SAE International™ SURFACE VEHICLE STANDARD

SAE J314 REAF. SEP2007

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Superseding J314 JUL2002

Felts—Wool and Part Wool

1. ***Scope***—This SAE Standard identifies chemical/mechanical properties, thickness, width, mass, and other requirements recommended for felts (refer to Tables 1 and 2). It was developed with the cooperation of the Standardization Committee of the Felt Association, Inc., and in accordance with the ASTM tests indicated in the document.

The commercial trade designations of the more commonly used grades of automotive felts are given along with complete specifications and tolerances for thickness, mass, wool content, chemical and physical requirements, color, and width.

General information, recommended uses, etc., are published in Appendix A as a guide in the selection of felts for particular uses, but the requirements for each application should be taken into consideration in making final selections.

1.1 Rationale—Reviewed by committee and reinstated without change.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 276—Identification of Fibers in Textiles
ASTM D 461—Standard Methods of Testing Wool Felt

2.1.2 OTHER PUBLICATIONS

Wool Products Labeling Act, 1939

3. Chemical and Mechanical Properties

3.1 The chemical and mechanical requirements for the several grades of automotive felts given in Table 1 include actual wool content (chemical basis), methyl chloroform soluble (percentage of residual oil and grease), water soluble (sizing and nonfibrous impurities), ash (the amount of residual inorganic matter), tensile strength, and splitting resistance.

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TABLE 1—STANDARD MECHANICAL ROLL FELT SPECIFICATIONS

SAE No.	Min Actual Wool Content,(1) %	Max Methyl Chloroform Soluble, %	Max Water Soluble, %	Max Combined Methyl Chloroform and Water, %	Max Ash, %	Min Tensile Strength kPa	Min Tensile Strength psi	Min Splitting Resistance(2) N 5 cm width	Min Splitting Resistance(2) lb 2 in width	Trade Designation	Color	Standard Width cm	Standard Width in
F-1	95	2.5	2.5	3.0	1.5	3450	500	142	32	Back check	White	152	60
F-2	90	2.5	2.5	4.0	2.0	3450	500	125	28	Back check	Any color except gray or black	152	60
F-3	85	2.5	3.0	4.5	2.5	2760	400	98	22	Back check	Gray	152	60
F-5	95	2.5	2.5	3.0	2.0	2760	400	80	18	Extra firm pad	White	152	60
F-6	87	2.5	2.5	4.5	2.5	1900	275	71	16	Extra firm pad	Gray	152 or 183	60 or 72
F-7	80	3.0	4.0	7.0	3.0	1730	250	53	12	Extra firm pad	Gray	183	72
F-10	95	2.5	2.5	3.0	2.5	1550	225	36	8	Firm pad	White	183	72
F-11	87	3.0	2.5	4.5	3.0	1380	200	27	6	Firm pad	Gray	183	72
F-12	85	4.0	2.5	6.5	3.5	690	100	13	3	Firm pad	Gray	183	72
F-13	75	4.0	4.0	8.0	3.5	518	75	9	2	Firm pad	Gray	183	72
F-15	55	4.0	5.0	9.0	4.0	518	75	9	2	Firm pad	Gray	183	72
F-26	45	8.0	6.0	14.0	5.0	—	—	—	—	Soft pad	Gray	183	72
F-50	95	2.5	2.5	3.0	1.5	3450	500	—	—	Ball bearing felt	White	152 or 183	60 or 72
F-51	92	2.5	2.5	4.5	2.5	2070	300	—	—	Ball bearing felt	Gray	152 or 183	60 or 72
F-55	75	4.0	4.0	8.0	3.0	1380	200	—	—	Lining	Gray or black	152 or 183	60 or 72

1. The actual wool content indicates the percent of wool by chemical analysis and is exclusive of traces of other fibers and impurities present in the wool used in fabricating the several grades of felt. For example, SAE F-1, fabricated from 100% wool, may contain incidental traces of cotton and other fibers, residual wool fats, and oils or soaps used in processing which may reduce the actual wool fiber content on analysis to a minimum of 95%.
2. Splitting resistance is not applicable to felts where the thickness is less than 4.75 mm (3/16 in). For materials less than 4.75 mm (3/16 in) in thickness, breaking strength only is recommended as an indicative test.

