



# IDEAL FOR THE CONTAINMENT OF WASTE AND WATER

## TERANAP BITUMINOUS GEOMEMBRANES & ELECTRIC WELDING

### TECHNOTE

The most common and traditional method for welding Bituminous Geomembrane (BGM) seams consists of using an open flame propane torch. This technique has been used since the inception of BGMs where used in large containment applications and is the preferred method for a number of reasons:

1. It produces a heat in excess of 1,500°C
2. It welds relatively fast compared to other methods
3. It has the ability to effectively weld a 200mm wide seam high temperature and a 200mm wide nozzle.
4. The necessary equipment is cost effective

Propane torch welding can appear agricultural, but with developments in tooling that confines the flame to the specified 200mm width, it is considered safe with the right safety measures in place.

BGMs continue to grow in the market and expand in application and use. As such, BGMs are being specified as landfill caps. However, it is common that landfills generate gas which immediately rules out the use of traditional open flame welding due to the risk of ignition.

As a result there has been a demand for an electric welding process that melts the modified bitumen without the risk of a naked flame. The Bitumat B2 Leister enables welding of modified bitumen sheeting (SBS) with a flameless nozzle that is up to 120mm wide. This is narrower than the traditional 200mm wide weld and as such weld strengths should be assessed and proven on site during CQA checks.

Travel speeds of the Bitumat B2 are 0.8m to 12m per minute with a maximum temperature of 650°C. The Bitumat B2 is designed to run in a straight line and cannot travel around corners or weld repair patches which must be rounded. In this case, patch welding should be done with a hand held Leister and roller similar to that shown below.



Figure 2: Hand held Electron ST Leister



Figure 1: Bitumat B2 Leister in action with Teranap TP631. Testing was done over grass to simulate a rough surface during a typical installation.

The hand held Electron ST Leister has a maximum temperature of 650°C and a nose width of up to 150mm.

In order to assess weld strength, it is recommended that an Examo Leister Tensiometer (or similar) is used as shown below.



Figure 3: Examo tensiometer by Leister for CQA checks of weld strength. It is preferable that weld strength achieved is no less than 80% of the tensile stress of the BGM.

The objective of the weld process when using the Bitumat B2 is to generate a consistent bleed of bitumen from the overlap which is then compressed with a 5kg to 10kg steel roller that is typically 200mm wide. The speed of welding is crucial to maintain installation rates and shall be tweaked on site to ensure the bleed is consistent which will ensure weld strengths are maximised.

