

# 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

Property	Test Method	Requirement
Tensile Strength	D5034 (Grab Tensile)	$\geq 30$ N (7 lbf)
Tear Strength:		
- Wovens	D5587 (Trap Tear)	$\geq 10$ N (2.3 lbf)
- Nonwovens	D5733 (Trap Tear)	$\geq 10$ N (2.3 lbf)
Seam Strength:		
- Woven/nonwoven	D1683 (Grab Tensile)	$\geq 30$ N (7 lbf)
- Stretch woven/ knitted	D751 (Bursting Strength)	$\geq 30$ N (7 lbf)

D5733 is withdrawn

D751 is a compendium of 23 test methods for coated fabrics



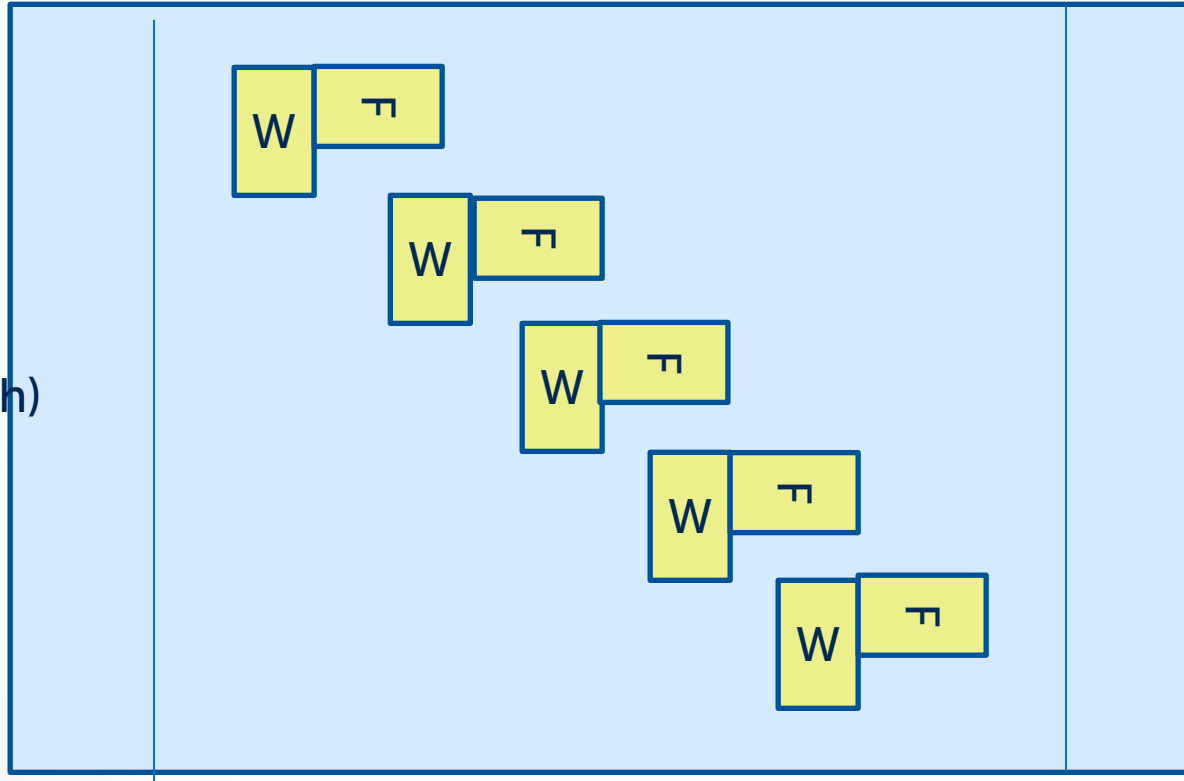
# Cutting samples

- ❖ **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

← Cross direction (fill) →



Avoid edges  
(10% of width)