3.2 All tests shall be made in accordance with ASTM D 461. If it is desired to detect the presence of, and identify, fibers other than wool, such as other animal fibers, vegetable, and synthetic fibers, the felt shall be tested as described in ASTM D 276.

4. Thickness, Width, and Mass

4.1 Thickness and mass requirements are given in Table 2.

4.2 Felt shall be furnished in standard width as shown in Table 1, unless otherwise specified.

4.3 The thickness tolerances given in Table 2 vary, depending on the density, thickness, and grade or quality of the felt, and are expressed as the permissible minimum and maximum thickness for each grade and thickness rather than as a percentage variation from the nominal thickness.

4.4 Any density or mass determinations shall be based on the thickness of the felt as ordered and no correction shall be made for variations in the thickness of the felt as received. For example, SAE F-1, back-check felt, in 12.7 mm (1/2 in) thickness may, according to Table 2, vary in mass from 4.12 to 4.55 kg/m^2 (7.60 to 8.40 lb/yd^2), while the thickness may, according to Table 1, vary from 12.22 to 13.18 mm (0.481 to 0.519 in). The combination of mass and thickness tolerances control the degree of felting or matting of the fibers, in other words, the hardness or the density, and conversely, the resiliency of the finished felt. Therefore, to maintain the normal density for each grade or type of felt, no correction in mass is permitted to compensate for a variation from the nominal thickness as specified.

NOTE—The mass or density requirements for the several grades of automotive felts given in Table 2 are expressed as the mass in kilograms per square meter (pounds per square yard) for each commercial thickness. This is the established standard unit of mass employed in the felt industry. Density may also be expressed as the mass in grams per cubic centimeter (ounces per cubic inch), specific gravity as compared with water, percentage specific gravity (specific gravity x 100), or as surface density in kilograms per square meter (pounds per square yard) of nominal 25.4 mm (1 in) thickness. The mass or density of cut parts may be expressed as the mass per one hundred (100) parts based on the nominal mass of the felt in the thickness specified.

5. Other Requirements

5.1 Color requirements are given in Table 1.

5.2 Special sizing, adhesives, and impregnating materials used to impart specific properties may alter the chemical and physical requirements specified in Table 1. The specific properties and methods of test for special products shall be agreed upon by supplier and purchaser.

5.3 When specified by the purchaser for ball and roller bearing oil retaining washers, felt shall be sheared on both sides to give a smooth surface free from “surface fuzz” or “flock.”

5.4 The quality, appearance, and oil absorption characteristics may be specified by the purchaser to be in accord with approved samples.

