



Designation: D 2475 – 01

Standard Specification for Felt¹

This standard is issued under the fixed designation D 2475; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers all standard types of felt in the form of rolls and sheets that are suitable for mechanical use. Certain special-purpose felts are also covered.

¹ This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.13 on Wool and Felt. Current edition approved April 10, 2001. Published June 2001. Originally published as D 2475 – 65 T, replacing D 114. Last previous edition D 2475 – 00.

1.2 This specification is not applicable to felt-like products that utilize weaving, knitting, stitching, or bonding such as papermaker's felt.

1.3 Trade practice in the felt industry deals in pounds, yards, and inches, therefore the values stated in inch-pound units are to be regarded as standard. The values in SI units are provided as information only.

1.3.1 The specification referenced in 2.2 uses only inch-pound units. The percent specific gravity of that class.

TABLE 1 Wool Sheet Felt: Thickness and Mass (Weight)

ASTM (NTA) Class	Color	Thickness, in.			Thickness, mm			Mass (Weight) lb/yd ²		Mass (Weight) kg/m ²			
		Nominal	Tolerances		Nominal	Tolerances		Nominal	Tolerances	Nominal	Tolerances		
			Sheets	Cut Parts		Sheets	Cut Parts						
26S1	White	0.125	± 0.014	± 0.016	3.17	± 0.35	± 0.41	1.50	± 0.10	0.81	± 0.05		
26S4	Gray	0.188	0.016	0.018	4.78	0.41	0.46	2.25	0.15	1.22	0.08		
		0.250	0.020	0.022	6.35	0.51	0.56	3.00	0.20	1.63	0.11		
		0.313	0.022	0.024	7.95	0.56	0.61	3.75	0.25	2.04	0.14		
		0.375	0.024	0.026	9.52	0.61	0.66	4.50	0.30	2.44	0.16		
		0.500	0.030	0.032	12.70	0.76	0.81	6.00	0.40	3.26	0.22		
		0.625	0.035	0.037	15.88	0.89	0.94	7.50	0.45	4.07	0.24		
		0.750	0.040	0.042	19.05	1.02	1.07	9.00	0.50	4.89	0.27		
		0.875	0.046	0.048	22.23	1.17	1.22	10.50	0.55	5.70	0.30		
		1.000	0.051	0.053	25.40	1.30	1.35	12.00	0.60	6.52	0.33		
		1.250	0.062	0.065	31.75	1.57	1.65	15.00	0.70	8.15	0.38		
		1.500	0.072	0.075	38.10	1.83	1.91	18.00	0.80	9.77	0.43		
		1.750	0.083	0.085	44.45	2.11	2.16	21.00	0.90	11.40	0.49		
		2.000	0.094	0.098	50.80	2.39	2.49	24.00	1.00	13.03	0.54		
		2.500	0.115	0.119	63.50	2.92	3.02	30.00	1.05	16.29	0.57		
		3.000	0.136	0.141	76.20	3.45	3.58	36.00	1.10	19.55	0.60		
34S1	White	0.125	0.012	0.014	3.17	0.30	0.36	2.00	0.10	1.09	0.05		
34S2	White	0.188	0.012	0.014	4.78	0.30	0.36	3.00	0.15	1.63	0.08		
34S3	White	0.250	0.016	0.018	6.35	0.41	0.46	4.00	0.30	2.17	0.16		
34S4	Gray	0.313	0.017	0.019	7.95	0.43	0.48	5.00	0.35	2.71	0.19		
		0.375	0.019	0.021	9.52	0.48	0.53	6.00	0.40	3.26	0.22		
		0.500	0.022	0.024	12.70	0.56	0.61	8.00	0.50	4.34	0.27		
		0.625	0.026	0.028	15.88	0.66	0.71	10.00	0.60	5.43	0.33		
		0.750	0.029	0.031	19.05	0.74	0.79	12.00	0.70	6.52	0.38		
		0.875	0.032	0.034	22.23	0.87	0.86	14.00	0.75	7.60	0.41		
		1.000	0.036	0.038	25.40	0.91	0.97	16.00	0.80	8.69	0.43		
		1.250	0.042	0.045	31.25	1.07	1.14	20.00	0.90	10.86	0.49		
		1.500	0.049	0.052	38.10	1.24	1.32	24.00	1.00	13.03	0.54		
		1.750	0.056	0.059	44.45	1.42	1.50	28.00	1.10	15.20	0.60		
		2.000	0.063	0.067	50.80	1.60	1.70	32.00	1.20	17.38	0.65		
		2.500	0.076	0.080	63.50	1.93	2.03	40.00	1.25	21.72	0.68		
		3.000	0.090	0.095	76.20	2.29	2.41	48.00	1.30	26.06	0.71		
		43S1	White	0.125	0.012	0.014	3.17	0.30	0.36	2.50	0.30	1.36	0.16
		43S2	White	0.188	0.012	0.014	4.78	0.30	0.36	3.75	0.35	2.04	0.19
43S3	White	0.250	0.014	0.016	6.35	0.36	0.41	5.00	0.40	2.71	0.22		

