



## Standard Specification for Wool Felt<sup>1</sup>

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 reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

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

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.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 123 Terminology Relating to Textiles<sup>2</sup>

D 461 Test Methods for Felt<sup>2</sup>

#### 2.2 Federal Standard:

C-F-206, Felt Sheet: Cloth Felt, Wool, Pressed<sup>3</sup>

#### 2.3 Felt Manufacturers Council:

FS14-68/71 Wool Felt Standard Specifications<sup>4</sup>

#### 2.4 SAE Standard:

J314b Felts-Wool and Part Wool<sup>5</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *black felt, n*—those classifications of felt manufactured to various shades of the color black.

3.1.2 *felt, n*—a textile structure characterized by interlocking and consolidation of its constituent fibers achieved by the interaction of a suitable combination of mechanical energy, chemical action, moisture, and heat but without the use of weaving, knitting, stitching, thermal bonding, or adhesives.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.13 on Wool and Wool Felt.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

<sup>4</sup> Available from the Northern Textile Association, 230 Congress Street, Boston, MA 02110.

<sup>5</sup> Available from the Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, NY 10001.

3.1.2.1 *Discussion*—In practice, light needling or tacking may be used to supplement the ability of the fibers to interlock and consolidate.

3.1.3 *gray felt, n*—a blend of white fibers with naturally colored or dyed fibers or both and that has an overall gray appearance.

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

3.1.5 *orthopedic and surgical felt, n*—a white, soft, low density, highly resilient felt.

3.1.5.1 *Discussion*—Such felts are commonly used in splint pads, abdominal supports, orthopedic devices, and fracture cast linings as well as other medical applications.

3.1.6 *papermaker's felt, n*—a fabric, made from wool or man-made fibers or mixtures of both, fabricated as an endless belt for use on a paper making machine. (See also *felt* and *needled felt*.)

3.1.6.1 *Discussion*—Papermaker's felt received its name because it replaced the sheets of felt used in squeezing the water from newly formed, manually made sheets of paper. Some finished papermaker's felts have matted surfaces similar to wool felts.

3.1.7 *part wool felt, n*—a felt composed of any one of or a combination of new and recycled wool fibers mixed with one or more man-made fibers, vegetable fibers, or animal fibers other than wool.

3.1.8 *recycled wool, n*— as defined in the *Wool Products Labeling Act of 1939 as amended in 1980*,<sup>6</sup> "the resulting fiber when wool has been woven or felted into a wool product which, without ever having been utilized in any way by the ultimate consumer, subsequently has been made into a fibrous state, or the resulting fiber when wool or reprocessed wool has been spun, woven, knitted or felted into a wool product which, after having been used in any way by the ultimate consumer, subsequently has been made into a fibrous state."

3.1.8.1 *Discussion*—In the amended Act of 1980, the term "recycled wool" replaced the terms "reprocessed wool" and "reused wool."

3.1.9 *specialty felt, n*—one of a number of special purpose felt structures available for, but not limited to, a specific end-use application.

<sup>6</sup> Act of Congress, "Wool Products Labeling Act of 1939," 76th Congress, Third Session, approved October 14, 1939, the amended Act of 1980.

3.1.9.1 *Discussion*—Orthopedic and surgical felts are examples of specialty felts. Additional information on these types is available in NTA Specifications FS14-68/71.

3.1.10 *specific gravity, n—of felt*, the relative mass per unit volume of felt expressed as a percentage of the mass per unit volume of water.

3.1.11 *supported needled felt, n*—a needled felt that is composed entirely of fibers physically interlocked and reoriented in combination with interlay, scrim, or foundation of knitted, stitched, bonded, or extruded structure.

3.1.12 *unsupported needled felt, n*—a needled felt that is composed entirely of fibers physically interlocked and reoriented with, and of themselves without an interlay, scrim, or foundation of knitted, stitched, bonded, or extruded structure.

3.1.13 *white wool, n*—wool having shade variations from true white to creamy white but free of pigmented, dyed, or otherwise colored wools.

3.1.13.1 *Discussion*—The shade variations in white wool can be caused by range conditions including forage, soil, rain, or lack thereof as well as the health of the animal.

3.1.14 *wool, n*—the fibrous covering of the sheep, *Ovis* species.

3.1.15 *wool, n—as defined in the Wool Products Labeling Act of 1939*, “the fiber from the fleece of sheep or lamb, or hair of the Angora goat or Cashmere goat (and may include the so called specialty fibers from the hair of the camel, alpaca, llama, and vicuna) which has never been reclaimed from any woven or felted wool product.”

