Seams for Protective Clothing–An Overview

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Abstract: Specialized clothing is essential for protection against specific environments like fire, heat, cold, chemical, mechanical and biological in nature. Specialized clothing that has been designed and fabricated to face the challenges of these environments is Protective Clothing which is a combination of technical design and functional focus. Seams are most important structures that help to keep a garment intact; they must be strong and have many qualities to hold the garment together in extreme conditions. The type and nature of thread, the model of seam construction and the testing of seams are important for the performance of protective clothing as one loose thread or gap in seams can unravel the space between the person and the environment leaving the person vulnerable. Seams for protective clothing play a critical role since they directly affect the integrity of providing protection, leading to death of the individual. In this paper the different seam construction methods used for protective clothing is being analyzed.

Keywords: Protective clothing, specialized environment, ultrasonic seams, seam taping and glueing.

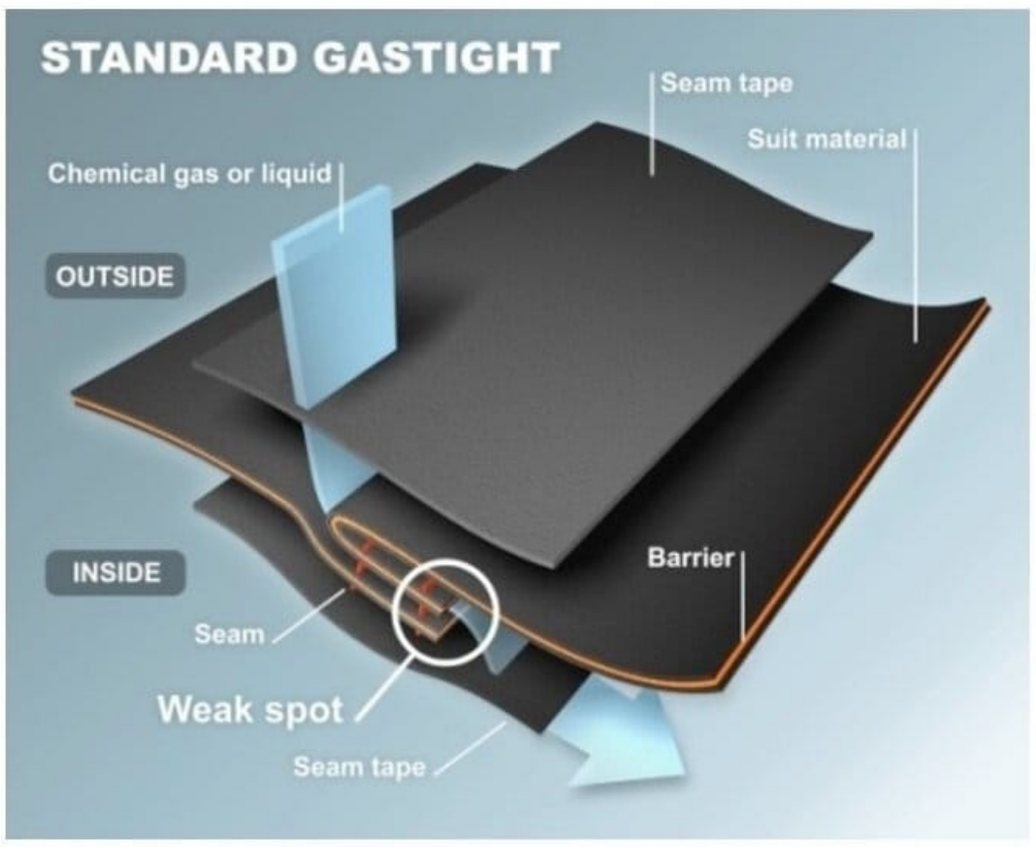


Figure 3: Seam Construction for Chemical Protective Clothing [10].

The seam types for chemical protective clothing include. (Figure **3**)

