Exciting new technical developments and project success with electric welding of Coletanche bituminous geomembranes for landfill capping in Australia

The challenge: How to use the benefits of Coletanche for a rough subgrade landfill capping without using a gas torch for seaming.

The solution: Coletanche with electric welding

Figure 1: When a rough subgrade must be capped without using a gas torch, then Coletanche BGM with electric welding is the solution

Figure 2. Note the good flow of bitumen from the welded seam which ensures excellent sealing and bonding.

Figure 3. Electric welding of Coletanche underway on the landfill site.

1. Introduction:

More than 50,000 m^2 of Coletanche ES2 was successfully installed by electric welding for the latest landfill capping layer at the Hervey Range Landfill site in Queensland, Australia. The project was designed by Golder Associates, and the installation was done by Fabtech. A big thank you to both these companies for their co-operation on this first large Coletanche landfill capping in Australia using electric welding.

2. Reasons for the technical developments with electric welding

Coletanche has an excellent track record in containing and capping a wide range of industrial, mining and domestic waste on sensitive environmental protection projects in Australia and around the world. The advantages of Coletanche in these applications include:

a) the ability to be used on rougher subgrades
b) excellent puncture resistance due to Coletanche's internal reinforcement
c) the ability to be used on steep slopes, due to its internal reinforcement and good interface friction angles
d) the ability to be installed in harsh weather conditions with strong winds up to 40km/h
e) Coletanche does not suffer from panel separation, cationic exchange, risk to the contractor from rain damage during panel placement, and does not need a confining layer, as some other capping systems do.

For most projects, Coletanche is bonded using a gas flame torch which bonds the 200mm overlap. This is a fast and effective means of bonding with cost effective tools. However for capping of landfill sites where methane gas is usually present, Axter has been working with a number of machine manufacturers to find the most efficient and practical electrical welding machine, so flameless technology can be used in these applications.

Figure 4: Axter's trials on a number of various electric welding machines showed that good seam strengths and complete sealing could be achieved.

For more detailed information on Axter's testing on the various machines, with the different temperatures and speeds, as well as the adapations required to these machines to optimise performance, please contact Axter Australia on email info@axter.com.au

3. Electric welding of Coletanche on the Hervey Range landfill capping project

The Coletanche ES2 was laid directly on the rough subgrade, and this facilitated saving in subgrade preparation. The reinforced Coletanche bituminous geomembrane allows for safe and efficient installation, even on a rough and sloping subgrade. A drainage geocomposite was installed directly onto the Coletance ES2.

The installer Fabtech used two electrically powered hot air welders to perform consistant welds on site. These electric welders were modified from the standard supplied machine to provide optimised performance to achieve the stringent seam tensile test requirements.

Figure 5: Good seaming is shown taking place in the foreground and the rough subgrade is shown in the background. Also shown in the background is the white drainage geocomposite placed on the Coletanche.

