91-2
88-8	4 Oct 88	Superseded by ETL 91-7
89-1	6 Feb 89	Superseded by ETL 90-4
89-5		Issued as ETL 90-7
91-8	24 Sep 91	Cancelled
91-3	14 Jun 91	Superseded by MIL HDBK 1008B, Jan 94