**A1 Group Drag In Liners Method Statement**

**THE ENCLOSED INFORMATION IS STRICTLY CONFIDENTIAL**

This Health and Safety Method Statement has been prepared by A1 Group and concerns Drag In Liners

Please find below details of the work to be carried out and any perceived hazards associated to the work involved and should be read in conjunction with quotation provided.

**First and foremost, there are three very important rules you must always adhere to:**

1. **Always carry out an independent T.V survey prior lining.**
2. **Never leave a curing liner unattended, it must always be monitored from start to finish.**
3. **Wear safety clothing and eye protection when mixing and using resins and additives.**
4. Always arrive on site with a fully equipped and clean vehicle to ensure a smooth lining installation. Always cover up the area where resin is being used in order to protect the customer’s property. Polythene sheeting is ideal for this purpose.
5. Establish the exact length of liner required plus a minimum extra ½ metre (to give 250mm either end for overhang in each manhole), and cut from role.
6. Ensure and check that the felt liner is open throughout its length. This can be checked either by hand or alternatively, you can run the appropriate sized disc through the centre.
7. Assemble the renoline combination wetting out machine by attaching the four legs and side tables.
8. Carry out a CCTV survey to the drain to be lined immediately before installing liner, high pressure water clean to remove debris and roots if necessary.
9. Place a strong draw line through the drain to be lined, minimum 6 mm rope diameter.
10. If you are lining from a single ended access point, the above does not apply, as you will be pushing the liner into position using a liner fork and steel rods.
11. Have ready inflatable drain plugs which will be used to plug off any incoming branched/laterals at the top of the drain run to be lined. These plugs must be fitted just prior to the liner being pulled into position and all people in the buildings should be informed.
12. Warning: Extreme care must be taken when using, handling and storing the vinyl inflation hose, although it is very tough, it will not withstand puncturing or abrasion and must be correctly stored, ideally in some type of protective container, before and after use. No responsibility will be accepted if the vinyl is damaged due to misuse.
13. Set up Combi Wetting out Machine and table on a level firm base out of direct sun light in a convenient position.
14. **Resin Preparation** - Mixing of the resins and additives and wetting out of the liner should not be carried out in direct sunlight as this can cause premature curing. You must use separate mixing jugs and syringes for the accelerator and activator/hardener to achieve accurate measurements.

The Renoline process has been designed to use high quality unsaturated polyester resin, accelerator and activator. We strongly advise you to adhere to our recommendation and keep the accelerator to a minimum dosage until you are confident and experienced enough to increase the minimum percentage to suit your own curing requirements. We recommend a log book be kept on all installations that are carried out, to be referred to as and when require.

To prepare the resin, work out the exact volume necessary to fully impregnate the liner from our mixing chart provided. Set out the buckets in which the resin is going to be mixed on a flat level surface, out of direct sunlight and in a cool open area.

1. Use a syringe or measuring jug with 10ml increments clearly marked on the side to measure the three chemicals.
2. Add the recommend amount of Renoline resin E9259 or E5787 (part A) into the bucket.
3. Add the Activator Dibenzoyl (part B) proceed to mix with electric drill and paddle mixing speed not to exceed 300 rpm in order to prevent entrainment of air.
4. When part B is thoroughly mixed into part A, proceed to mix in the accelerator Pergaquick A2S or A3S (Part C).
5. The resin mixture has now got a time frame for curing.

Examples of mixing formula:

1. 100mm diameter liner x 3mm material thickness x 1 metre in length; will require a minimum of 1.1 litres of resin.
2. 150mm diameter liner x 3mm material thickness x 1 metre in length will require 1.6 litres.
3. 225mm diameter liner x 3mm material thickness x 1 metre in length requires 2.7 litres of resin.

Minimum accelerator required for the three examples is 2% by volumes of resin to a maximum of 4%. Activator or hardener will be 3% by volume if Resin which should stay as a constant.

1. **Wetting out of liner** - Clamp off the downstream end of the felt liner with liner clamps provided and make sure the end is air tight.

Set up vacuum pump, make a small cut over in the liner at the downstream end approx. 100mm away from the end of the liner and put the suction cup over the cut and turn the vacuum pump on. Suction will over occur when resin has been poured into the liner

Place a funnel into the top end of the liner and pour in the premixed resin. The liner should now be under suction. Place the end of the liner that has the resin inserted into the wetting out rollers.

