STEVE VICK INTERNATIONAL

SOLUTIONS FOR THE REPAIR RENOVATION AND DECOMMISSIONING OF PIPELINES

Perpetual Pipe Pusher

Operating Instructions

Steve Vick International Ltd

Treenwood Industrial Estate, Bradford on Avon, Wiltshire, BA15 2AU, UK

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1. INTRODUCTION

Since its foundation in 1981, Steve Vick International has been at the leading edge of trenchless techniques for the repair and renovation of underground **gas** distribution pipes.

In the UK, we are a major supplier to the gas distribution networks and many of our techniques have become accepted practice in the industry. We constantly seek to provide our customers with renewal methods which will minimise their costs and maximise their production.

The company has been supplying pipe handler equipment to the **water** utilities and their contractors for over 20 years. More recently we have entered the market with pipe cutting equipment and our sealant technology has been successfully adapted for use in the waste water sector.

In 2014 the company relocated and can be found at:

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2. PRODUCT DESCRIPTION

The Perpetual Pipe Pusher is designed to attach to an excavator in order to insert PE pipe into a host pipe. It can also manoeuvre pipe around site where the entire operation is controlled from the cab of the mini excavator reducing manual handling.

Using an adjustable set of rollers housed inside the chassis, this model handles pipe diameters from 63mm to 180mm and is suitable for use with a 1.5, 2 or 3 tonne class hydraulic excavator. For larger excavators an adaptor plate is available from Steve Vick International.

Figure 1: Side view of the Perpetual Pipe Pusher

2.1 PERPETUAL PIPE PUSHER HIGHLIGHTS

Fits most 1.5, 2 and 3 tonne excavators — recommend 3 tonne **(check SWL at furthest reach)**	Pushes at speeds up to 20 metres per minute
Internal rollers deliver 1500kg of pushing force	Powered off the excavator's boom mounted hydraulics typically running between 180—220bar
Powered from third service off-take/breaker line hydraulic power source on excavator arm/boom	Several hundred metres can be 'rolled' in one go
Suitable for use with dual flow excavators only	Capable of forward and reverse roller action
Hydraulic feed is 3/8" using flat faced couplings. Adaptors may be required for different sizes.	Connects to excavator arm via multi-pin swivel
Can halve insertion time*	Requires no anchoring — soft ground conditions not an issue
Robust construction — designed for use in pipe laying environment	May be used to align and secure pipe next to butt-fusing machine
No swinging arm to insert pipe	No host main stress — when correctly used

3. SPECIFICATIONS

WEIGHTS AND DIMENSIONS	
OVERALL MACHINE	
LENGTH	895mm
WIDTH CLOSE	356mm
WIDTH OPEN	550mm
HEIGHT	490mm
WEIGHT (INCLUDING HOSES AND ADDITIONAL FITTINGS)	219kg

TOP BRACKET DIMENSIONS			
PIN SIZE	LENGTH BETWEEN CENTRES OF PINS		WIDTH BETWEEN BRACKETS
25mm	110mm	A	137mm
30mm	163.5mm	B	137mm
34mm	220mm	C	137mm