3.1.15.1 *Discussion*—For the purpose of this standard, the term “wool” includes both wool as defined in the Wool Products Labeling Act of 1939 as well as recycled wool as defined in the amended Act of 1980.

3.1.16 *wool content, n*—the quantity of new and recycled wool, as defined in the Wool Products Labeling Act, which is determined by chemical analysis.

3.1.16.1 *Discussion*—Felt 34R1, as an example, which theoretically is made from 100 % wool fiber, may contain incidental amounts of other natural or man-made fibers, residual wool fats and oils, and processing soaps which may reduce the actual wool content on the chemical analysis basis to 95 %.

3.1.17 *wool felt, n*—a felt composed wholly of any one of or a combination of new or recycled wool fibers.

3.1.18 For definitions of other textile terms, refer to Terminology D 123.

## 4. Types of Felts

### 4.1 ASTM Classification:

4.1.1 The ASTM Classification number in Tables 1-3 is the percent specific gravity of that class. It 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).

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**TABLE 1 Wool Roll and Sheet Felt Corresponding Classifications—Properties and General Description**

| ASTM (NTA) Classification <sup>A</sup> | Corresponding Classifications |                    | Compo- sition                      | Chemical Requirements               |                     |  |            | Physical Requirements  |      |                       |               | Color           | General Description |            |                            |           |
|--|-------------------------------|--------------------|------------------------------------|-------------------------------------|---------------------|--|------------|------------------------|------|-----------------------|---------------|-----------------|---------------------|------------|----------------------------|-----------|
|  | SAE J314b                     | Fed. Spec. C-F-206 | Wool Content Chemical Basis, min % | 1,1,1-Trichloroethane Extract, max% | Water Extract max % | 1,1,1-Trichloroethane and Water Extract, max % | Ash, max % | Min. Tensile Strength, |      | Min. Split Resistance |               |                 | Normal Width        |            | Thickness: Available Range |           |
|  |                               |                    |                                    |                                     |                     |  |            | psi                    | kPa  | lbf/2 in. width       | N/50 mm width |                 | in.                 | cm         | in.                        | mm        |
| 14R1                                   | ...                           | ...                | 40                                 | 2.5                                 | 2.5                 | 3.0  | 2.5        | ...                    | ...  | ...                   | ...           | white           | 72                  | 183        | 0.125–0.500                | 3.17–12.7 |
| 17R1                                   | ...                           | ...                | 45                                 | 2.5                                 | 2.5                 | 3.0  | 2.5        | ...                    | ...  | ...                   | ...           | white           | 72                  | 183        | 0.125–1.000                | 3.17–25.4 |
| 17R2                                   | F26                           | 8R5                | 45                                 | 8.0                                 | 6.0                 | 14.0   | 5.0        | ...                    | ...  | ...                   | ...           | gray            | 72                  | 183        | 0.125–1.000                | 3.17–25.4 |
| 18R1                                   | F10                           | 9R1                | 95                                 | 2.5                                 | 2.5                 | 3.0  | 2.5        | 225                    | 1551 | 8                     | 35            | white           | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 18R2                                   | F11                           | 9R2                | 87                                 | 3.0                                 | 2.5                 | 4.5  | 3.0        | 200                    | 1379 | 6                     | 26            | gray            | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 18R3                                   | F12                           | 9R3                | 85                                 | 4.0                                 | 2.5                 | 6.5  | 3.5        | 100                    | 690  | 3                     | 13            | gray            | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 18R4                                   | F13                           | 9R4                | 75                                 | 4.0                                 | 4.0                 | 8.0  | 3.5        | 75                     | 517  | 2                     | 9             | gray            | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 18R5                                   | F15                           | 9R5                | 55                                 | 4.0                                 | 5.0                 | 9.0  | 4.0        | 75                     | 517  | 2                     | 9             | gray            | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 26R1                                   | F5                            | 12R1               | 95                                 | 2.5                                 | 2.5                 | 3.0  | 2.0        | 400                    | 2758 | 18                    | 79            | white           | 60                  | 152        | 0.063–1.000                | 1.60–25.4 |
| 26R2                                   | F6                            | 12R2               | 87                                 | 2.5                                 | 2.5                 | 4.5  | 2.5        | 275                    | 1896 | 16                    | 71            | gray            | 60 or 72            | 152 or 183 | 0.063–1.000                | 1.60–25.4 |
| 26R3                                   | F7                            | 12R3               | 80                                 | 3.0                                 | 4.0                 | 7.0  | 3.0        | 250                    | 1724 | 12                    | 53            | gray            | 72                  | 183        | 0.063–1.000                | 1.60–25.4 |
| 26R3X                                  | F55                           | 12R3X              | 75                                 | 4.0                                 | 4.0                 | 8.0  | 3.0        | 200                    | 1379 | ...                   | ...           | gray            | 60 or 72            | 152 or 183 | 0.063–0.094                | 1.60–2.39 |
| 34R1                                   | F1                            | 16R1               | 95                                 | 2.5                                 | 2.5                 | 3.0  | 1.5        | 500                    | 3448 | 33                    | 147           | white           | 60                  | 152        | 0.125–1.000                | 3.17–25.4 |
