

PIPEJACKING design guidance for CDM duty holders



PIPE JACKING ASSOCIATION

www.pipejacking.org

This document is a best practice consensus agreed between the PJA & BTS and is issued as GUIDANCE, it does not relieve any CDM Duty holder of their responsibilities under that legislation, likewise where improvements in technology and working practices occur, or through the adoption of measures to mitigate risk, then there is a case to vary the guidance appropriately.

The enclosed table illustrates the guidance, however it must be read in conjunction with the guidance notes and BS6164 Health & Safety in Tunnelling in the Construction Industry.



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This document is a best practice consensus agreed between the Pipe Jacking Association and the British Tunnelling Society.



Internal dimensions & indicative drive lengths for pipejacks and microtunnels

Table 1 Nominal internal diameter of pipeline or microtunnel lining and suitability of different excavation techniques

Excavation technique	<1.2m	1.2m	1.5m	1.8m	>1.8m
Pipejack - machine (remote operation from surface)	Low risk				
Pipejack - machine (operator controlled below ground)		Medium risk			
Pipejack - hand dig		Medium risk			
Pipejack - machine operator controlled (+ mechanical erector)			Medium risk	Low risk	
Pipejack - hand dig (+ mechanical erector)			Medium risk		
Timber heading - hand dig		Medium risk			

Table 2 Indicative drive lengths (e.g. between shafts) and maximum number of drives

Excavation technique	<1.2m	1.2m	1.5m	1.8m	>1.8m
Pipejack - machine (remote operation from surface)	Non Man Entry: distance limited by equipment capability	<250m	<500m	<750m	<750m
Pipejack - machine (operator controlled below ground)		250m to 500m (see Note 7)	to 750m (see Note 7)	>750m (see Note 7)	1000m + (see Note 7)
Pipejack - hand dig		*50m – 2 drive lengths	*75m – 2 drive lengths	*100m (plan to use mini-digger if over 2.1m dia)	
Pipejack - machine operator controlled (+ mechanical erector)			*250m	*500m	>500m (see Note 7)
Pipejack - hand dig (+ mechanical erector)			*50m	*100m (plan to use mini-digger if over 2.1m dia)	
Timber heading - hand dig		*25m - Minimum cross section inside frames to be subject to rigorous risk assessment with consideration for rescue (absolute minimum of 1.2m high x 1.0m wide to be provided)			

Note: Pipe jacks and Microtunnels are now routinely installed at up to 3.4m ID and above subject to site logistics.

Definitions



Designers and Contractors should undertake a robust assessment of the risks associated with pipejacking and tunnelling, in addition to site specific risks and specify the appropriate mitigation measures.



Designers and Contractors should undertake a robust technical assessment and risk assessment in addition to site specific risks and specify the appropriate mitigation measures to justify their decisions to deviate from LOW RISK criteria.



Where a method requires routine personnel access and is below 1.2m ID, Designers and Contractors should not specify pipejacking/tunnelling of this size and construction method. An alternative design solution should be sought.

This table must be read in conjunction with the guidance notes and BS6164 Health and safety in tunnelling in the construction industry - Code of practice

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Notes

- 1 This guidance should be read in conjunction with the current version of BS 6164 Health and safety in tunnelling in the construction industry - Code of practice. It is intended to be used only by those competent to plan, design and construct pipejacks and microtunnels.
- 2 This guidance is for all CDM Duty Holders and is broadly based upon dimensions previously agreed with HSE and updated by the recognised tunnelling industry organisations (BTS/PJA). It is based on experience of the occupational health and safety risks arising from heavy physical work, including the use of vibrating tools, in a confined space along with the need to be able to evacuate quickly/ effect a rescue in a range of reasonably foreseeable situations.

- 3 Complying with the guidance does not relieve the user of their duty to consider the risks arising from the foreseeable hazards of pipejacking and tunnelling, including but not limited to:

Manual handling
Atmosphere
Heat & fire
Ground conditions
Vibration
Ground gases, water & contamination
Ventilation
Confined space working
Escape
Emergency planning

Neither does it relieve the user of the duty to ensure there is adequate space to allow a safe means of access and egress along with adequate working space within the pipejack/tunnel. The minimum internal diameter required for construction may, in some cases, be determined by the criteria above rather than by consideration of the hydraulic requirements for or the intended use of the pipejack/tunnel.

- 4 Indicative drive lengths include a consideration of access and escape requirements of pipejacking systems. Complying with the guidance does not relieve the user of their duty to consider the risks arising from the range of foreseeable emergency events, which could arise and which necessitate escape or rescue of those underground.
- 5 The drive lengths given in Table 2 are indicative. For entries marked *, it is acceptable to exceed the indicative drive lengths where suitable risk assessment has been carried out and where adequate control and mitigation measures are implemented. Exceeding drive lengths by more than 25% but not more than 75% should be considered to result in medium risk and should be referred to the principal designer to determine if the risk mitigation measures proposed are adequate. Exceeding drive length by more than 75% should be considered **not acceptable**.
- 6 All hand dig is categorised as **not acceptable** or **medium risk**. The lengths given in Table 2 for items marked * are indicative and are included as **medium risk**.
- 7 Long drive lengths, which will require frequent access to manage multiple inter jacks; which are not supported by an automatic lubrication system and/or where retooling will be required should be considered **not acceptable** unless the pipejack/tunnel can incorporate appropriate risk mitigation and/or is of sufficiently large cross section to allow the Contractor to incorporate an access envelope in line with current guidance and with appropriate risk assessment and mitigation. All services, including ventilation ducts, spoil handling systems and ancillaries should be outside the clear access envelope.
- 8 Notwithstanding drive length capability, where small diameter machines are able to have tools replaced within the ground, the first choice – least risk option should always be to change tools within an intermediate shaft rather than within the pipejack/tunnel. Where possible, drive lengths should be designed such that in-tunnel tool changes are avoided.