Tables 2 and 3 showing weights and key dimensions

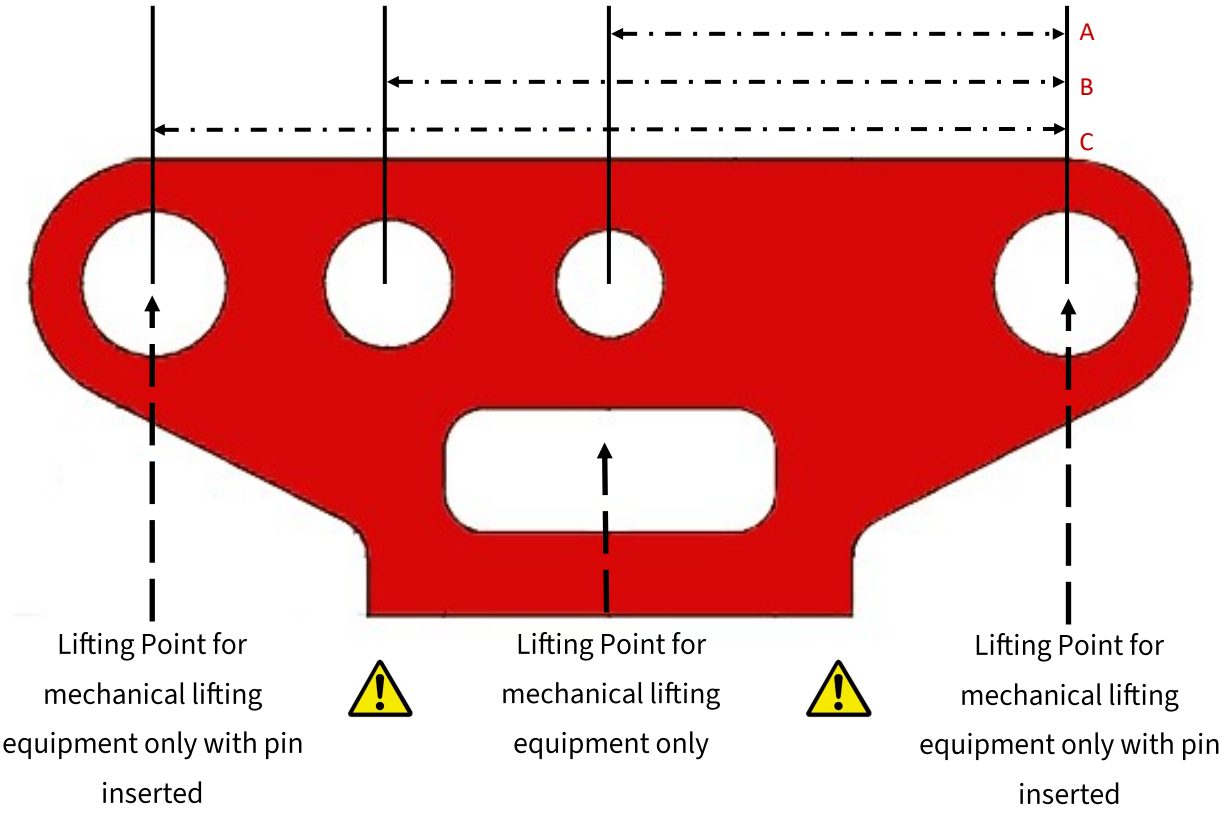

Figure 2 Side view of top bracket and the respective distances between the pin slots and the correct lifting points for removing the Perpetual Pipe Pusher from delivery vehicles.

4. SAFETY AND PRECAUTIONS

4.1 THE FOLLOWING PPE MUST BE WORN AT ALL TIMES:

A. Safety Goggles
B. Hard hat
C. High visibility jacket
D. Gloves
E. Steel toe cap footwear

4.2 Lifting the Perpetual Pipe Pusher needs to carried out using suitable lifting equipment. **ONLY use the designated lifting point as highlighted in Figure 2 page 4.**

4.3 All excavation work shall be carried out in accordance with T/PR/SW/1 – Work Procedure for Excavations or equivalent, and all other related codes of practice.

4.4 Ensure there is a designated banksman to control all operations of the excavator.

4.5 Ensure that the attachment and detachment of the Perpetual Pipe Pusher to and from the excavator takes place within the cordoned off area.

4.6 Ensure that all the pipe handling, manoeuvring and pipe insertion activities using the excavator take place within the cordoned off area.

4.7 Ensure the movement of the excavator arm is contained within the cordoned off area.

4.8 The driver shall operate the excavator and Perpetual Pipe Pusher from the cab at all times.

4.9 Check that the Safe Working Load of the excavator is not exceeded by the combined weight of the Perpetual Pipe Pusher and the PE pipe being handled.

4.10 Check there are no overhead lines in close proximity to the lifting position.

4.11 Check that all of the fittings and attachments required to correctly attach the Perpetual Pipe Pusher to the excavator are available.

4.12 Only lift PE pipe and do not attempt to lift anything else for example cast iron pipe, as this will damage the Perpetual Pipe Pusher and may exceed the Safe Working Load of the excavator.

