Novel High Strength Barrier Seams for Shelters

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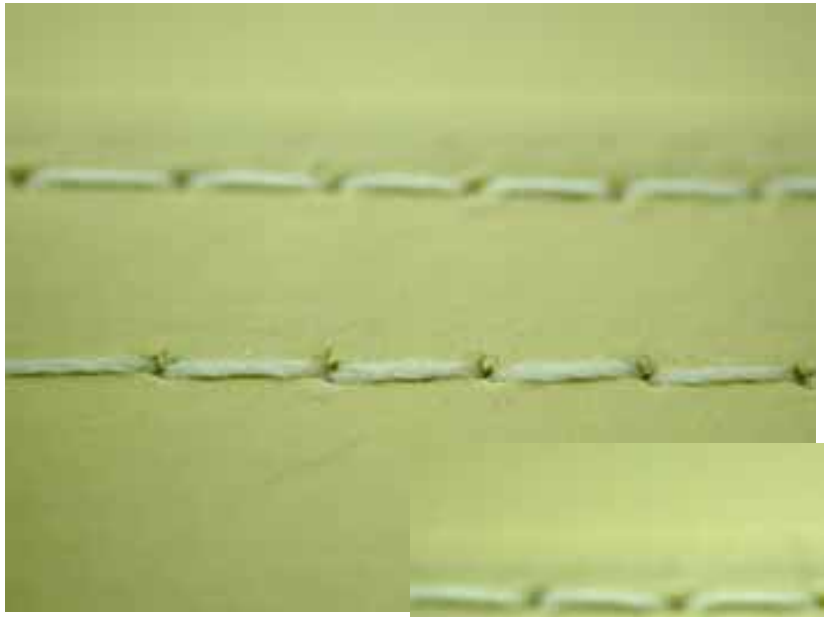
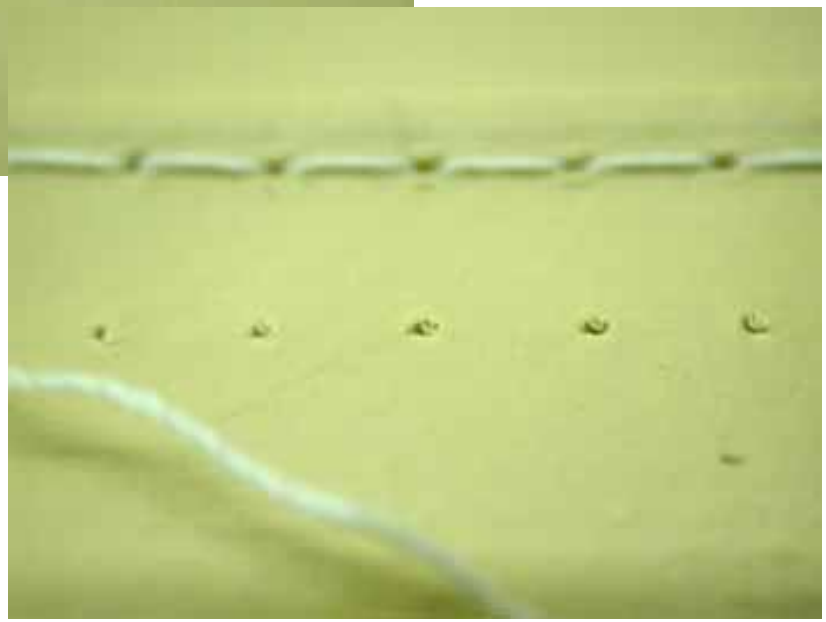
Shelter Barrier Materials

Vinyl-coated PET

Polyurethane-coated Kevlar

Typical seam construction utilized with shelter fabrics. Double/triple/quadruple lines of stitching form strong seams and thousands of needle holes.





Taping of Sewn Seams

Ultrasonic Welding is possible with materials which contain at least 50% thermoplastic component but processing conditions must be carefully controlled.

QuickTime™ and a
Video decompressor
are needed to see this picture.

Duraseal™ Seam: Vinyl-coated polyester shelter fabric

QuickTime™ and a
Video decompressor
are needed to see this picture.