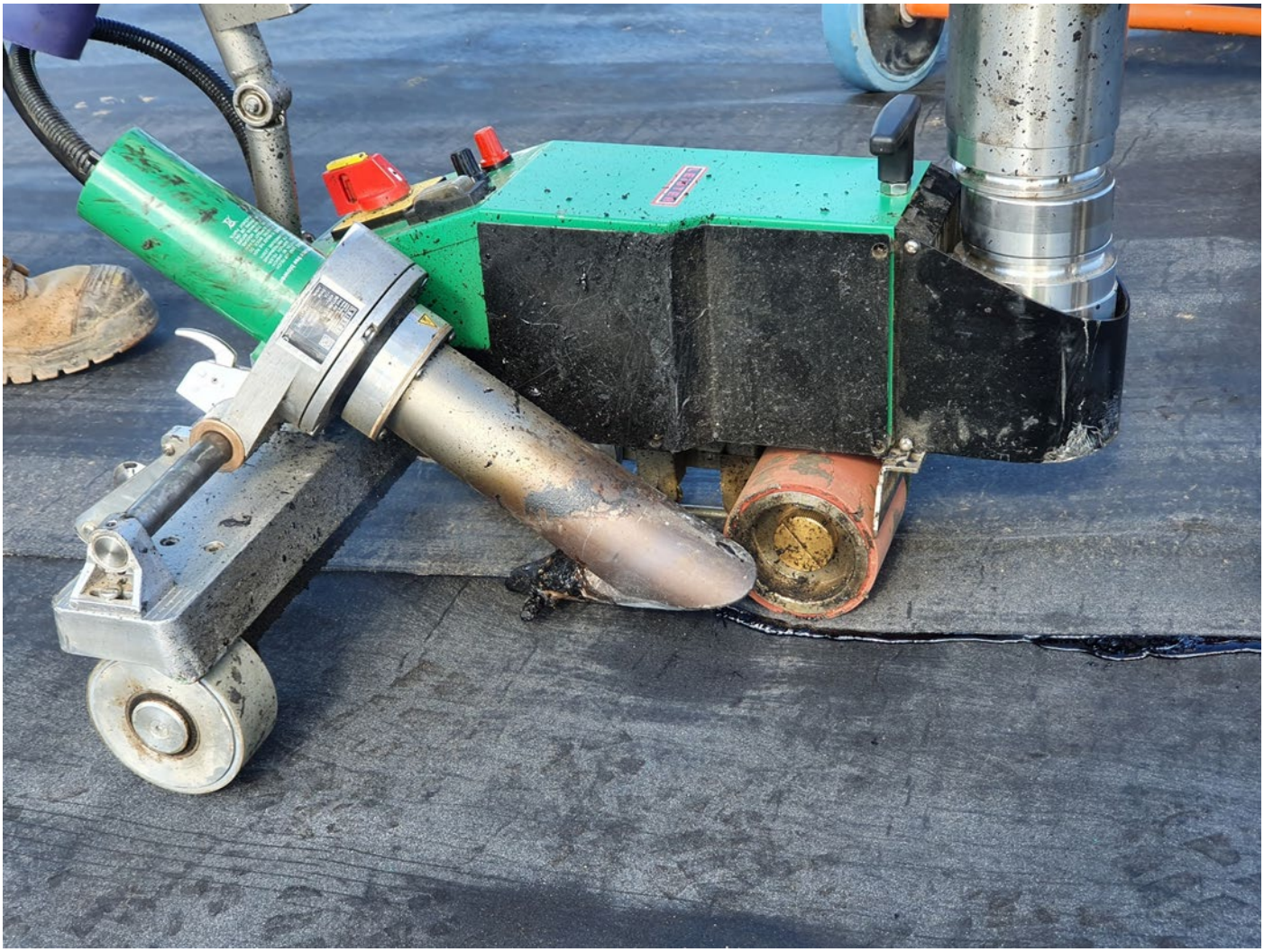

Figure 6 .The motor driven operation of the hot air welder heats the material and also applies a controllable amount of pressure

Strict quality controls were applied to the installation including destructive tensile tests of the welds. The material and welding proved very robust.

Figure 7: On-site shear tensile tests where used to confirm the good seam tensile strengths.

Gas detectors were mounted in the welder as a safeguard against concentrated gas conditions.

Figure 8: Methane Gas detection monitors were mounted directly to the welder as an extra safeguard

4. Conclusion

The electric welding of Coletanche on this Hervey Range landfill site showed that the good benefits of Coletanche could be used for landfill capping applications without the use of a gas torch for seaming.

It is positive to note that already another similar landfill capping has been designed by another Australian landfill design consulting company and the project is currently out for tender. We foresee that many other landfill designers will start using the technical and practical benefits of Coletanche for landfill cap designs now that flameless welding technique has shown to be successful on a major landfill project in Australia.

Figure 9: An overhead shot of the hot air welder in operation reveals a consistent weld and bitumen beading

This article was prepared by Preston Kendall and Rob Mcilwraith from Axter Australia Pty Ltd. November 2020