5. OPERATING INSTRUCTIONS

5.1 Site Preparation: Using the Perpetual Pipe Pusher requires no increase in the size of trench normally excavated.
Where the trench needs shoring or shuttering (where a risk assessment deem it necessary due to depth, unstable ground etc.) ensure no support props hinder the positioning of the Perpetual Pipe Pusher. If this is unavoidable, relocate the excavator to a location where the pipe can still be safely inserted. Table 4 shows suggested excavation lengths for inserting up to and including 180mm PE pipe.

5.2 It is recommended that the Perpetual Pipe Pusher is taken to site on appropriate transport and lifted off/out using suitable mechanical lifting equipment. Use specified lifting points as per Figure 2 page 4.

Size of Excavation Required			
Minimum Total Length			Width
Up to 1m	1m to 2m	2m to 3 m	750
5m	6m	7m	

Table 4—Excavation sizes from UK Standard Main Laying Manual

5.3 Attaching Perpetual Pipe Pusher using Bucket Pins: Position the excavator so that the arm can be lowered onto the swivel bracket on top of the Perpetual Pipe Pusher.

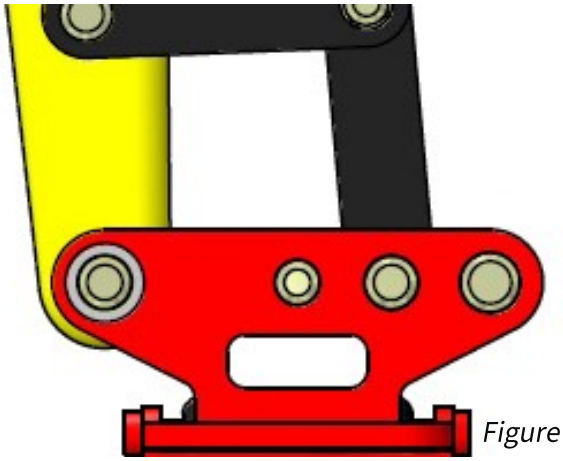

Figure 3

Locate the rigid dipper arm of the excavator in line with the single hole slot and slide the pin fully through. Bushes are not needed for 34mm but are supplied for 30mm and 25mm pins. Swing the link arm to the hole slot of the same size as the pin and slide it fully through. Secure all pins with r-clips provided.

Always use the maximum size pin that will fit with the excavator to prevent a loose fit.

5. OPERATING INSTRUCTIONS (CONTINUED)

5.4 Attaching Perpetual Pipe Pusher using a Pin System Quick Hitch:

Position the excavator so that the arm can be lowered onto the Perpetual Pipe Pusher.

With the pin fitted in the single slot locate the quick hitch so that the open end encompasses the pin. Bushes are not needed for 34mm but are supplied for 30mm and 25mm pins. If the quick hitch is going to fit the top bracket check the alignment of the locking jaw slot with the nearest pin slot on the bracket. If the alignment is good slide the remaining pin fully through. Secure all pins with r-clips provided.

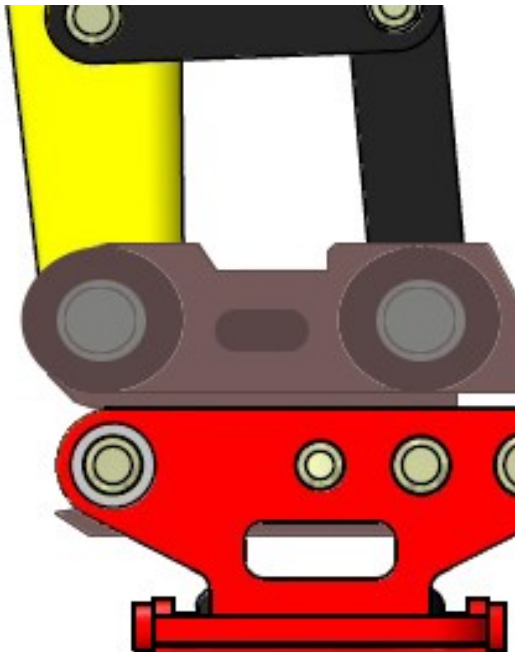

Figure 4

Always use the maximum size pin that will fit with the excavator to prevent a loose fit.
DO NOT USE IF THE LOCKING PIN WILL NOT FULLY ENGAGE.