Machine  
Direction



# Grab Tensile – ASTM D5034

## ▀ 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

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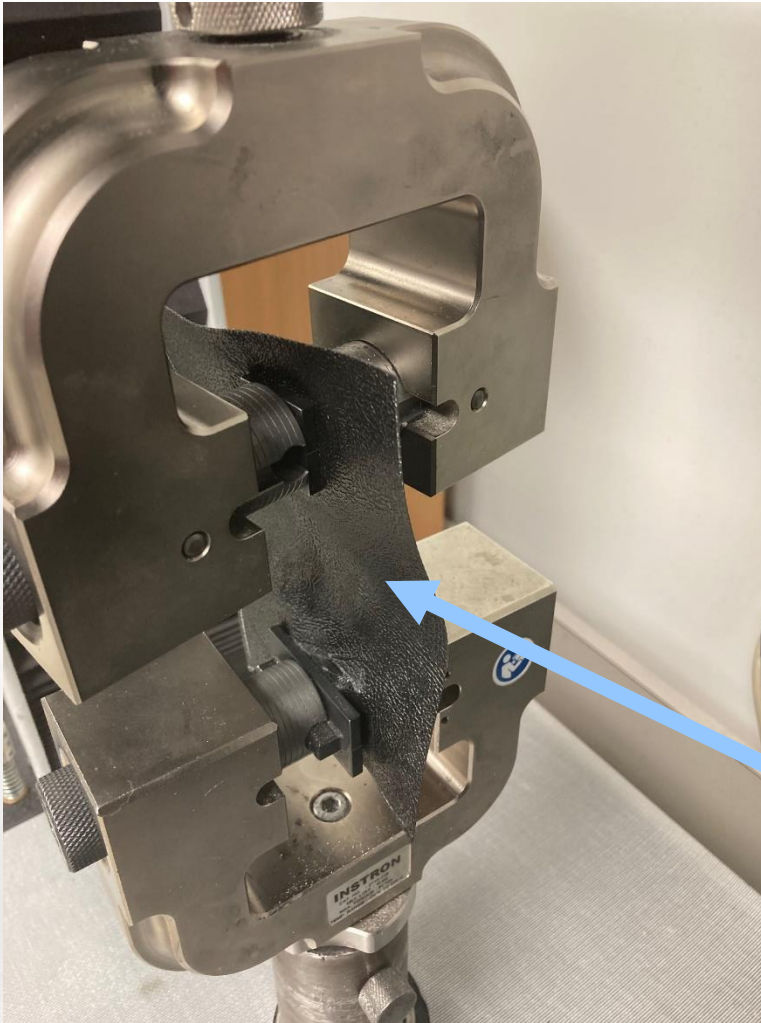
JAW DIMENSIONS:

FRONT FACE: 25mm x 25mm

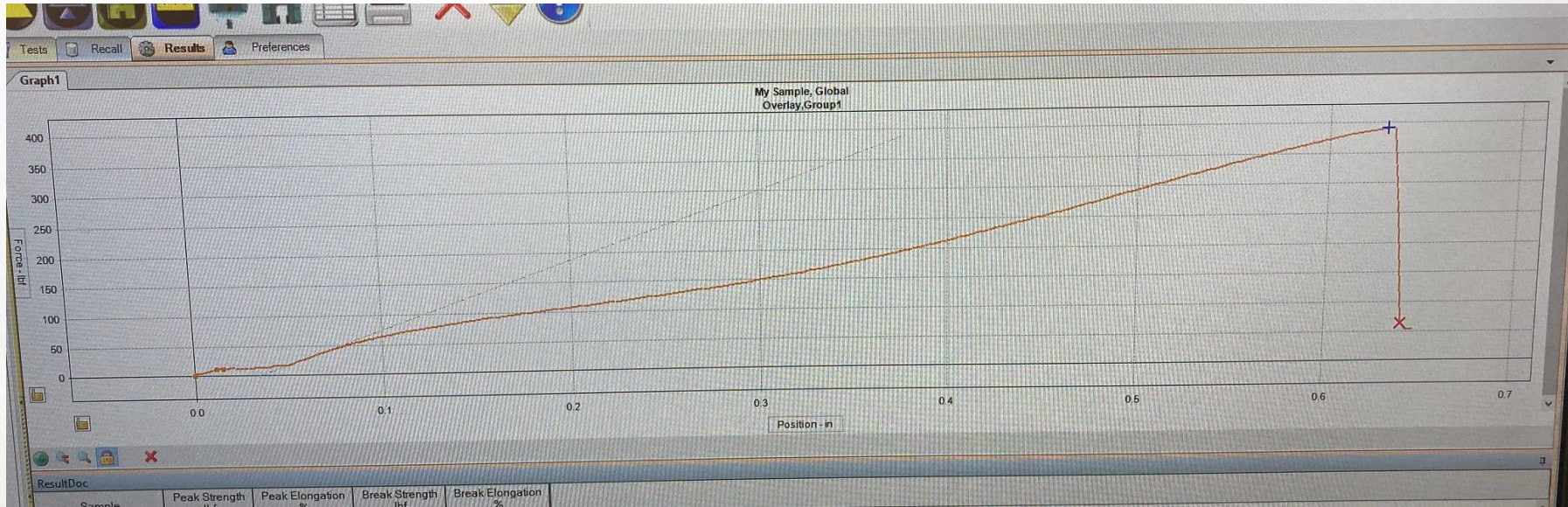
BACK FACE: 25mm x 50mm or more

(Alternate: 50x25 front, 50x50 back)

Location of expected break



# Grab Tensile D5034



- ❖ Tension will increase, terminate at maximum
- ❖ Acceptance based on average of all specimens in each direction





# Grab Tensile D5034

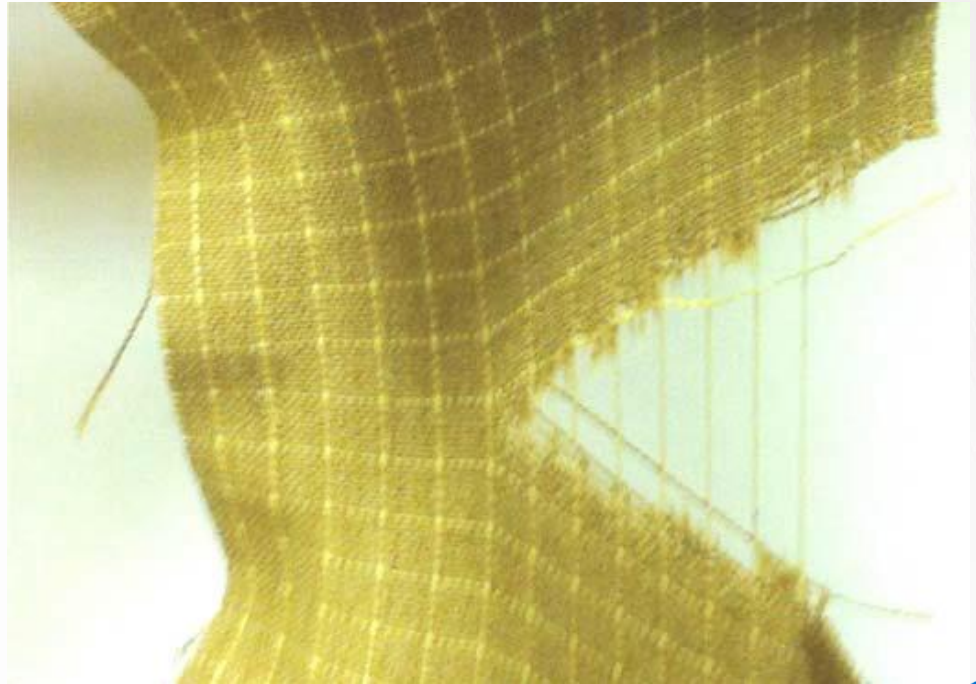
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- ▣ Breaks near jaws are not unusual
  - ▣ Do not discard unless damage to specimen or clear tearing by jaw edge
  - ▣ Pad jaws if necessary or go to alternate jaw size
- ▣ ASTM D751 Grab Tensile is substantively equivalent