| 34R1X                                  | F50                           | 16R1X              | 95                                 | 2.5                                 | 2.5                 | 3.0  | 1.5        | 500                    | 3448 | ...                   | ...           | white           | 60                  | 152        | 0.047–0.092                | 1.19–2.39 |
| 34R2                                   | F2                            | 16R2               | 90                                 | 2.5                                 | 2.5                 | 4.0  | 2.0        | 500                    | 3448 | 28                    | 124           | not blk or gray | 60                  | 152        | 0.047–1.000                | 1.19–25.4 |
| 34R3                                   | F3                            | 16R3               | 85                                 | 2.5                                 | 3.0                 | 4.5  | 2.5        | 400                    | 2758 | 22                    | 97            | gray            | 60                  | 152        | 0.125–1.000                | 3.17–25.4 |
| 34R3X                                  | F51                           | 16R3X              | 92                                 | 2.5                                 | 2.5                 | 4.5  | 2.5        | 300                    | 2069 | ...                   | ...           | gray            | 60 or 72            | 152 or 183 | 0.047–0.094                | 1.19–2.39 |
| 38R1                                   | ...                           | 18R1               | 95                                 | 2.5                                 | 2.5                 | 3.0  | 1.5        | 600                    | 4137 | 35                    | 154           | white           | 60                  | 152        | 0.125–0.500                | 3.17–12.7 |
| 38R2                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 3.0  | 2.5        | 550                    | 3792 | 30                    | 132           | gray            | 60                  | 152        | 0.125–0.500                | 3.17–12.7 |
| 26S1                                   | ...                           | 12S1               | 95                                 | 2.0                                 | 2.0                 | 3.0  | 1.5        | 400                    | 2758 | 18                    | 79            | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 26S4                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 4.0  | 2.0        | 300                    | 2069 | 16                    | 71            | gray            | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 34S1                                   | ...                           | 16S1               | 95                                 | 2.0                                 | 2.0                 | 3.0  | 1.5        | 500                    | 3448 | 32                    | 141           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 34S2                                   | ...                           | 16S3               | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 28                    | 124           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 34S3                                   | ...                           | 16S4               | 95                                 | 2.5                                 | 2.5                 | 4.0  | 2.5        | 300                    | 2069 | 20                    | 89            | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 34S4                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 22                    | 97            | gray            | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 43S1                                   | ...                           | 20S1               | 95                                 | 2.0                                 | 2.0                 | 3.0  | 1.5        | 500                    | 3448 | 44                    | 196           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 43S2                                   | ...                           | 20S3               | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 40                    | 178           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 43S3                                   | ...                           | 20S4               | 95                                 | 2.5                                 | 2.5                 | 4.0  | 2.5        | 300                    | 2069 | 32                    | 142           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 43S4                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 36                    | 160           | gray            | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 56S1                                   | ...                           | 26S1               | 95                                 | 2.0                                 | 2.0                 | 3.0  | 1.5        | 600                    | 4137 | 48                    | 212           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 56S2                                   | ...                           | 26S3               | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 500                    | 3448 | 46                    | 205           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 56S3                                   | ...                           | 26S4               | 95                                 | 2.5                                 | 2.5                 | 4.0  | 2.5        | 400                    | 2758 | 36                    | 160           | white           | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 56S4                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 40                    | 178           | gray            | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 68S1                                   | ...                           | 32S1               | 95                                 | 2.0                                 | 2.0                 | 3.0  | 1.5        | 600                    | 4137 | 50                    | 222           | white           | 36                  | 91         | 0.125–2.500                | 3.17–63.5 |
| 68S2                                   | ...                           | 32S3               | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 500                    | 3448 | 48                    | 212           | natural         | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 68S3                                   | ...                           | 32S4               | 95                                 | 2.5                                 | 2.5                 | 4.0  | 2.5        | 400                    | 2758 | 40                    | 178           | natural         | 36                  | 91         | 0.125–3.000                | 3.17–76.2 |
| 68S4                                   | ...                           | ...                | 95                                 | 2.5                                 | 2.5                 | 3.5  | 2.0        | 400                    | 2758 | 46                    | 205           | gray            | 36                  | 91         | 0.125–2.500                | 3.17–63.5 |