A Duraseal™ can be formed using a custom folder and commercial equipment.

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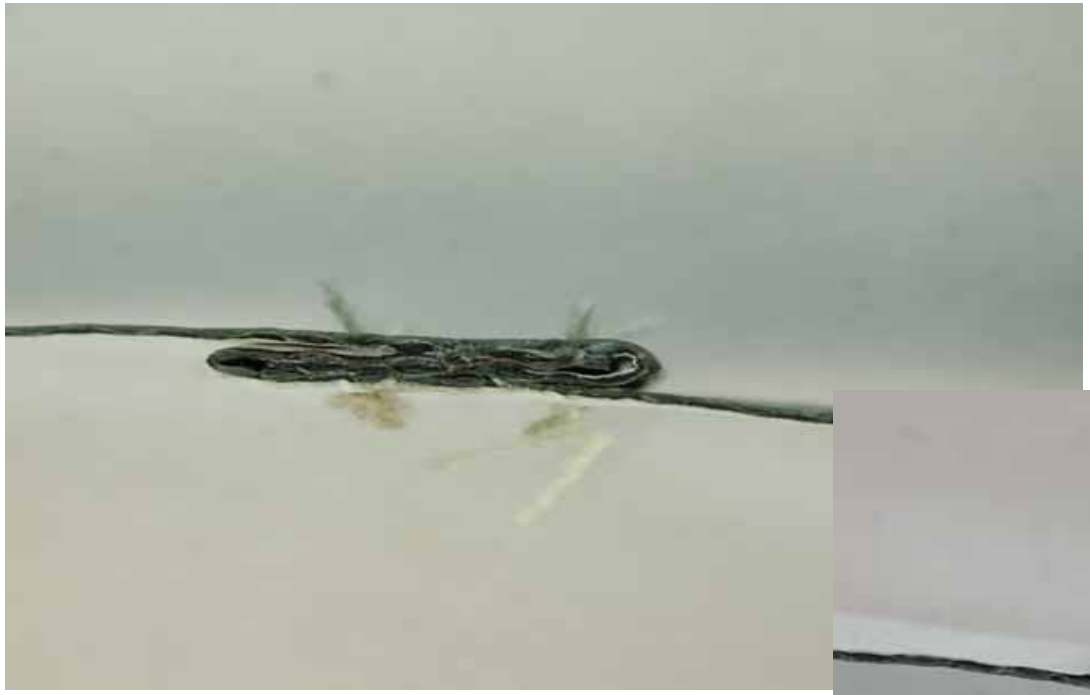
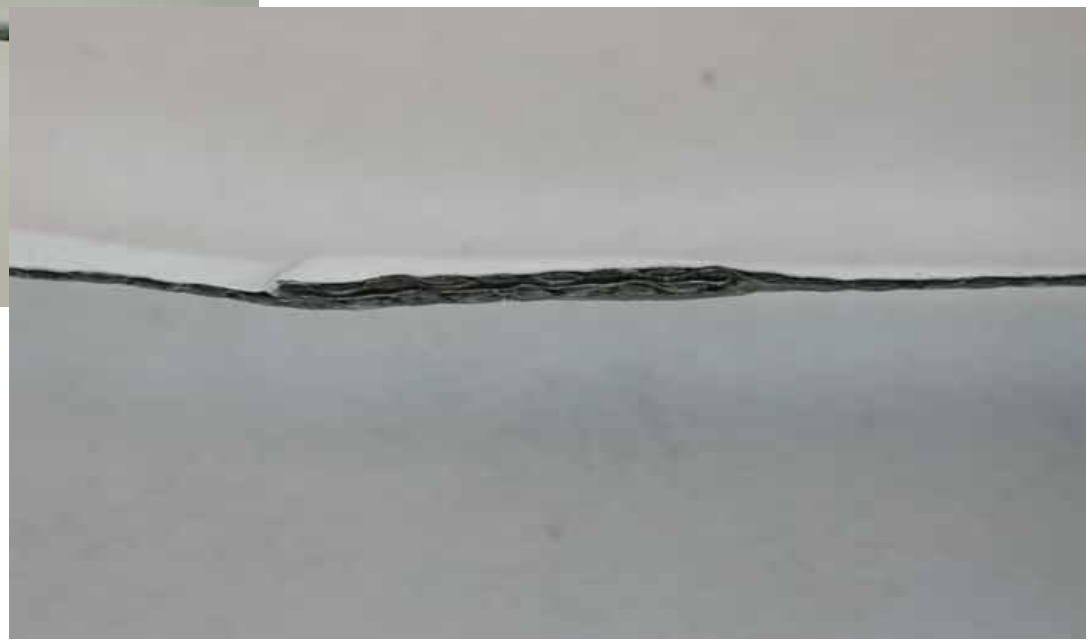
Cross sectional photo of a typical sewn felled seam using shelter fabric MIL-PRF-44103.