TABLE 1 *Continued*

ASTM (NTA) Class	Color	Thickness, in.			Thickness, mm			Mass (Weight) lb/yd ²		Mass (Weight) kg/m ²			
		Nominal	Tolerances		Nominal	Tolerances		Nominal	Tolerances	Nominal	Tolerances		
			Sheets	Cut Parts		Sheets	Cut Parts						
43S4	Gray	0.375	0.016	0.019	9.52	0.41	0.48	7.50	0.50	4.07	0.27		
		0.500	0.019	0.022	12.70	0.48	0.56	10.00	0.60	5.43	0.33		
		0.625	0.022	0.025	15.88	0.56	0.64	12.50	0.70	6.79	0.38		
		0.750	0.025	0.028	19.05	0.63	0.71	15.00	0.80	8.15	0.43		
		0.875	0.027	0.030	22.23	0.69	0.76	17.50	0.90	9.50	0.49		
		1.000	0.030	0.033	25.40	0.76	0.84	20.00	1.00	10.86	0.54		
		1.250	0.036	0.040	31.15	0.91	1.02	25.00	1.10	13.56	0.60		
		1.500	0.041	0.045	38.10	1.04	1.14	30.00	1.20	16.29	0.65		
		1.750	0.047	0.051	44.45	1.19	1.30	35.00	1.30	19.00	0.71		
		2.000	0.053	0.058	50.80	1.35	1.47	40.00	1.40	21.72	0.76		
		2.500	0.064	0.070	63.50	1.63	1.78	50.00	1.45	27.15	0.79		
		3.000	0.075	0.082	76.20	1.90	2.08	60.00	1.50	32.58	0.81		
		56S1	White	0.125	0.010	0.014	3.17	0.25	0.36	3.25	0.40	1.76	0.22
		56S2	White	0.188	0.010	0.014	4.78	0.25	0.36	4.90	0.50	2.66	0.27
56S3	White	0.250	0.011	0.016	6.35	0.28	0.41	6.50	0.60	3.53	0.33		
S654	Gray	0.375	0.013	0.018	9.52	0.33	0.46	9.75	0.80	5.29	0.43		
		0.500	0.016	0.022	12.70	0.41	0.56	13.00	1.00	7.06	0.54		
		0.625	0.018	0.024	15.88	0.46	0.61	16.25	1.10	8.82	0.60		
		0.750	0.020	0.026	19.05	0.51	0.66	19.50	1.20	10.59	0.65		
		0.875	0.022	0.028	22.23	0.56	0.71	22.75	1.30	12.35	0.70		
		1.000	0.025	0.031	25.40	0.63	0.79	26.00	1.40	14.12	0.76		
		1.250	0.029	0.036	31.75	0.74	0.91	32.50	1.50	17.65	0.81		
		1.500	0.033	0.040	38.10	0.84	1.02	39.00	1.60	21.18	0.87		
		1.750	0.038	0.046	44.45	0.97	1.17	45.50	1.70	24.71	0.92		
		2.000	0.042	0.051	50.80	1.07	1.30	52.00	1.80	28.24	0.98		
		2.500	0.050	0.061	63.50	1.27	1.55	65.00	1.85	35.29	1.00		
		3.000	0.058	0.070	76.20	1.47	1.78	78.00	1.90	42.35	1.03		
		68S1	White	0.125	0.007	0.013	3.17	0.18	0.33	4.00	0.50	2.17	0.27
		68S2	White	0.188	0.007	0.014	4.78	0.18	0.36	6.00	0.75	3.26	0.41
68S3	White	0.250	0.007	0.015	6.35	0.18	0.38	8.00	1.00	4.34	0.54		
68S4	Gray	0.375	0.009	0.018	9.52	0.23	0.46	12.00	1.10	6.52	0.60		
		0.500	0.011	0.020	12.70	0.28	0.51	16.00	1.20	8.69	0.65		
		0.625	0.013	0.022	15.88	0.33	0.56	20.00	1.30	10.86	0.71		
		0.750	0.015	0.024	19.05	0.38	0.61	24.00	1.40	13.03	0.76		
		0.875	0.017	0.026	22.23	0.43	0.66	28.00	1.50	15.20	0.81		
		1.000	±0.019	±0.028	25.40	±0.48	±0.71	32.00	±1.60	17.38	±0.87		
		1.250	0.022	0.032	31.75	0.56	0.81	40.00	1.70	21.72	0.92		
		1.500	0.026	0.036	38.10	0.66	0.91	48.00	1.80	26.06	0.98		
		1.750	0.029	0.041	44.45	0.74	1.04	56.00	1.90	30.41	1.03		
		2.000	0.032	0.046	50.80	0.81	1.17	64.00	2.00	34.75	1.09		
2.500	0.038	0.055	63.50	0.97	1.40	80.00	2.05	43.44	1.11				

