

## General Advice

These instructions should be read in conjunction with the contract specification and drawings. They are intended to provide guidance in normal installation situations. If there are any questions related to the design, unusual installation challenges, or any doubt, consult ABG for further advice. In all situations, responsibility for installation remains with the Installer.

## Description

**Cavidrain Protector** is a cusped HDPE membrane supplied in 2.2m widths with a selvedge of 80mm along one edge to facilitate overlapping (**Fig 1**). **Cavidrain Protector** is a regulating spacer around tunnel walls to provide a smooth surface to place a tunnel liner against (**Fig 2**).

## Equipment Supplied

- **Cavidrain Protector**
- **Rondels**

## Equipment Required

- Safety knife
- Nail gun

## Preparation for Laying and Storage

**Cavidrain Protector** is supplied in rolls and should be stored on a level surface and protected by tarpaulin. Whilst **Cavidrain Protector** is flexible, the surface to which it is fixed should be relatively smooth (+/- 100mm). A rough cut rock wall should be smoothed with a minimum 50mm thick shotcrete or as specified.

## Fixing First Panel

### Step 1.1

Measure the tunnel wall perimeter allowing for the sidewall drainage detail (**Fig. 3**) as shown on the Contract drawings. Cut panels to the required length with a safety knife.

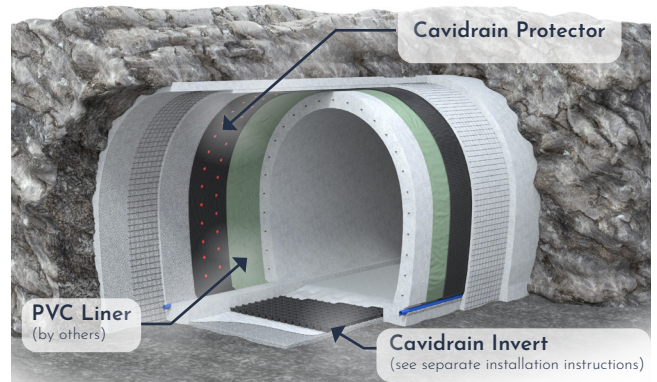


Fig. 1: Cavidrain Liner cut-away diagram

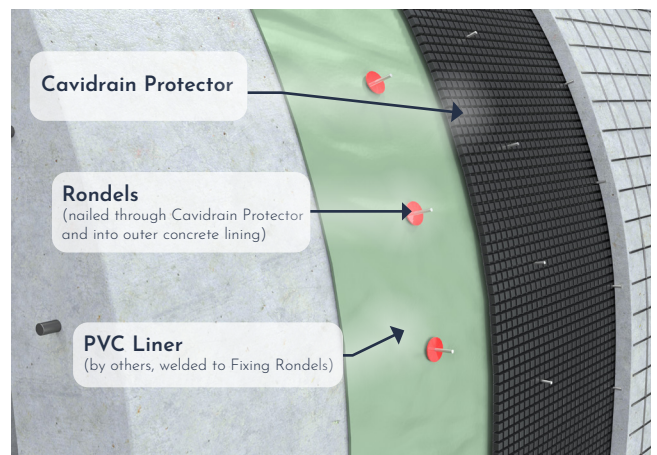


Fig. 2: Cavidrain Protector tunnel wall cross section

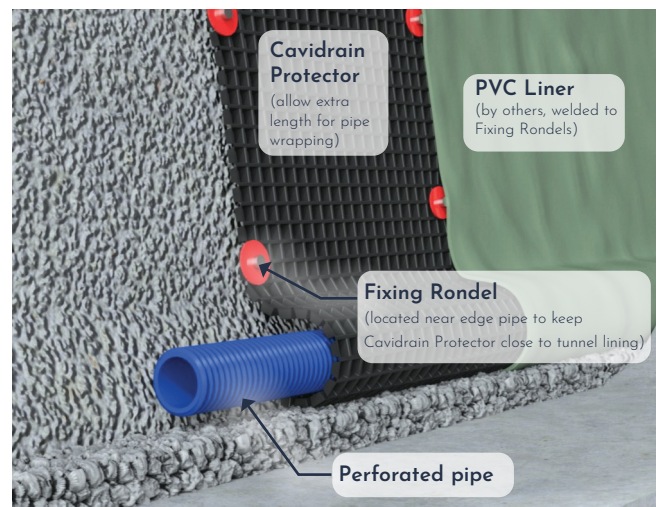


Fig. 3: Example of edge pipe detail

## Step 1.2

Mark centreline of cut length then re-roll the panel, with the dimples facing the prepared tunnel wall. Re-roll from either end towards the centreline. Stack the rolls ready for placement.