<sup>A</sup> NTA refers to Northern Textile Association.

**TABLE 2 Wool Roll Felt Thicknesses and Weights**

NOTE 1—The F-50, F-51, and F-55 classifications are available in limited thickness ranges. See Table 1.

| ASTM<br>(NTA)<br>Classifi-<br>cation | SAE<br>J314b | Fed. Spec.<br>C-F-206 | Color                | Trade Designa-<br>tion                   | Thickness Tolerances |            |            |         |             |          | Mass (Weight) Per Unit Area |                   |      |        |
|--------------------------------------|--------------|-----------------------|----------------------|--|----------------------|------------|------------|---------|-------------|----------|-----------------------------|-------------------|------|--------|
|                                      |              |                       |                      |  | Nominal              | Inches     |            | Nominal | Millimetres |          | Nominal Tolerances          |                   |      |        |
|                                      |              |                       |                      |  |                      | Roll       | Cutparts   |         | Roll        | Cutparts | lb/yd <sup>2</sup>          | kg/m <sup>2</sup> |      |        |
| 14R1                                 | ...          | ...                   | White                | Soft Pad                                 | 0.125                | ±<br>0.040 | ±<br>0.048 | 3.18    | ± 1.02      | ± 1.22   | 0.83                        | ± 0.10            | 0.45 | ± 0.05 |
|                                      |              |                       |                      |  | 0.250                | 0.056      | 0.064      | 6.35    | 1.42        | 1.63     | 1.65                        | 0.20              | 0.90 | 0.11   |
|                                      |              |                       |                      |  | 0.375                | 0.072      | 0.082      | 9.53    | 1.83        | 2.08     | 2.48                        | 0.30              | 1.35 | 0.16   |
|                                      |              |                       |                      |  | 0.500                | 0.088      | 0.098      | 12.70   | 2.24        | 2.49     | 3.30                        | 0.40              | 1.79 | 0.22   |
| 17R1                                 | ...          | ...                   | White                | Soft Pad                                 | 0.125                | 0.040      | 0.044      | 3.18    | 1.02        | 1.12     | 0.9                         | 0.09              | 0.49 | 0.05   |
| 17R2                                 | F-26         | 8R5                   | Gray                 |  | 0.250                | 0.056      | 0.062      | 6.35    | 1.42        | 1.58     | 1.8                         | 0.18              | 0.98 | 0.10   |
|                                      |              |                       |                      |  | 0.375                | 0.072      | 0.079      | 9.53    | 1.83        | 2.01     | 2.7                         | 0.27              | 1.47 | 0.15   |
|                                      |              |                       |                      |  | 0.500                | 0.088      | 0.098      | 12.70   | 2.24        | 2.49     | 3.6                         | 0.36              | 1.95 | 0.20   |
|                                      |              |                       |                      |  | 0.750                | 0.120      | 0.135      | 19.05   | 3.05        | 3.43     | 5.4                         | 0.54              | 2.93 | 0.29   |
|                                      |              |                       |                      |  | 1.000                | 0.152      | 0.170      | 25.40   | 3.86        | 4.32     | 7.2                         | 0.72              | 3.91 | 0.39   |
| 18R1                                 | F-10         | 9R1                   | White                | Firm Pad                                 | 0.125                | 0.020      | 0.023      | 3.18    | 0.51        | 0.58     | 1.06                        | 0.08              | 0.58 | 0.04   |
| 18R2                                 | F-11         | 9R2                   | Gray                 | Firm Pad                                 | 0.188                | 0.023      | 0.026      | 4.78    | 0.58        | 0.66     | 1.59                        | 0.12              | 0.86 | 0.07   |
| 18R3                                 | F-12         | 9R3                   | Gray                 | Firm Pad                                 | 0.250                | 0.026      | 0.031      | 6.35    | 0.66        | 0.79     | 2.12                        | 0.16              | 1.15 | 0.09   |
| 18R4                                 | F-13         | 9R4                   | Gray                 | Firm Pad                                 | 0.313                | 0.029      | 0.033      | 7.95    | 0.74        | 0.84     | 2.65                        | 0.20              | 1.44 | 0.11   |