Cross sectional photo of a Duraseal™ seam using the same fabric



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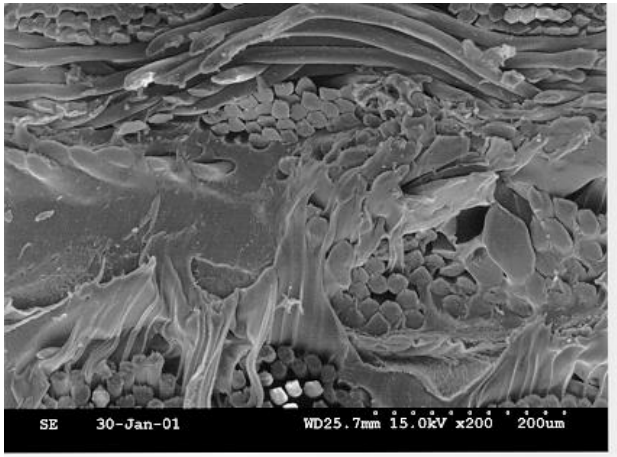
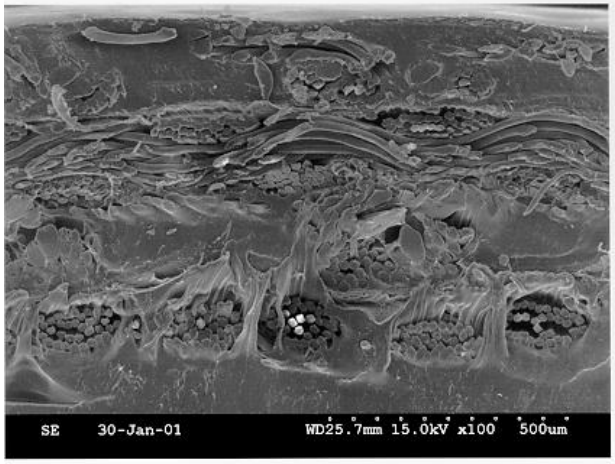
Photomicrographs of Duraseal™ seam

The seam forms a barrier throughout the thickness of the fabric by interpenetrating the material.





Result of Laboratory Exposure to Chemical Agent (Netherlands)

SD Method -

Agent: HD

Droplet Size: 50 microLiters

Humidity: <5%

Detection: Visual, Color Change

Result: No penetration for a minimum of 24 hours:
Seam forms a barrier comparable to the fabric