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textiles²

D 461 Test Methods for Felt²

D 4845 Terminology Relating to Wool³

2.2 Federal Standard:

C-F-206, Felt Sheet: Cloth Felt, Wool, Pressed⁴

2.3 Felt Manufacturers Council:

FS14-68/71 Wool Felt Standard Specifications⁵

2.4 SAE Standard:⁶

J314b Felts-Wool and Part Wool

3. Terminology

3.1 Definitions:

3.1.1 *felt, n*—a textile structure characterized by interlocking and consolidation of its constituent fibers.

3.1.2 *machined felt, n*—a felt structure achieved by the interaction of a suitable combination of mechanical energy, chemical action, moisture and heat causing the constituent fibers to migrate and interlock.

3.1.3 *needled felt, n*—a structure composed entirely of fibers physically interlocked and reoriented through the action of felting needles.

3.1.4 For standard terminology relating to wool, refer to Terminology **D 4845**.

3.1.5 For definitions of other textile terms used in these test methods, refer to Terminology **D 123**.

3.1.5.1 *Discussion*—For the purpose of this document, there are only two types of felt, machined and needled. All other

² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 07.02.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁵ Available from the Northern Textile Association, 230 Congress Street, Boston, MA 02110.

⁶ Available from the Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, NY 10001.

terms alluded to as types of felt, such as papermakers, black, unsupported, supported, part wool, wool, etc. are considered to be simply terms describing attributes of these two types of felts.

3.1.6 *relative density, n*—the ratio of the mass of a volume of felt to the mass of an equivalent volume of water, alternatively, use density.

4. Types of Felts

4.1 ASTM Classification:

4.1.1 The ASTM Classification number in Tables 1-3 is felt may be computed from the mass (weight), thickness, and area values in these tables. This number is followed by the letter R or S, which designates the method of manufacture as roll or sheet form, respectively. The last digit is the overall quality index in decreasing order of quality from one to four (see Note 1).

4.1.2 To obtain the average density of the different felts in lb/ft³, multiply the percent specific gravity number of the first column of Tables 1-4 by 0.6243.

4.1.3 To obtain the average density in kg/m³, (1) multiply the percent specific gravity of the first column in Tables 1-4 by 10, or (2) multiply the average density in lb/ft³ by 16.02.

4.1.4 Examples of ASTM classifications are as follows:
26R2 Felt

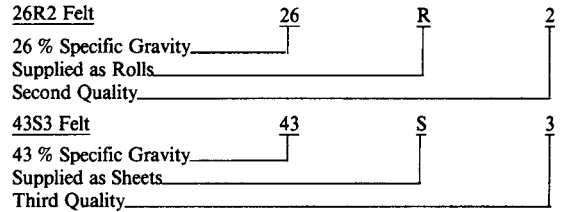


TABLE 2 Roll and Sheet Felt Corresponding Classifications—Properties and General Description