| 18R5                                 | F-15         | 9R5                   | Gray                 | Firm Pad                                 | 0.375                | 0.032      | 0.036      | 9.53    | 0.81        | 0.91     | 3.18                        | 0.24              | 1.73 | 0.13   |
|                                      |              |                       |                      |  | 0.500                | 0.038      | 0.044      | 12.70   | 0.97        | 1.12     | 4.24                        | 0.32              | 2.31 | 0.18   |
|                                      |              |                       |                      |  | 0.625                | 0.044      | 0.050      | 15.88   | 1.12        | 1.27     | 5.30                        | 0.40              | 2.89 | 0.22   |
|                                      |              |                       |                      |  | 0.750                | 0.050      | 0.060      | 19.05   | 1.27        | 1.52     | 6.36                        | 0.48              | 3.46 | 0.26   |
|                                      |              |                       |                      |  | 0.875                | 0.056      | 0.065      | 22.23   | 1.42        | 1.65     | 7.42                        | 0.56              | 4.03 | 0.30   |
|                                      |              |                       |                      |  | 1.000                | 0.062      | 0.070      | 25.40   | 1.58        | 1.78     | 8.48                        | 0.64              | 4.62 | 0.35   |
| 26R1                                 | F-5          | 12R1                  | White                | Ex Firm Pad                              | 0.063                | 0.007      | 0.012      | 1.60    | 0.18        | 0.31     | 0.75                        | 0.04              | 0.41 | 0.02   |
| 26R2                                 | F-6          | 12R2                  | Gray                 | Ex Firm Pad                              | 0.094                | 0.007      | 0.012      | 2.39    | 0.18        | 0.31     | 1.12                        | 0.05              | 0.61 | 0.03   |
| 26R3                                 | F-7          | 12R3                  | Gray                 | Ex Firm Pad &<br>Gray or Black<br>Lining | 0.125                | 0.014      | 0.016      | 3.18    | 0.36        | 0.41     | 1.53                        | 0.08              | 0.83 | 0.04   |
|                                      |              |                       |                      |  | 0.188                | 0.016      | 0.018      | 4.78    | 0.41        | 0.46     | 2.29                        | 0.12              | 1.24 | 0.07   |
| 26R3X                                | F-55         | 12R3X                 | ...                  |  | 0.250                | 0.018      | 0.020      | 6.35    | 0.46        | 0.51     | 3.06                        | 0.16              | 1.66 | 0.09   |
|                                      |              |                       |                      |  | 0.313                | 0.020      | 0.022      | 7.95    | 0.51        | 0.56     | 3.82                        | 0.20              | 2.07 | 0.11   |
|                                      |              |                       |                      |  | 0.375                | 0.022      | 0.025      | 9.53    | 0.56        | 0.64     | 4.59                        | 0.24              | 2.49 | 0.13   |
|                                      |              |                       |                      |  | 0.500                | 0.026      | 0.029      | 12.70   | 0.66        | 0.74     | 6.12                        | 0.32              | 3.32 | 0.18   |
|                                      |              |                       |                      |  | 0.625                | 0.030      | 0.033      | 15.88   | 0.76        | 0.84     | 7.65                        | 0.40              | 4.15 | 0.22   |
|                                      |              |                       |                      |  | 0.750                | 0.034      | 0.038      | 19.05   | 0.86        | 0.97     | 9.18                        | 0.48              | 4.98 | 0.26   |
|                                      |              |                       |                      |  | 0.875                | 0.038      | 0.042      | 22.23   | 0.97        | 1.07     | 10.71                       | 0.56              | 5.82 | 0.30   |
|                                      |              |                       |                      |  | 1.000                | 0.042      | 0.046      | 25.40   | 1.07        | 1.17     | 12.24                       | 0.64              | 6.65 | 0.35   |
| 34R1                                 | F-1          | 16R1                  | White                | Backcheck &<br>Ball Bearing              | 0.047                | 0.007      | 0.010      | 1.19    | 0.18        | 0.25     | 0.75                        | 0.04              | 0.41 | 0.02   |
| 34R1X                                | F-50         | 16R1X                 | White                |  | 0.063                | 0.007      | 0.010      | 1.60    | 0.18        | 0.25     | 0.98                        | 0.04              | 0.53 | 0.02   |