Note, once the quick hitch is confirmed as fitting, the pins can remain in their position to allow quick removal and attachment of the Perpetual Pipe Pusher.

5.5 Connect the two sets of couplings on the Perpetual Pipe Pusher hoses into the correct fittings on the excavator and secure by turning the knurled swivel ring. Use the Adaptor to take into account 3/4" fittings on the mini excavator.

Ensure no hoses are restricting the movement of the Perpetual Pipe Pusher.

Figure 5

5. OPERATING INSTRUCTIONS (CONTINUED)

5.6 The Perpetual Pipe Pusher is not compatible with single fed excavators and must use an excavator with dual flow hydraulics on the boom.

Figure 6

5.7 In modern excavators the operation of the Perpetual Pipe Pusher may be controlled by the hand operated joy stick.

Figure 7

5.8 Retire to a safe location and raise the Perpetual Pipe Pusher to approximately 1.5m off the ground. Ensure the Perpetual Pipe Pusher remains horizontal—any other position/orientation could cause an imbalance and unexpected shift in the machine.

SWITCH OFF POWER TO DIGGER AND VACATE THE CABIN.

The Adjustment Bolts will be accessible at this height to allow a safe roller setting for the size of PE pipe being inserted.

Figure 8

5.9 Adjusting the PPP for size of pipe:

Figure 10 is the same graphic on the Indicator Bolts on the side of the machine. This shows the setting for 63mm PE—the cap head is located so that it sits in the middle of the 63mm lines.

There are two sets of Pipe Size Gauges on each side of the machine totalling four in total.

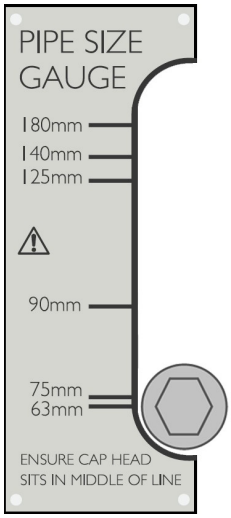

Figure 9

5. OPERATING INSTRUCTIONS (CONTINUED)

5.10 Power to the digger must be off and the cab vacated.

Loosen the two front Roller Securing Bolts (A) and rear two Roller Securing Bolts (at location B). Ensure there is a gap of around 2mm between the underside of cap head and the machine frame—this will allow the chassis to travel when being adjusted.

Use a 17mm Spanner/Socket.

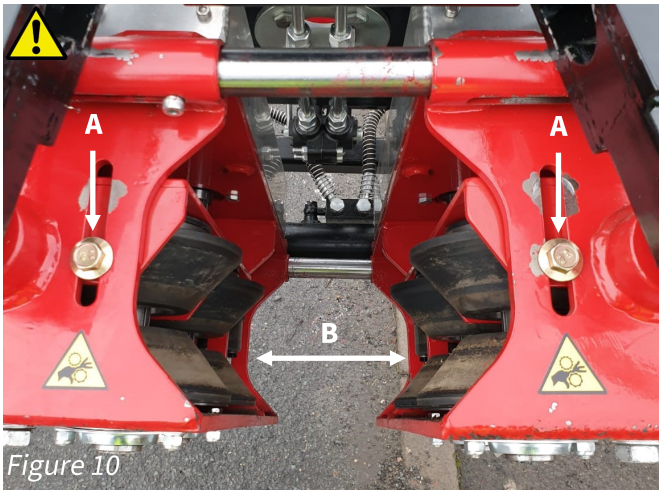

Figure 10

5.11 Check the Indicator Bolts are not tight to the machine body. This will allow the chassis to travel when being adjusted. Figure 12 shows the Indicator Bolts in the 63mm setting as per Figure 10 above. Ensure all four Indicator Bolts (two on both sides of the machine) are not tight to the machine body.

Figure 11

5.12 Underneath the chassis the rollers are raised by winding the Adjustment Bolts as shown by the four arrows in Figure 12.

Clockwise raises the chassis for larger pipe sizes.
Anti-clockwise lowers the chassis for smaller pipe sizes.

Wind each Adjustment Bolt one turn at a time and repeat with the other three. Repeat this process.
Use a 24mm Spanner/Socket.

Ensure the Perpetual Pipe Pusher remains horizontal—any other position/orientation could cause an imbalance and unexpected shift in the machine.