TABLE 2—STANDARD MECHANICAL ROLL FELT SPECIFICATIONS

SAE No.	Thickness, mm Nominal	Thickness, mm Limits	Thickness, in Nominal	Thickness, in Limits	Mass, kg/m^2 Nominal	Mass, kg/m^2 Limits	Mass (Weight) lb/yd^2 Nominal	Mass (Weight) lb/yd^2 Limits
F-1[1]	3.2	2.87–3.48	1/8	0.113–0.137	1.08	1.03–1.14	2.0	1.90–2.10
	4.8	4.45–5.11	3/16	0.175–0.201	1.63	1.54–1.71	3.0	2.85–3.15
	6.4	5.99–6.71	1/4	0.236–0.264	2.17	2.06–2.28	4.0	3.80–4.20
	8.0	7.57–8.33	5/16	0.298–0.328	2.71	2.57–2.85	5.0	4.75–5.25
	9.5	9.12–9.93	3/8	0.359–0.391	3.25	3.09–3.41	6.0	5.70–6.30
	12.7	12.22–13.18	1/2	0.481–0.519	4.34	4.12–4.55	8.0	7.60–8.40
	15.9	15.32–16.43	5/8	0.603–0.647	5.42	5.15–5.69	10.0	9.50–10.50
	19.1	18.42–19.69	3/4	0.725–0.775	6.50	6.18–6.83	12.0	11.40–12.60
	22.2	21.51–22.94	7/8	0.847–0.903	7.59	7.21–7.97	14.0	13.30–14.70
	25.4	24.61–26.19	1	0.969–1.031	8.67	8.24–9.11	16.0	15.20–16.80
F-2	3.2	2.87–3.48	1/8	0.113–0.137	1.08	1.03–1.14	2.0	1.90–2.10
	4.8	4.45–5.11	3/16	0.175–0.201	1.63	1.54–1.71	3.0	2.85–3.15
	6.4	5.99–6.71	1/4	0.236–0.264	2.17	2.06–2.28	4.0	3.80–4.20
	8.0	7.57–8.33	5/16	0.298–0.328	2.71	2.57–2.85	5.0	4.75–5.25
	9.5	9.12–9.93	3/8	0.359–0.391	3.25	3.09–3.41	6.0	5.70–6.30
	12.7	12.22–13.18	1/2	0.481–0.519	4.34	4.12–4.55	8.0	7.60–8.40
	15.9	15.32–16.43	5/8	0.603–0.647	5.42	5.15–5.69	10.0	9.50–10.50
	19.1	18.42–19.69	3/4	0.725–0.775	6.50	6.18–6.83	12.0	11.40–12.60
	22.2	21.51–22.94	7/8	0.847–0.903	7.59	7.21–7.97	14.0	13.30–14.70
	25.4	24.61–26.19	1	0.969–1.031	8.67	8.24–9.11	16.0	15.20–16.80
F-3[1]	3.2	2.87–3.48	1/8	0.113–0.137	1.07	0.98–1.14	1.97	1.80–2.10
	4.8	4.45–5.11	3/16	0.175–0.201	1.59	1.47–1.71	2.93	2.71–3.15
	6.4	5.99–6.71	1/4	0.236–0.264	2.11	1.96–2.27	3.90	3.61–4.19
	8.0	7.57–8.33	5/16	0.298–0.328	2.64	2.44–2.84	4.87	4.50–5.24
	9.5	9.12–9.93	3/8	0.359–0.391	3.17	2.93–3.41	5.85	5.41–6.29
	12.7	12.22–13.18	1/2	0.481–0.519	4.23	3.91–4.55	7.80	7.21–8.39
	15.9	15.32–16.43	5/8	0.603–0.647	5.28	4.88–5.69	9.75	9.01–10.49
	19.1	18.42–19.69	3/4	0.725–0.775	6.34	5.86–6.82	11.70	10.81–12.59
	22.2	21.51–22.94	7/8	0.847–0.903	7.40	6.83–7.96	13.65	12.61–14.69
	25.4	24.61–26.19	1	0.969–1.031	8.46	7.81–9.10	15.60	14.41–16.79
F-5	3.2	2.82–3.53	1/8	0.111–0.139	0.83	0.79–0.87	1.53	1.45–1.61
	4.8	4.37–5.18	3/16	0.172–0.204	1.24	1.18–1.31	2.29	2.17–2.41
	6.4	5.89–6.81	1/4	0.232–0.268	1.66	1.57–1.75	3.06	2.90–3.22
	8.0	7.44–8.46	5/16	0.293–0.333	2.07	1.96–2.18	3.82	3.62–4.02
	9.5	8.97–10.08	3/8	0.353–0.397	2.49	2.36–2.62	4.59	4.35–4.83
	12.7	12.04–13.36	1/2	0.474–0.526	3.32	3.14–3.49	6.12	5.80–6.44
	15.9	15.11–16.64	5/8	0.595–0.655	4.15	3.93–4.36	7.65	7.25–8.05
	19.1	18.19–19.91	3/4	0.716–0.784	4.98	4.72–5.24	9.18	8.70–9.66
	22.2	21.26–23.19	7/8	0.837–0.913	5.80	5.50–6.11	10.71	10.15–11.27
	25.4	24.33–26.47	1	0.958–1.042	6.63	6.29–6.98	12.24	11.60–12.88