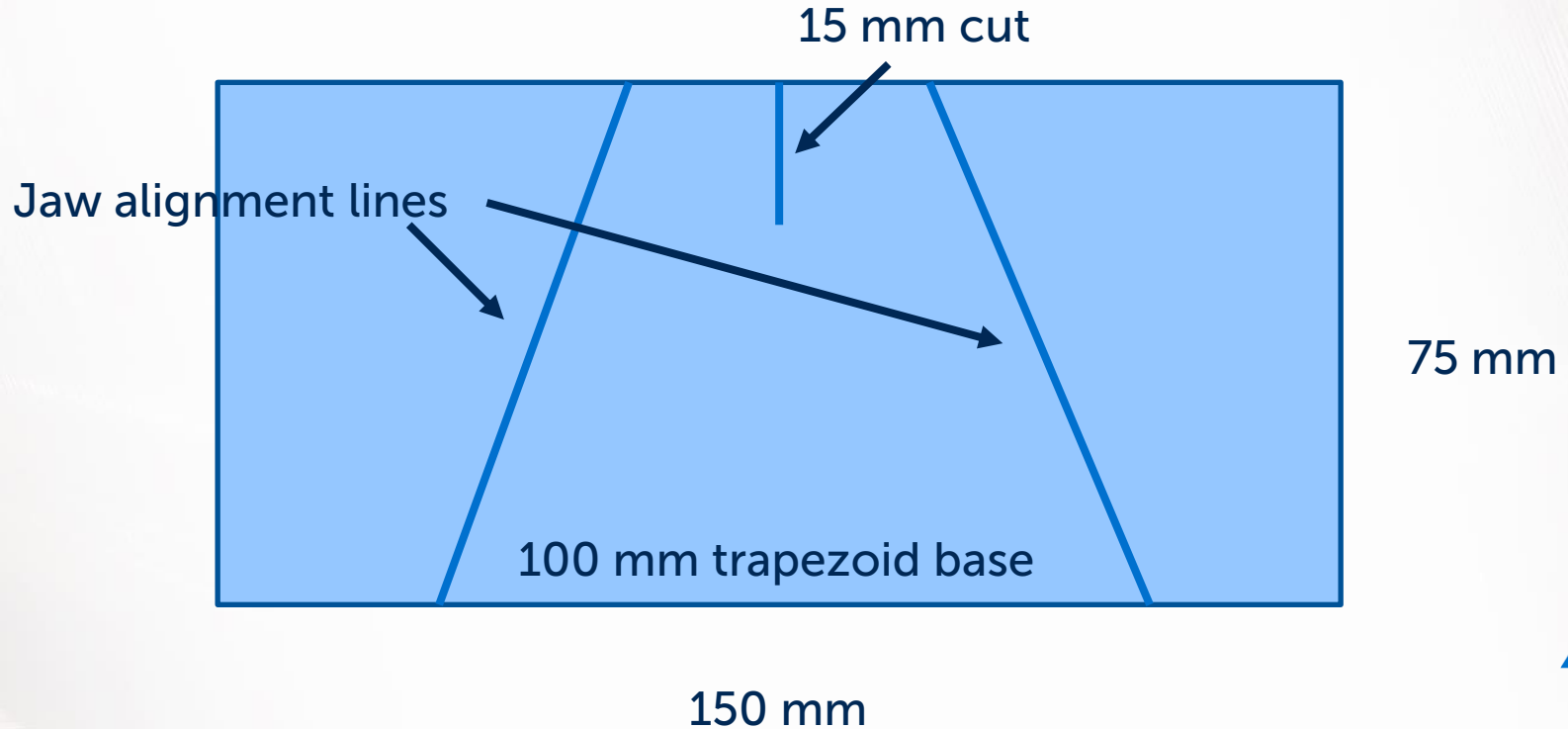


# Trapezoid Tear – ASTM D5587

- ❖ “In plane” force applied to a tear in the fabric (woven)
- ❖ D5733 for nonwovens is equivalent