Figure 12

5. OPERATING INSTRUCTIONS (CONTINUED)

5.13 Raise the rollers and monitor the four Indicator Bolts until they are in the correct position. In Figure 13 the middle of the cap head is positioned in line with the 90mm line. When all four Indicator Bolts are in line with the 90mm line the PPP can be used for inserting 90mm PE.

Other sizes are indicated on the Pipe Size Gauge.

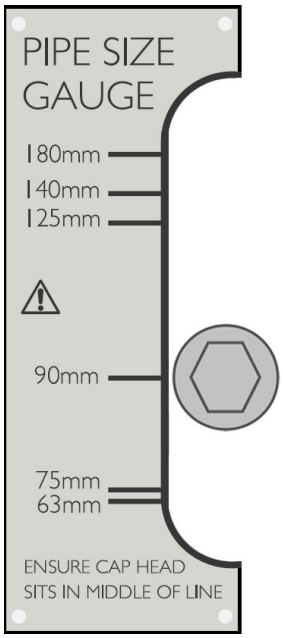

Figure 13

5.14 In Figure 14 the Indicator Bolt sits in the middle of the line for 180mm. When all four Indicator Bolts are in line with the 180mm line the PPP can be used for inserting 180mm PE.

Other sizes are indicated on the Pipe Size Gauge.

Tighten the four Roller Securing Bolts as described in 5.11

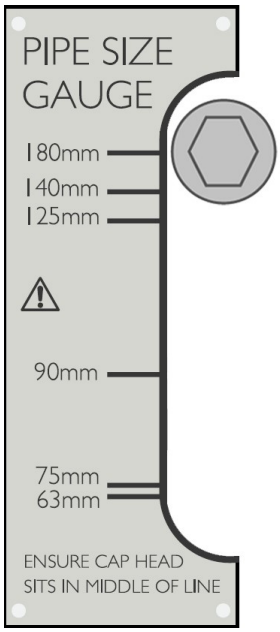

Figure 14

Note: The Perpetual Pipe Pusher is fitted with **two** flow control valves on the hose line. These are located directly behind the flat face couplers on the two separate hose lines. This allows the clamping and insertion speed to be controlled to prevent damage to the PE. As each excavator has different hydraulic hose arrangements on the boom, each hose will have to be adjusted to determine which of these functions it performs:

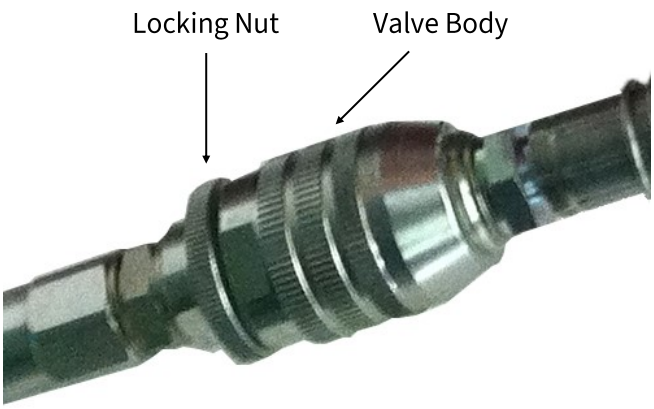

Figure 15

5. OPERATING INSTRUCTIONS (CONTINUED)

5.15 Connect the hoses to the excavator. Loosen the Locking Nut and screw the Valve Body towards the Locking Nut. This will allow the Perpetual Pipe Pusher to operate at maximum power.

- Ensure the hydraulic line on the excavator is open, there is usually a valve operated by a flat face screw driver that must be turned 'in line' to the coupler.
- Also ensure foot pedals in the cabin can be pressed fully down—check feed screws under pedals, or that the joy stick has full revs turned on.


Figure 16

5.16 To visually set the Flow Control Valves the excavator will need to be powered up. Under no circumstances should any limbs be placed inside the chassis containing the rollers and when opening and closing the chassis the operative must step away from the Perpetual Pipe Pusher.