TABLE 2—STANDARD MECHANICAL ROLL FELT SPECIFICATIONS (CONTINUED)

SAE No.	Thickness, mm Nominal	Thickness, mm Limits	Thickness, in Nominal	Thickness, in Limits	Mass, kg/m^2 Nominal	Mass, kg/m^2 Limits	Mass (Weight) lb/yd^2 Nominal	Mass (Weight) lb/yd^2 Limits
F-6	3.2	2.82–3.53	1/8	0.111–0.139	0.83	0.79–0.87	1.53	1.45–1.61
	4.8	4.37–5.18	3/16	0.172–0.204	1.24	1.18–1.31	2.29	2.17–2.41
	6.4	5.89–6.81	1.4	0.232–0.268	1.66	1.57–1.75	3.06	2.90–3.22
	8.0	7.44–8.46	5/16	0.293–0.333	2.07	1.96–2.18	3.82	3.62–4.02
	9.5	8.97–10.08	3/8	0.353–0.397	2.49	2.36–2.62	4.59	4.35–4.83
	12.7	12.04–13.36	1/2	0.474–0.526	3.32	3.14–3.49	6.12	5.80–644
	15.9	15.11–16.64	5/8	0.595–0.655	4.15	3.93–4.36	7.65	7.25–8.05
	19.1	18.19–19.91	3/4	0.716–0.784	4.98	4.72–5.24	9.18	8.70–9.66
	22.2	21.26–23.19	7/8	0.837–0.913	5.80	5.50–6.11	10.71	10.15–11.27
	25.4	24.33–26.47	1	0.958–1.042	6.63	6.29–6.98	12.24	11.60–12.88
F-7[(1)]	3.2	2.82–3.53	1/8	0.111–0.139	0.83	0.79–0.87	1.53	1.45–1.61
	4.8	4.37–5.18	3/16	0.172–0.204	1.24	1.18–1.31	2.29	2.17–2.41
	6.4	5.89–6.81	1/4	0.232–0.268	1.66	1.57–1.75	3.06	2.90–3.22
	8.0	7.44–8.46	5/16	0.293–0.333	2.07	1.96–2.18	3.82	3.62–4.02
	9.5	8.97–10.08	3/8	0.353–0.397	2.49	2.36–2.62	4.59	4.35–4.83
	12.7	12.04–13.36	1/2	0.474–0.526	3.32	3.14–3.49	6.12	5.80–6.44
	15.9	15.11–16.64	5/8	0.595–0.655	4.15	3.93–4.36	7.65	7.25–8.05
	19.1	18.19–19.91	3/4	0.716–0.784	4.98	4.72–5.24	9.18	8.70–9.66
	22.2	21.26–23.19	7/8	0.837–0.913	5.80	5.50–6.11	10.71	10.15–11.27
	25.4	24.33–26.47	1	0.958–1.042	6.63	6.29–6.98	12.24	11.60–12.88
F-10	3.2	2.67–3.68	1/8	0.105–0.145	0.57	0.53–0.62	1.06	0.96–1.14
	4.8	4.19–5.36	3/16	0.165–0.211	0.86	0.80–0.93	1.59	1.47–1.71
	6.4	5.69–7.01	1/4	0.224–0.276	1.15	1.06–1.24	2.12	1.96–2.28
	8.0	7.21–8.69	5/16	0.284–0.342	1.44	1.33–1.54	2.65	2.45–2.85
	9.5	8.71–10.34	3/8	0.343–0.407	1.72	1.59–1.85	3.18	2.94–3.42
	12.7	11.73–13.67	1/2	0.462–0.538	2.30	2.12–2.47	4.24	3.92–4.56
	15.9	14.76–16.99	5/8	0.581–0.669	2.87	2.66–3.09	5.30	4.90–5.70
	19.1	17.78–20.32	3/4	0.700–0.800	3.45	3.19–3.71	6.36	5.88–6.84
	22.2	20.80–23.65	7/8	0.819–0.931	4.02	3.72–4.33	7.42	6.86–7.98
	25.4	23.83–26.97	1	0.938–1.062	4.60	4.25–4.94	8.48	7.84–9.12
F-11	3.2	2.67–3.68	1/8	0.105–0.145	0.57	0.53–0.62	1.06	0.98–1.14
	4.8	4.19–5.36	3/16	0.165–0.211	0.86	0.80–0.93	1.59	1.47–1.71
	6.4	5.69–7.01	1/4	0.224–0.276	1.15	1.06–1.24	2.12	1.96–2.28
	8.0	7.21–8.69	5/16	0.284–0.342	1.44	1.33–1.54	2.65	2.45–2.85
	9.5	8.71–10.34	3/8	0.343–0.407	1.72	1.59–1.85	3.18	2.94–3.42
	12.7	11.73–13.67	1/2	0.462–0.538	2.30	2.12–2.47	4.24	3.92–4.56
	15.9	14.76–16.99	5/8	0.581–0.669	2.87	2.66–3.09	5.30	4.90–5.70
	19.1	17.78–20.32	3/4	0.700–0.800	3.45	3.19–3.71	6.36	5.88–6.84
	22.2	20.80–23.65	7/8	0.819–0.931	4.02	3.72–4.33	7.42	6.86–7.98
	25.4	23.83–26.97	1	0.938–1.062	4.60	4.25–4.94	8.48	7.84–9.12