ASTM (NTA) Classification ^A	Corresponding Classifications		Physical Requirements					General Description			
	SAE J314b	Fed. Spec. C-F-206	Min. Tensile Strength,		Min. Split Resistance		Color	Normal Width		Thickness: Available Range	
			psi	kPa	lb/2 in. width	N/50 mm width		in.	cm	in.	mm
14R1	...	...	...	...	...	...	white	72	183	0.125–0.500	3.17–12.7
17R1	...	...	...	...	...	...	white	72	183	0.125–1.000	3.17–25.4
17R2	F26	8R5	...	...	...	...	gray	72	183	0.125–1.000	3.17–25.4
18R1	F10	9R1	225	1551	8	35	white	72	183	0.063–1.000	1.60–25.4
18R2	F11	9R2	200	1379	6	26	gray	72	183	0.063–1.000	1.60–25.4
18R3	F12	9R3	100	690	3	13	gray	72	183	0.063–1.000	1.60–25.4
18R4	F13	9R4	75	517	2	9	gray	72	183	0.063–1.000	1.60–25.4
18R5	F15	9R5	75	517	2	9	gray	72	183	0.063–1.000	1.60–25.4
26R1	F5	12R1	400	2758	18	79	white	60	152	0.063–1.000	1.60–25.4
26R2	F6	12R2	275	1896	16	71	gray	60 or 72	152 or 183	0.063–1.000	1.60–25.4
26R3	F7	12R3	250	1724	12	53	gray	72	183	0.063–1.000	1.60–25.4
26R3X	F55	12R3X	200	1379	...	...	gray	60 or 72	152 or 183	0.063–0.094	1.60–2.39
34R1	F1	16R1	500	3448	33	147	white	60	152	0.125–1.000	3.17–25.4
34R1X	F50	16R1X	500	3448	...	...	white	60	152	0.047–0.092	1.19–2.39
34R2	F2	16R2	500	3448	28	124	not blk or gray	60	152	0.047–1.000	1.19–25.4
34R3	F3	16R3	400	2758	22	97	gray	60	152	0.125–1.000	3.17–25.4
34R3X	F51	16R3X	300	2069	...	...	gray	60 or 72	152 or 183	0.047–0.094	1.19–2.39
38R1	...	18R1	600	4137	35	154	white	60	152	0.125–0.500	3.17–12.7
38R2	...	...	550	3792	30	132	gray	60	152	0.125–0.500	3.17–12.7
26S1	...	12S1	400	2758	18	79	white	36	91	0.125–3.000	3.17–76.2
26S4	...	...	300	2069	16	71	gray	36	91	0.125–3.000	3.17–76.2
34S1	...	16S1	500	3448	32	141	white	36	91	0.125–3.000	3.17–76.2
34S2	...	16S2	400	2758	28	124	white	36	91	0.125–3.000	3.17–76.2
34S3	...	16S3	300	2069	20	89	white	36	91	0.125–3.000	3.17–76.2
34S4	...	...	400	2758	22	97	gray	36	91	0.125–3.000	3.17–76.2
43S1	...	20S1	500	3448	44	196	white	36	91	0.125–3.000	3.17–76.2
43S2	...	20S2	400	2758	40	178	white	36	91	0.125–3.000	3.17–76.2
43S3	...	20S3	300	2069	32	142	white	36	91	0.125–3.000	3.17–76.2
43S4	...	...	400	2758	36	160	gray	36	91	0.125–3.000	3.17–76.2
56S1	...	26S1	600	4137	48	212	white	36	91	0.125–3.000	3.17–76.2
56S2	...	26S2	500	3448	46	205	white	36	91	0.125–3.000	3.17–76.2
56S3	...	26S3	400	2758	36	160	white	36	91	0.125–3.000	3.17–76.2
56S4	...	...	400	2758	40	178	gray	36	91	0.125–3.000	3.17–76.2
68S1	...	32S1	600	4137	50	222	white	36	91	0.125–2.500	3.17–63.5
68S2	...	32S2	500	3448	48	212	natural	36	91	0.125–3.000	3.17–76.2
68S3	...	32S3	400	2758	40	178	natural	36	91	0.125–3.000	3.17–76.2
68S4	...	...	400	2758	46	205	gray	36	91	0.125–2.500	3.17–63.5

^A NTA refers to Northern Textile Association.