Standards for Surgical Gowns and Isolation Gowns and Their Medical Applications:

Physical Property Testing

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My experience
## Physical Property Tests for Gowns

<table>
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<tr>
<th>Property</th>
<th>Test Method</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>Tensile Strength</td>
<td>D5034 (Grab Tensile)</td>
<td>( \geq 30 \text{ N (7 lbf)} )</td>
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<tr>
<td>Tear Strength:</td>
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<tr>
<td>- Wovens</td>
<td>D5587 (Trap Tear)</td>
<td>( \geq 10 \text{ N (2.3 lbf)} )</td>
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<tr>
<td>- Nonwovens</td>
<td>D5733 (Trap Tear)</td>
<td>( \geq 10 \text{ N (2.3 lbf)} )</td>
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<tr>
<td>Seam Strength:</td>
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<tr>
<td>- Woven/nonwoven</td>
<td>D1683 (Grab Tensile)</td>
<td>( \geq 30 \text{ N (7 lbf)} )</td>
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<tr>
<td>- Stretch woven/knitted</td>
<td>D751 (Bursting Strength)</td>
<td>( \geq 30 \text{ N (7 lbf)} )</td>
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D5733 is withdrawn
D751 is a compendium of 23 test methods for coated fabrics
Tear and Tensile are DIRECTIONAL

- **Machine Direction, Warp, MD**: Yarns oriented in the long direction of a roll of fabric
- **Cross Direction, Fill, CD or XMD**: Yarns oriented across the roll of fabric (edge to edge)

Tests must be conducted in BOTH directions – both must be in compliance
Diagonal sampling technique

Avoid edges (10% of width)

Cross direction (fill)

Machine Direction
ASTM D5034

- Sample wider than jaws
- 100 mm wide
- 150 mm long
- Initial jaw gap 75 mm
- 300 mm/min jaw speed
Grab Tensile D5034

JAW DIMENSIONS:
FRONT FACE:  25mm x 25mm
BACK FACE:   25mm x 50mm or more

(Alternate:  50x25 front, 50x50 back)

Location of expected break
- Tension will increase, terminate at maximum
- Acceptance based on average of all specimens in each direction
Breaks near jaws are not unusual
- Do not discard unless damage to specimen or clear tearing by jaw edge
- Pad jaws if necessary or go to alternate jaw size
- ASTM D751 Grab Tensile is substantively equivalent
Trapezoid Tear – ASTM D5587

- “In plane” force applied to a tear in the fabric (woven)
- D5733 for nonwovens is equivalent
Trapezoid Tear – ASTM D5587

- 15 mm cut
- 100 mm trapezoid base
- 75 mm
- Jaw alignment lines

150 mm
Trapezoid Tear – ASTM D5587

- Test 5 samples in each direction (diagonal sampling if possible)
- Jaws 50mm x 75 mm
- Jaw gap 25 mm (highest tension at the cut)
- Jaw speed 300 mm/min
Trapezoid Tear – ASTM D5587

Option 1: Average of 5 highest peaks

Average the 5 samples in each direction for acceptance
Seam Strength – ASTM D1683

- Meant to determine sewn seam efficiency, slippage
- For gown standards, used for woven fabrics
- For heat sealed/ultrasonic/glued seams, it is equivalent to ASTM D5034 Grab Tensile
  - Place seam in the middle of jaw separation area, perpendicular to force application
  - Seam should be as strong as the fabric itself
ASTM D751 Bursting Strength

- For gown standards, used for knitted and high stretch wovens
- Ball Burst Method (Procedure A) is specified
ASTM D751 Bursting Strength

45 mm (1.75 in) diameter hole
ASTM D751 Bursting Strength
ASTM D751 Bursting Strength

Place seam centered in hole

300 mm/min speed

There should be no slippage during test

Break at maximum
Thank you!

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