TABLE 2—STANDARD MECHANICAL ROLL FELT SPECIFICATIONS (CONTINUED)

SAE No.	Thickness, mm Nominal	Thickness, mm Limits	Thickness, in Nominal	Thickness, in Limits	Mass, kg/m^2 Nominal	Mass, kg/m^2 Limits	Mass (Weight) lb/yd^2 Nominal	Mass (Weight) lb/yd^2 Limits
F-12	3.2	2.67–3.68	1/8	0.105–0.145	0.57	0.53–0.62	1.06	0.98–1.14
	4.8	4.19–5.36	3/16	0.165–0.211	0.86	0.80–0.93	1.59	1.47–1.71
	6.4	5.69–7.01	1/4	0.224–0.276	1.15	1.06–1.24	2.12	1.96–2.28
	8.0	7.21–8.69	5/16	0.284–0.342	1.44	1.33–1.54	2.65	2.45–2.85
	9.5	8.71–10.34	3/8	0.343–0.407	1.72	1.59–1.85	3.18	2.94–3.42
	12.7	11.73–13.67	1/2	0.462–0.538	2.30	2.12–2.47	4.24	3.92–4.56
	15.9	14.76–16.99	5/8	0.581–0.669	2.87	2.66–3.09	5.30	4.90–5.70
	19.1	17.78–20.32	3/4	0.700–0.800	3.45	3.19–3.71	6.36	5.88–6.84
	22.2	20.80–23.65	7/8	0.819–0.931	4.02	3.72–4.33	7.42	6.86–7.98
	25.4	23.83–26.97	1	0.938–1.062	4.60	4.25–4.94	8.48	7.84–9.12
F-13	3.2	2.67–3.68	1/8	0.105–0.145	0.57	0.53–0.62	1.06	0.98–1.14
	4.8	4.19–5.36	3/16	0.165–0.211	0.86	0.80–0.93	1.59	1.47–1.71
	6.4	5.69–7.01	1/4	0.224–0.276	1.15	1.06–1.24	2.12	1.96–2.28
	8.0	7.21–8.69	5/16	0.284–0.342	1.44	1.33–1.54	2.65	2.45–2.85
	9.5	8.71–10.34	3/8	0.343–0.407	1.72	1.59–1.85	3.18	2.94–3.42
	12.7	11.73–13.67	1/2	0.462–0.538	2.30	2.12–2.47	4.24	3.92–4.56
	15.9	14.76–16.99	5/8	0.581–0.669	2.87	2.66–3.09	5.30	4.90–5.70
	19.1	17.78–20.32	3/4	0.700–0.800	3.45	3.19–3.71	6.36	5.88–6.84
	22.2	20.80–23.65	7/8	0.819–0.931	4.02	3.72–4.33	7.42	6.86–7.98
	25.4	23.83–26.97	1	0.938–1.062	4.06	4.25–4.94	8.48	7.84–9.12
F-15	3.2	2.67–3.68	1/8	0.105–0.145	0.57	0.53–0.62	1.06	0.98–1.14
	4.8	4.19–5.36	3/16	0.165–0.211	0.86	0.80–0.93	1.59	1.47–1.71
	6.4	5.69–7.01	1/4	0.224–0.276	1.15	1.06–1.24	2.12	1.96–2.28
	8.0	7.21–8.69	5/16	0.284–0.342	1.44	1.33–1.54	2.65	2.45–2.85
	9.5	8.71–10.34	3/8	0.343–0.407	1.72	1.59–1.85	3.18	2.94–3.42