3.1.1. Serged Seam

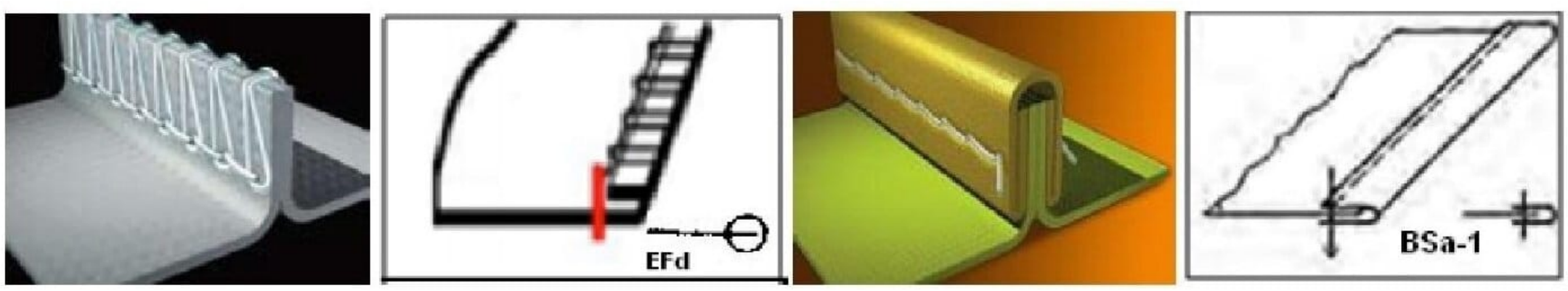
A serged seam joins two pieces of material with a thread that interlocks. This is an economical stitching method for general applications. This stitching method is generally not used for all types of chemical protective clothing. It is more commonly found on limited use in dry particulate protective clothing where dry particles are of concern. An example of a serged seam is given in Figure **4**(**a**). Apart from serged seams, lap or fell seams may also be used.

3.1.2. Bound Seam

Stitched seams produces stitched holes that provides a path to chemical penetration. The bound seam limits the pathways for chemical penetration as the seam is wrapped with a folded strip of similar or stronger material and chain-stitched through all five layers in a single operation. These operations result in a tougher seam which also provides improved liquid and particle repellency at the seams as well as a tougher garment all round. A bound seam is not suitable for a chemical suit as it is not liquid tight. Figure **4**(**b**) shows the bound seam.

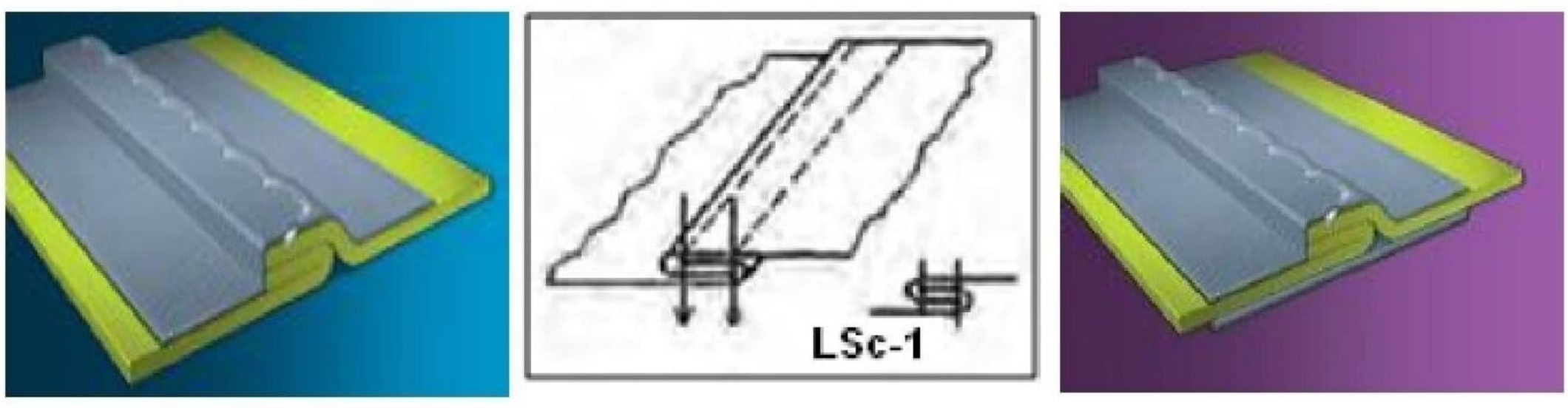
3.1.3. Stitched and Taped Seam

The seam is first stitched and sealed on the outside with a heat activated tape. This results in an impervious seam which is completely liquid-tight. As these seams are generally used for chemical suits the tape type is often constructed from a similar material to the garment fabric in order to maintain similar chemical permeation properties. When the heat sealing is done on both sides with a heat activated tape the seam becomes fully impervious and is considered to be the strongest seam for gas-tight suits e.g. Interceptor [14]. Figure **5** shows the flat felled seam (LSc -1) with heat sealing tape on one side (**5a**) and heat sealing tape on top and bottom sides of seam (**5b**).



(**a**) (**b**)

Figure 4: (**a**) Serged seam EFd; (**b**) Bound seam BSa-1 [11 & 12, 13].



(**a**) (**b**)

Figure 5: Stitched and taped seam: (**a**) Stitched & Single Taped Seam; (**b**) Stitched & Double-Taped Seam [11, 15].