Physical Testing on Two Mil Shelter Fabrics

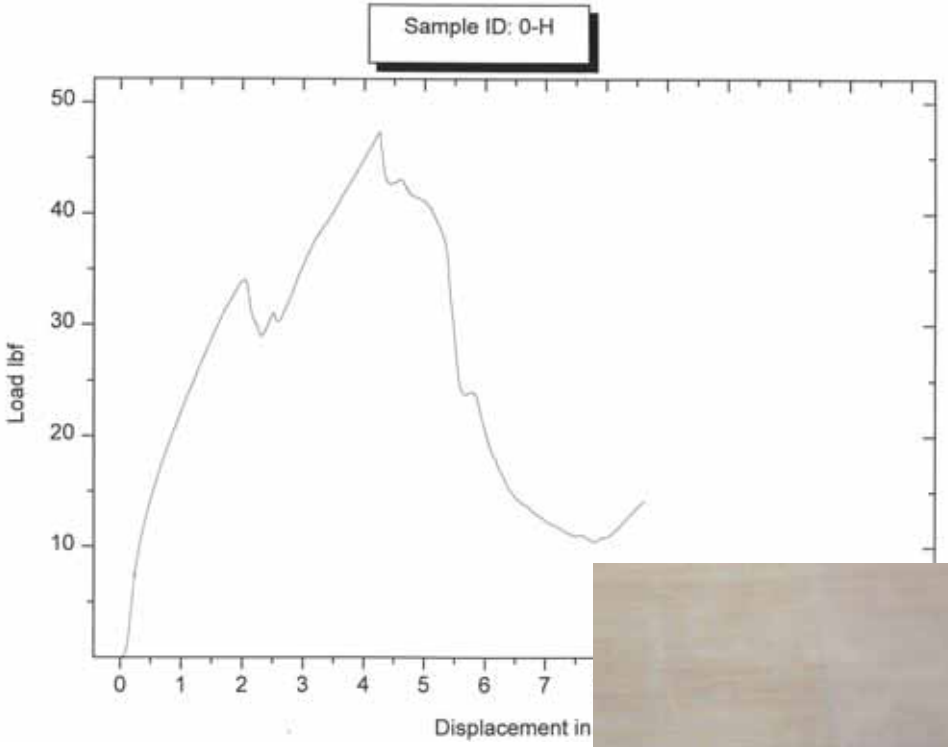
	Mil-C-44423-C2 Heat Set Urethane Coated Nylon	Mil-PRF-44103 Vinyl Coated Polyester
Grab Test: ASTM D5034	301 lbf	185 lbf
Peel Test: FTM 5960	44 lbf	28 lbf
Seam Efficiency: FTM 5110	95%	100%

QuickTime™ and a
Cinepak decompressor
are needed to see this picture.

Typically either the fabric tears across the seam or the yarns pull out of the coating.

Film Laminate

Peel Strength with Duraseal ™
Seam: 50 pounds
Seam Efficiency: 100%



QuickTime™ and a
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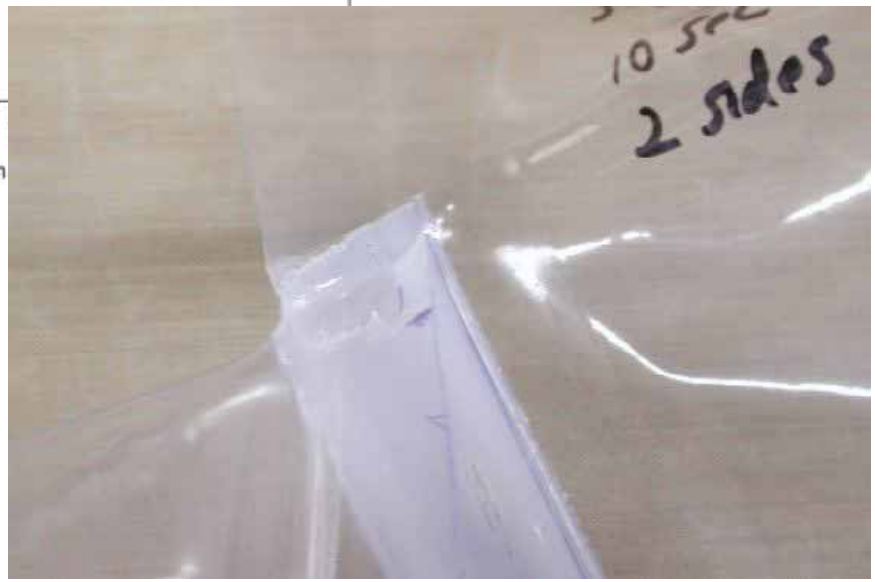

Fluoropolymer Laminate

QuickTime™ and a
H.263 decompressor
are needed to see this picture.

Peel Strength with Duraseal™
Seam: 10 pounds
Seam efficiency: 50%

Conclusions

- Generally, there is no reason for seams to be stronger than the materials they join, that is, a seam efficiency of 100%.
- There is no reason for a seam peel strength which is greater than the tear strength of the material it joins.
- There is no reason for a seam peel strength which is greater than the delamination strength of the material it joins.

Duraseal in Action