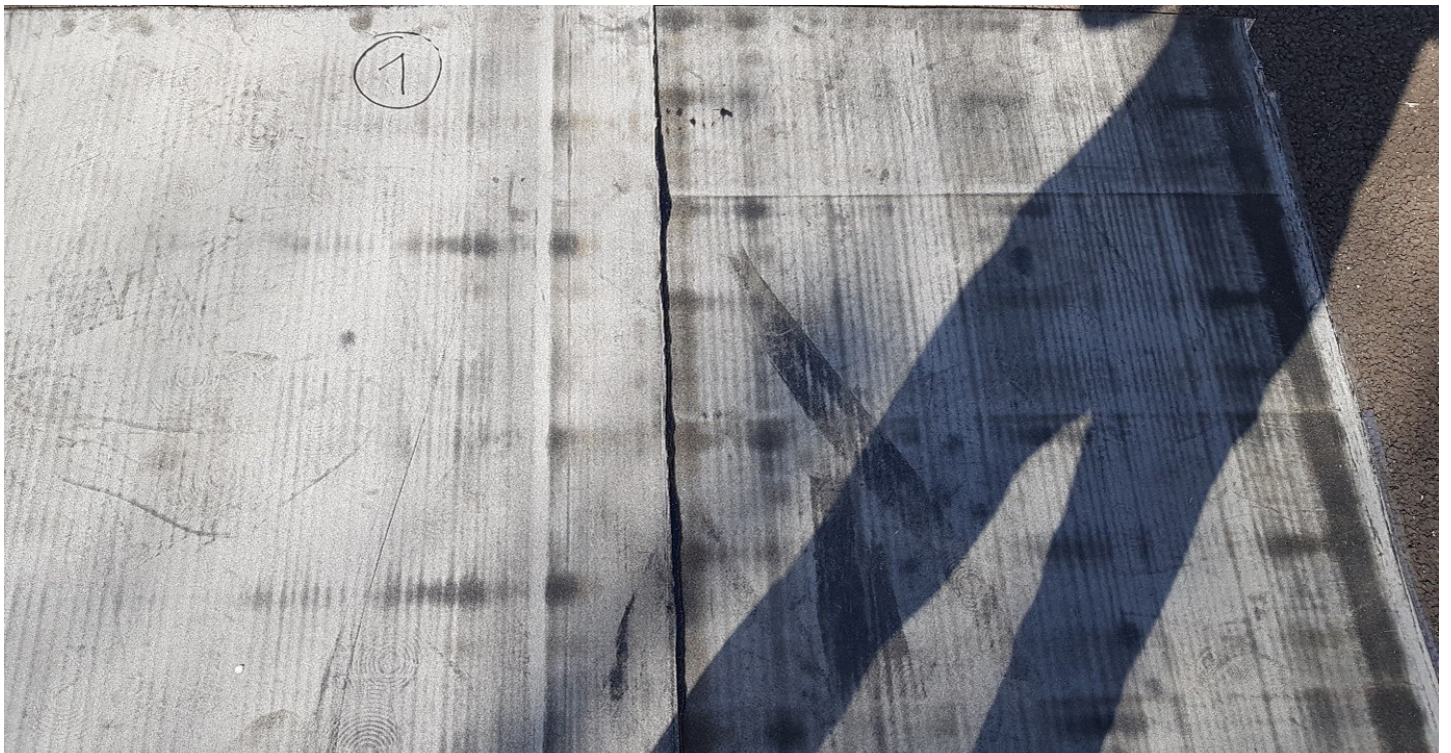


Figure 4: View of a completed trial weld using the Bitumat B2 on the Teranap TP631 showing a consistent bleed of bitumen along the weld.



The noted evidence suggests that the Bitumat B2 Leister welder works effectively with Teranap's modified SBS bitumen. It enables welding of Teranap in high risk scenarios where gas is present. Although it has been proven to be highly effective in terms of weld strength and overcoming risk, certain details should be considered by contractors that utilise this method, instead of the traditional propane torch. This includes:

1. The speed of welding is approximately half as fast using the Bitumat B2 compared to using a propane torch. This should be factored in when pricing projects with respect to time taken to weld.
2. The weld achieved is up to 120mm wide. Typical landfill cap specifications require a 200mm wide weld and thus approvals may be sought to accept this reduction in width.
3. Although the Bitumat B2 comes with an attached silicone roller, it is still recommended that a 5kg to 10kg roller follows the Bitumat machine to compress the weld which will improve its strength.

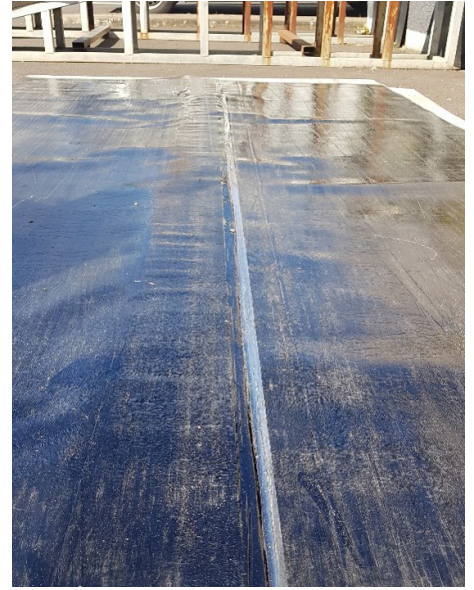


Figure 5: View of Teranap TP631 turned upside down after Bitumat B2 welding to illustrate the straight lines on the weld.

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