	12.7	11.73–13.67	1/2	0.462–0.538	2.30	2.12–2.47	4.24	3.92–4.56
	15.9	14.76–16.99	5/8	0.581–0.669	2.87	2.66–3.09	5.30	4.90–5.70
	19.1	17.78–20.32	3/4	0.700–0.800	3.45	3.19–3.71	6.36	5.88–6.84
	22.2	20.80–23.65	7/8	0.819–0.931	4.02	3.72–4.33	7.42	6.86–7.98
	25.4	23.83–26.97	1	0.938–1.062	4.60	4.25–4.94	8.48	7.84–9.12
F-26	3.2	2.16–4.19	1/8	0.085–0.165	0.49	0.44–0.54	0.90	0.81–0.99
	6.4	4.93–7.77	1/4	0.194–0.306	0.98	0.88–1.07	1.80	1.62–1.98
	9.5	7.70–11.35	3/8	0.303–0.447	1.46	1.32–1.61	2.70	2.43–2.97
	12.7	10.46–14.94	1/2	0.412–0.588	1.95	1.76–2.15	3.60	3.24–3.96
	19.1	16.00–22.10	3/4	0.630–0.870	2.93	2.63–3.22	5.40	4.86–5.94
	25.4	21.54–29.26	1	0.848–1.152	3.90	3.71–4.29	7.20	6.84–7.92
F-50	1.2	1.02–1.37	3/64	0.040–0.054	0.41	0.39–0.43	0.750	0.712–0.788
	1.6	1.42–1.78	1/16	0.056–0.070	0.53	0.51–0.55	0.975	0.937–1.013
	2.0	1.80–2.16	5/64	0.071–0.085	0.65	0.63–0.67	1.200	1.162–1.238
	2.4	2.21–2.57	3/32	0.087–0.101	0.77	0.75–0.79	1.425	1.387–1.463
F-51	1.2	1.02–1.37	3/64	0.040–0.054	0.41	0.39–0.43	0.750	0.712–0.788
	1.6	1.42–1.78	1/16	0.056–0.070	0.53	0.51–0.55	0.975	0.937–1.013
	2.0	1.80–2.16	5/64	0.071–0.085	0.65	0.63–0.67	1.200	1.162–1.238
	2.4	2.21–2.57	3/32	0.087–0.101	0.77	0.75–0.79	1.425	1.387–1.463

TABLE 2—STANDARD MECHANICAL ROLL FELT SPECIFICATIONS (CONTINUED)

SAE No.	Thickness, mm Nominal	Thickness, mm Limits	Thickness, in Nominal	Thickness, in Limits	Mass, kg/m^2 Nominal	Mass, kg/m^2 Limits	Mass (Weight) lb/yd^2 Nominal	Mass (Weight) lb/yd^2 Limits
F-55	1.6	1.42–1.78	1/16	0.056–0.070	0.41	0.39–0.43	0.750	0.712–0.788
	2.4	2.21–2.57	3/32	0.087–0.101	0.61	0.59–0.63	1.125	1.087–1.163

1. For thicknesses less than 3.2 mm (1/8 in) for SAE F-1, see SAE F-50; F-3, see SAE F-51; and F-7, see SAE F-55.

PREPARED BY THE SAE TEXTILE AND FLEXIBLE PLASTICS COMMITTEE