## Step 1.3

Working from a mobile tunnel platform, mark out the tunnel centreline on the tunnel crown. This will be a guide to position the centreline of each **Cavidrain Protector** panel.

## Step 1.4

Position the first panel at the crown of the tunnel, in line with the marked out centreline of the tunnel crown. Fix in place using a nail gun with rondels at 0.5m centres (**Fig. 4**). Nail length is determined by the strength of the tunnel perimeter material. Take time to correctly align the first panel, since it will form the guide for all subsequent panels.

## Step 1.5

Unroll the **Cavidrain Protector** panel down each side from the tunnel crown fixing rondels as the panel is unrolled. Unroll to the invert following the surface of the tunnel wall, avoiding spanning of hollows. Rondels should be placed at a minimum rate of five per square metre over the prepared tunnel surface.

## Fixing Additional Panels

### Step 2.1

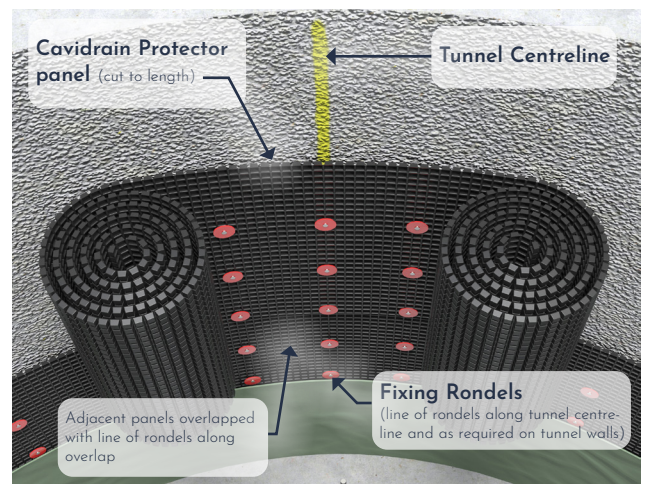
Cut the next panel of **Cavidrain Protector** and re-roll, as per Steps 1.1 to 1.3. Place the next panel with the selvedge edge fully overlapping the previous panel (**Fig. 5**) and in line with the crown centreline. If the tunnel alignment is curved, then ensure that the selvedge overlap is sufficient to provide full coverage against the tunnel face.

### Step 2.2

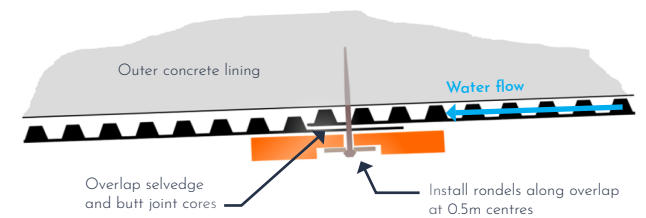
Install rondels as per Steps 1.4 to 1.5 ready for the liner to be installed (**Fig 6**).

### Step 2.3

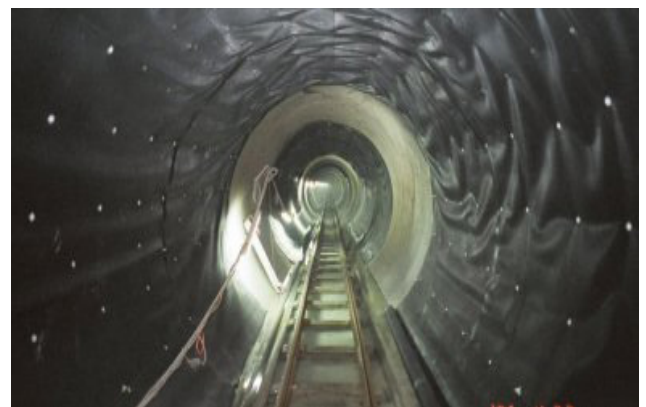
Install the liner by heat welding to the rondels, following the manufacturer's instructions, ready for the inner concrete lining as per the design.



**Fig. 4:** Align with tunnel crown and weld to rondels



**Fig. 5:** Cavidrain Protector panel overlap detail



**Fig. 6:** Ready for liner to be installed

## Terms and Conditions

Site specific engineering design should be carried out after the site investigation has provided all the necessary information.

The assessment of suitable safety factors in relation to each particular project must always remain the responsibility of the design engineer.

Cavidrain Protector INSTALL