With the lever directly in front of you and to the left of the top bracket the following positions operate the Perpetual Pipe Pusher's functions:

- **10 o'clock position: Rollers**
- **2 o' clock position: Open/Close Rollers**

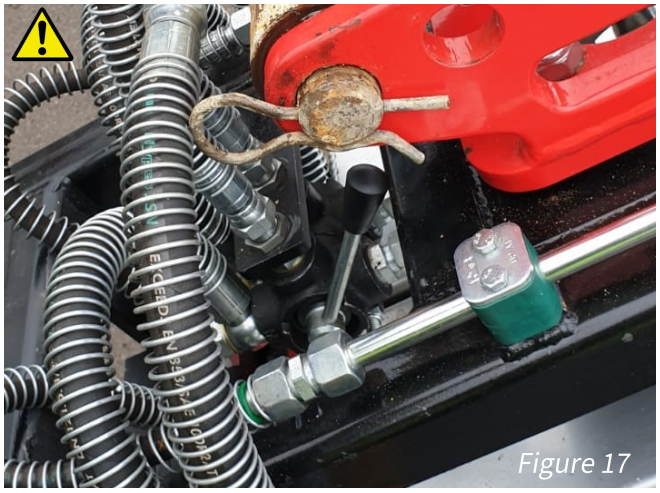
Figure 17

5.17 Carefully offer the PE pipe inside the rollers.

Ensure no limbs are near the machine.


Figure 18

5. OPERATING INSTRUCTIONS (CONTINUED)

5.18 Start up the excavator and close the jaws ensuing the PE pipe is square inside the rollers. If the speed of closure is too fast, adjust one of the Flow Control Valves by screwing the Valve Body away from the Locking Nut. This will be one of the two valves, which one will depend on the hydraulic configuration of the excavator. The speed of opening can also be adjusted using one of the Flow Control Valves


Figure 19

Ensure no limbs are near the machine.

5.19 Switch the power off to the excavator and slide the Function Lever to the other side to operate the rollers (see 5.7)

Restart the excavator and check the speed of the insertion rate **before lowering the Perpetual Pipe Pusher into the trench**. Check both forward and reverse and adjust the flow control valves if required.


Figure 20

5.20 Carefully lower the Perpetual Pipe Pusher into the trench and **line up with host main.**


Figure 21

5.21 When the insertion is ready to take place operate the foot pedal or joy stick and gently roll the pipe into the host main.


Figure 22

5. OPERATING INSTRUCTIONS (CONTINUED)

5.22 Monitor the insertion at all times and pay special attention in case an obstruction is met. If this happens reverse the rollers and pull the pipe out 2-3 meters. Attempt to insert the pipe again however if unsuccessful contact line manager and discuss option.

5.23 When the insertion is complete switch power off to the digger and slide the Function Lever over to the other side and open the rollers off the pipe.

5.24 Carefully lift away the Perpetual Pipe Pusher and locate on the ground in a safe location.

5.25 Unhook the excavator from the Perpetual Pipe Pusher in the opposite manner as described in 5.3 or 5.4.

6. ROUTINE MAINTENANCE

The Perpetual Pipe Pusher has been designed to be relatively free of maintenance. Simple checks on the tightness of bolts, checking for hydraulic leaks and general wear on parts being all that is required in normal day to day operation. When checking the inside of the machine (rollers etc.) ensure there is no power going to the Perpetual Pipe Pusher.

An annual service is recommended which can either be carried out by Steve Vick International or in line with the customers maintenance program. We also recommend anyone servicing the PPP is trained by Steve Vick International prior to doing so.

ROUTINE MAINTENANCE	FREQUENCY
Clean down the machine and check all moving parts for wear and tear.	Daily
Check all hydraulic joints and couplers for leaks.	Daily
Check all hoses are in good condition.	Daily
Ensure the flow control feed is operational.	Daily
Ensure the swivel bracket rotates and is not clogged up with grease and debris.	Daily
Check the rollers are fit for purpose and free from any debris.	Daily
Visually inspect all nuts and bolts paying particular attention to the swivel bracket bolts that hold the PPP to the excavator.	Daily
Check and if necessary re-tighten all nuts and bolts, paying particular attention to the swivel bracket. Bolts used on the swivel bracket are M12 and require a torque setting of 100 ft./lbs.	Weekly

Table 5—Routine maintenance