# Trapezoid Tear – ASTM D5587



# 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

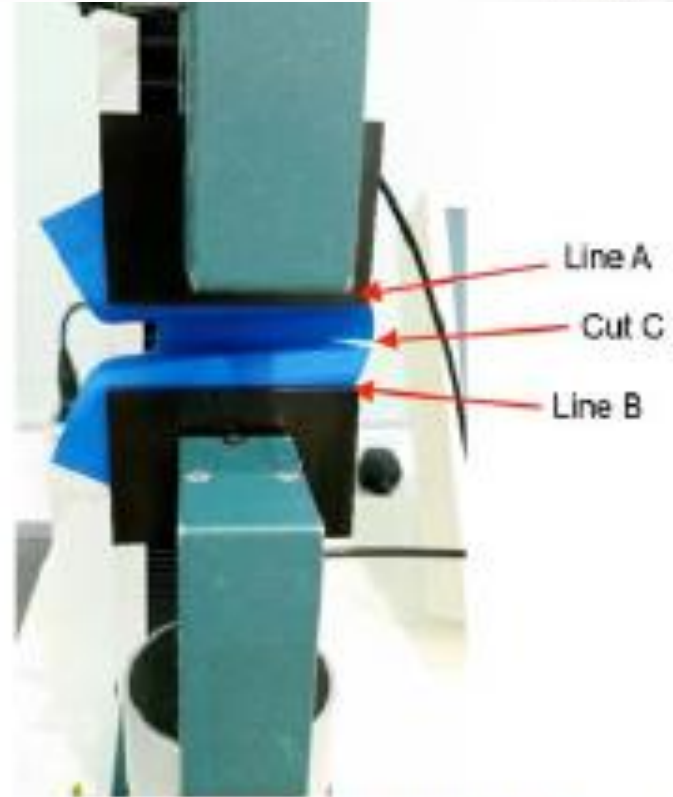
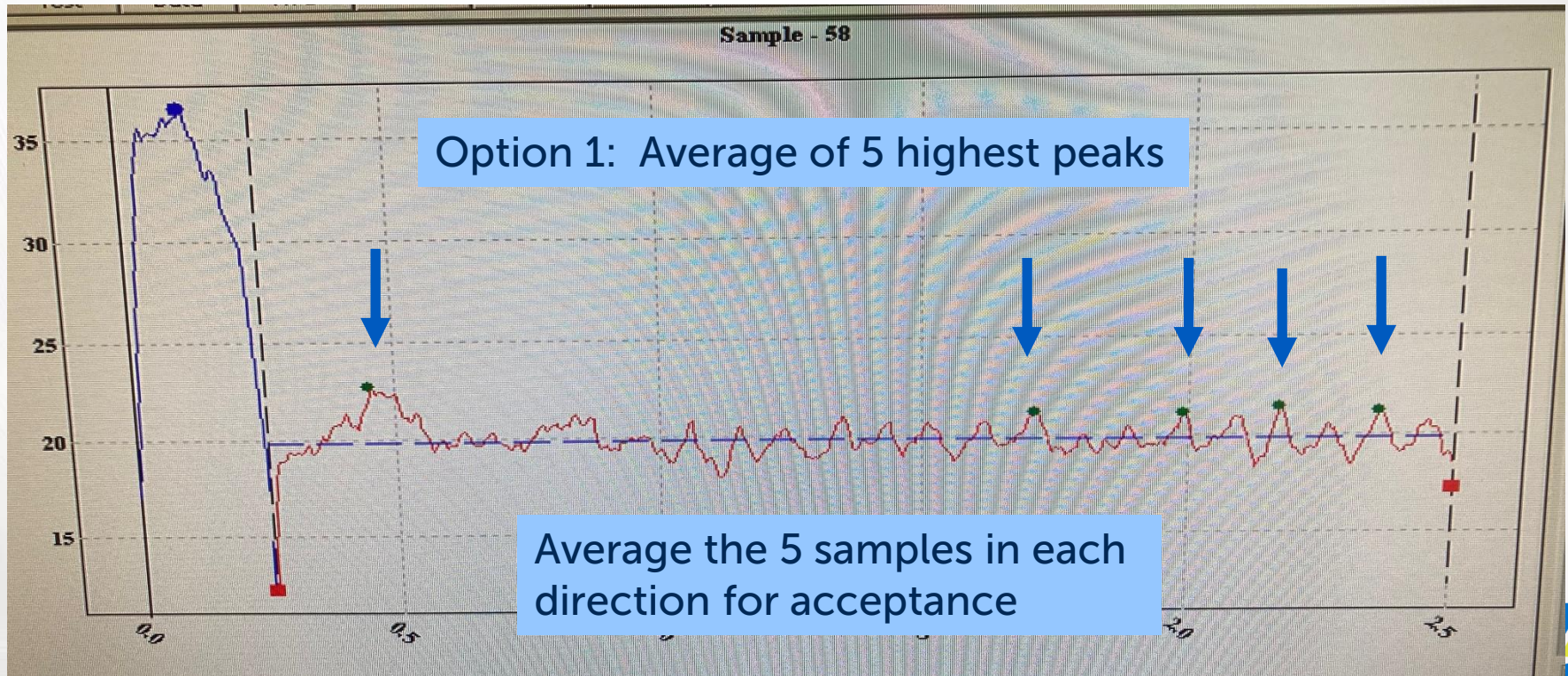


