

## Umbrella Pipe System

### DESCRIPTION

The umbrella arch system, also known as the canopy tube method, is increasingly utilized in tunnel construction, particularly in geologically challenging or high-risk areas. This technique involves the strategic installation of a protective arch of steel pipes, often referred to as "canopy tubes" or "spiles," around the tunnel's excavation perimeter. The primary purpose of this system is to stabilize the surrounding ground and mitigate the risk of surface subsidence, which could otherwise lead to structural damage to buildings or infrastructure located above the tunnel route. The selection of the appropriate pipe diameter is crucial, as it directly impacts both the structural integrity and economic viability of the project. A properly dimensioned umbrella arch system can significantly enhance tunnel stability by distributing loads and reducing deformation within the tunnel lining. Conversely, undersized pipes may compromise the system's effectiveness, while oversized pipes can lead to unnecessary cost increases and extended project timelines. Thus, the choice of pipe diameter must balance the technical demands of the ground conditions with the project's budgetary and scheduling constraints. In summary, the umbrella arch system is a vital component in modern tunnel construction, particularly in areas with poor ground conditions, as it offers an effective means of protecting both the tunnel and the structures above it from potential damage.



### Pilot bit 2W

The pilot bit 2W is a specialized drilling tool used in the installation of umbrella arch systems, which are critical for stabilizing tunnels in poor ground conditions. This bit is designed for precise and efficient drilling of pilot holes, which guide the placement of steel pipes or spiles in the canopy tube method. The "2W" designation refers to the bit's specific design features, including its double-wing structure, which enhances drilling stability and ensures accurate alignment of the steel pipes. This precision is crucial in maintaining the structural integrity of the tunnel and minimizing potential ground disturbances. The pilot bit 2W is typically used in conjunction with high-performance drilling rigs, ensuring optimal performance in challenging geotechnical environments. Its robust

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construction and advanced design make it an essential component in the successful implementation of umbrella arch systems.

MODEL	OUTER DIA	THICKNESS	INNER DIA	DRILLING PIDE	PILOT BIT	THREAD TYPE
2UMB3,5	88.9mm	3-4mm	80mm	ISO 10208	R32, T38, R38, T45, T51	
2UMB4	101.6mm	4-6mm	80mm	ISO 10208	R32, T38, R38, T45, T51	
2UMB4,5	114.3mm	6-8mm	95mm	ISO 10208	R32, T38, R38, T45, T51	



This table summarizes the specifications for different models of the Pilot Bit 2W, including outer diameter, thickness, inner diameter, drilling standards (ISO 10208), and thread types. We are able to produce any size bits and ballistic, semi-ballistic or spherical button type diamonds on your demands.

### Pilot bit 3W three wings

The Pilot Bit 3W is a highly specialized drilling tool designed for use in the umbrella pipe system, specifically tailored for challenging tunnel construction projects. Characterized by its three-wing design, the 3W bit offers enhanced cutting efficiency and stability, making it ideal for creating precise pilot holes in varying ground conditions. The additional wing compared to the 2W model provides superior control and reduces deviation during drilling, ensuring optimal alignment of the steel pipes or spiles in the canopy tube method. This design improvement not only enhances the structural integrity of the tunnel but also contributes to more efficient project timelines and cost-effectiveness. The Pilot Bit 3W is a crucial component for achieving high-quality results in geotechnically complex environments.

MODEL	OUTER DIA	THICKNESS	OUTER DIA (Wings)	DRILLING PIDE	PILOT BIT	THREAD TYPE
UMB3,5	88.9mm	3-4mm	72mm	ISO 10208	R32, T38, R38, T45, T51	
UMB4	101.6mm	4-8mm	84mm	ISO 10208	R32, T38, R38, T45, T51	
UMB4,5	114.3mm	6-10mm	90mm	ISO 10208	R32, T38, R38, T45, T51	

This table outlines the specifications for the three-wing model of the Pilot Bit 3W, chosen based on soil conditions, and provides details on outer diameter, thickness, and the corresponding thread types and standards. We are able to produce any size bits and ballistic, semi-ballistic or spherical button type diamonds on your demands.

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### **Umbrella pipe adabter pin and box**

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The Umbrella Pipe Adapter, featuring both pin and box connections, is a crucial component in tunnel stabilization systems, particularly in the umbrella arch method. This adapter ensures a secure and seamless connection between the drilling rig and the steel pipes used in the canopy tube system. The pin and box design allows for efficient assembly and disassembly, facilitating precise alignment and strong joint integrity under high-stress conditions. Its robust construction is engineered to withstand the demanding environments of tunnel construction, ensuring reliable performance and minimizing the risk of connection failure during operations.



### **Ring bit**

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The ring bit is a critical component used alongside a pilot bit in drilling operations. It is designed to remain embedded in the soil after the drilling process is completed. Its primary function is to create a precise and stable borehole for further construction or stabilization work. By ensuring a consistent and accurate excavation, the ring bit facilitates the effective installation of subsequent structural elements, such as umbrella pipes, thereby enhancing the stability and integrity of underground constructions.



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### Ring bit two wings

MODEL	OUTER DIA	THICKNESS	OUTER DIA (Wings)	INNER DIA	DRILLING PIDE	PILOT BIT
2UMB3.5	88.9mm	3-4mm	100mm	70mm	3.5	Compatible with Pilot Bit 3.5
2UMB4	101.6mm	6-10mm	110mm	70mm	4	Compatible with Pilot Bit 4
2UMB4.5	114.3mm	6-10mm	120mm	76mm	4.5	Compatible with Pilot Bit 4.5

This table provides the specifications for the Ring Bit Two Wings model, including outer diameter, thickness, and dimensions for both the outer and inner diameters. It also indicates compatibility with different drilling pidge sizes and pilot bits. We are able to produce any size bits and ballistic, semi-ballistic or spherical button type diamonds on your demands.

### Ring bit three wings

DRILLING PIDE	RING BIT MODEL	OUTER DIA	THICKNESS	OUTER DIA (Wings)	INNER DIA
3.5	UMB3.5	88.9mm	3-4mm	108mm	50mm
4	UMB4	101.6mm	4-8mm	120mm	60mm
4.5	UMB4.5	114.3mm	6-10mm	130mm	76mm

This table provides the specifications for the three-wing Ring Bit model, including outer diameter, thickness, outer diameter of the wings, and inner diameter for various drilling pidge sizes. We are able to produce any size bits and ballistic, semi-ballistic or spherical button type diamonds on your demands.

### Umbrella pipe

The umbrella pipe is a crucial component in ground stabilization and tunneling projects. It is used in conjunction with ring bits, where the ring bit facilitates the creation of a borehole through the soil. As the ring bit advances, the umbrella pipe is positioned within the borehole. Once in place, the strength and stability of the installation are achieved by concreting the space inside the pipe. This process ensures that the surrounding soil is effectively supported and stabilized, providing a secure foundation for further construction activities.



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