The resin mixture inside the liner should now be in between the wetting out machine and the vacuum pump.

Adjust the rollers on the wetting out machine to the right gap (example 3mm liner should be 3mm + or - 0.5mm in order to grip the liner so as to push the resin along its length. The resin should be drawn along and into the felt with the vacuum pump as the liner is being wet out.

Repeat the procedure for as many times as required to thoroughly and uniformly impregnate the liner. The purpose of this exercise is to transport the resin evenly and yet retain the full amount of resin inside the liner and not to ring out what appears to be surplus.

Be sure not to wet out the liner right up to the end otherwise the resin will be sucked up the vacuum tube.

Insufficient resin will create a fluffy liner interior, and, even worse, will compromise its strength. Two passes through the rollers is normally sufficient.

Now remove the clamp and turn off vacuum pump. Trim the non-impregnated section of liner at one end only. Make small holes through the side of the liner approximately 75mm back from the end of the liner. Thread through a strong rope approximately 6 to 8mm in diameter through the holes and create a loop with the rope which corresponds to the approximate depth of the manhole opening to which the liner is being pulled into.

1. **Pulling a liner through the pipe** (with two access points) - Tie the draw line which has been previously placed in the drain onto the loop. The liner should preferably be pulled downstream. Ensure that all the incoming connections are stopped off, preventing water from getting trapped under the liner. The liner can now be pulled, either manually or by using a winch depending on the length and weight of the liner. A second person is required to smoothly feed the liner into the drain. The idea of the loop is that it can be cut and easily be removed from No 2 manhole once the liner is correctly positioned and flush to the entry wall of the manhole. Upon entry into the second manhole, the joining tape should be in the corresponding position as is at No 1 manhole. In other words, the liner must not be twisted. Ensure the liner is now flush to the No 1 manhole upstream wall with a loop rope left intact. Now return to No 2 and carefully pull the liner via the loop to bring the liner flush with the downstream manhole wall. You now have a flush liner at both ends which avoids difficult mechanical trimming off after the liner has cured. You will find through experience that when installed longer lengths of liner, that stretching occurs when pulling it in and retraction of the liner occurs when inflating it. You must take this into account prior to trimming off.
2. **Inflation of the liner** - Using the RENOLINE air inversion machine (Midi or Mini) Position the machine over the manhole or pipe work which now has the liner installed pressurise the machine using the air compressor. The inflation hose should now inflate and start to make its way out of the machine. Make sure that not too much pressure is applied during this procedure - you need just enough to push the inflation hose out of the machine.

Manually guild the inflation hose into the deflated liner, and let it freely invert itself down the liner until it appears at the other end of the liner.

Lock off the air inversion machine wheel to stop the inflation tube proceeding any further and bring the air pressure inside the machine up to 5 psi.

Never leave the machine and lined pipe work on its own whilst curing. The air pressure will need constant monitoring in order to maintain at 5 psi.

1. **Removing the vinyl inflation liner from within the cured liner** - Once you have established that the liner has fully cured release the air from the air machine by means of the air outlet valve and leave open. Using the wheel on the side of the machine wind back in the inflation tube. The inflation tube will release from the cured liner very easily.
2. **Inserting a liner from a one ended access point** - This is achieved by rodding the liner from the entry point using an 8mm/10mm steel cane rods fitted with our special liner attachment fork. The fork is inserted at the extreme end of the liner through two pre-cut holes which are formed using a 5mm hole punch or similar. The liner is pushed into the pipe and when in position the rods are pulled out. The maximum length of liner which can be placed using this method varies due to manhole depths etc. 20 metre runs of 100mm and 150mm have been achieved on a regular basis but do a trial run with a dry liner prior to impregnating to establish the distance push-able.
3. **Trimming Off** - To avoid unnecessary access to the manhole, we would advise that trimming off liners be carried out prior to inflation. This can easily be carried out using disposable knifes.

*This method statement has been written in layman’s terms to successfully guide you through the Renoline drain lining installation procedure. However, from time to time you may come across problems not mentioned in this method statement.*

These problems can be easily overcome by telephone xxxx

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| **Confirmation** |

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