FIG. 3 Positioning Specimen in Clamps



# Trapezoid Tear – ASTM D5587



# Seam Strength – ASTM D1683

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- ❖ 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

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- ❖ 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

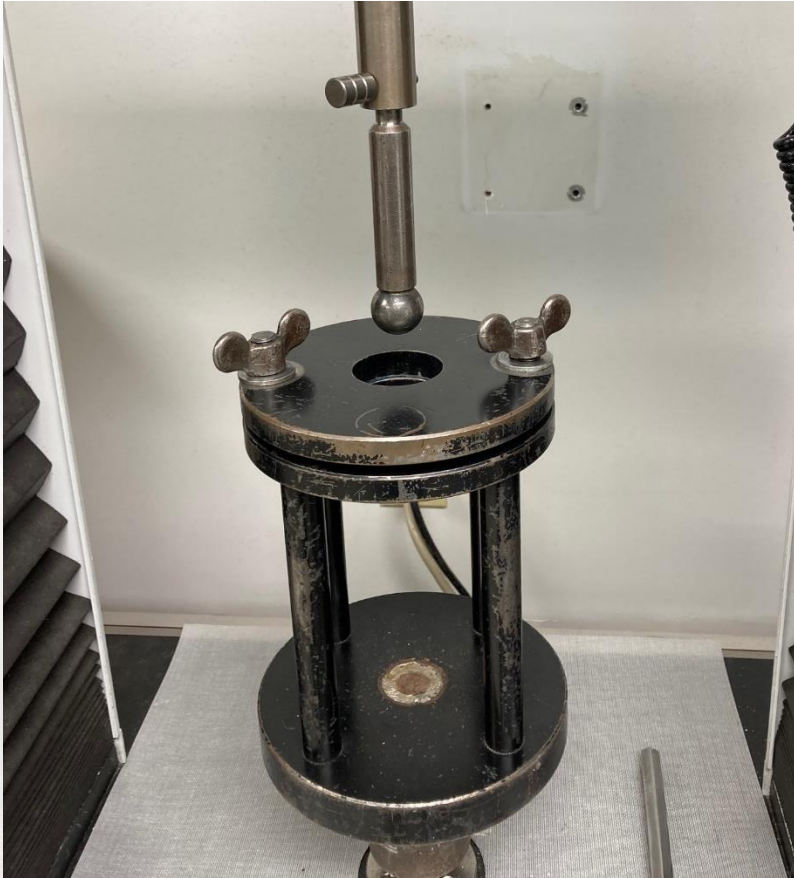




# ASTM D751 Bursting Strength



# ASTM D751 Bursting Strength



Place seam centered in hole

300 mm/min speed

There should be no slippage during test

Break at maximum



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# Thank you!

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