| 34R2                                 | F-2          | 16R2                  | Not Black<br>or Gray | Backcheck                                | 0.078                | 0.007      | 0.010      | 1.98    | 0.18        | 0.25     | 1.20                        | 0.04              | 0.65 | 0.02   |
|                                      |              |                       |                      |  | 0.094                | 0.007      | 0.011      | 2.39    | 0.18        | 0.28     | 1.43                        | 0.04              | 0.78 | 0.02   |
| 34R3                                 | F-3          | 16R3                  | Gray                 | Backcheck &<br>Ball Bearing              | 0.125                | 0.012      | 0.015      | 3.18    | 0.31        | 0.38     | 2.00                        | 0.10              | 1.09 | 0.05   |
| 34R3X                                | F-51         | 16R3X                 | Gray                 |  | 0.188                | 0.013      | 0.017      | 4.78    | 0.33        | 0.43     | 3.00                        | 0.15              | 1.63 | 0.08   |
|                                      |              |                       |                      |  | 0.250                | 0.014      | 0.020      | 6.35    | 0.36        | 0.51     | 4.00                        | 0.20              | 2.17 | 0.11   |
|                                      |              |                       |                      |  | 0.313                | 0.015      | 0.021      | 7.95    | 0.38        | 0.53     | 5.00                        | 0.25              | 2.72 | 0.14   |
|                                      |              |                       |                      |  | 0.375                | 0.016      | 0.023      | 9.53    | 0.41        | 0.58     | 6.00                        | 0.30              | 3.26 | 0.16   |
|                                      |              |                       |                      |  | 0.500                | 0.019      | 0.025      | 12.70   | 0.48        | 0.64     | 8.00                        | 0.40              | 4.34 | 0.22   |
|                                      |              |                       |                      |  | 0.625                | 0.022      | 0.027      | 15.88   | 0.56        | 0.69     | 10.00                       | 0.50              | 5.43 | 0.27   |
|                                      |              |                       |                      |  | 0.750                | 0.025      | 0.030      | 19.05   | 0.64        | 0.76     | 12.00                       | 0.60              | 6.52 | 0.33   |
|                                      |              |                       |                      |  | 0.875                | 0.028      | 0.035      | 22.23   | 0.71        | 0.89     | 14.00                       | 0.70              | 7.60 | 0.38   |
|                                      |              |                       |                      |  | 1.000                | 0.031      | 0.040      | 25.40   | 0.79        | 1.02     | 16.00                       | 0.80              | 8.69 | 0.43   |
| 38R1                                 | ...          | 18R1                  | White                | Laundry                                  | 0.125                | 0.012      | 0.015      | 3.18    | 0.31        | 0.38     | 2.25                        | 0.10              | 1.22 | 0.05   |
| 38R2                                 | ...          | ...                   | Gray                 |  | 0.188                | 0.013      | 0.017      | 4.78    | 0.33        | 0.43     | 3.38                        | 0.15              | 1.84 | 0.08   |
|                                      |              |                       |                      |  | 0.250                | 0.014      | 0.020      | 6.35    | 0.36        | 0.51     | 4.50                        | 0.20              | 2.44 | 0.11   |
|                                      |              |                       |                      |  | 0.313                | 0.015      | 0.021      | 7.95    | 0.38        | 0.53     | 5.63                        | 0.25              | 3.06 | 0.14   |
|                                      |              |                       |                      |  | 0.375                | 0.016      | 0.023      | 9.53    | 0.41        | 0.58     | 6.75                        | 0.30              | 3.67 | 0.16   |
|                                      |              |                       |                      |  | 0.500                | 0.019      | 0.025      | 12.70   | 0.48        | 0.64     | 9.00                        | 0.40              | 4.89 | 0.22   |

**TABLE 3 Wool Sheet Felt: Thickness and Mass (Weight)**

| ASTM (NTA)<br>Class | Color | Thickness, in. |            |           | Thickness, mm |            |           | Mass (Weight) lb/yd <sup>2</sup> |            | Mass (Weight) kg/m <sup>2</sup> |            |
|---------------------|-------|----------------|------------|-----------|---------------|------------|-----------|----------------------------------|------------|---------------------------------|------------|
|                     |       | 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       |