

MANAGED PRESSURE DRILLING

Sigra designs and manufactures customised managed pressure drilling equipment for the tunnelling industry. For drilling and grouting operations where formation fluid ingress into a tunnel needs to be mitigated, and the formation fluid pressure closely managed, a well-designed managed pressure system is required. Sigra works with clients to determine the goals and challenges of a specific project to design the best fitting managed pressure drilling system.

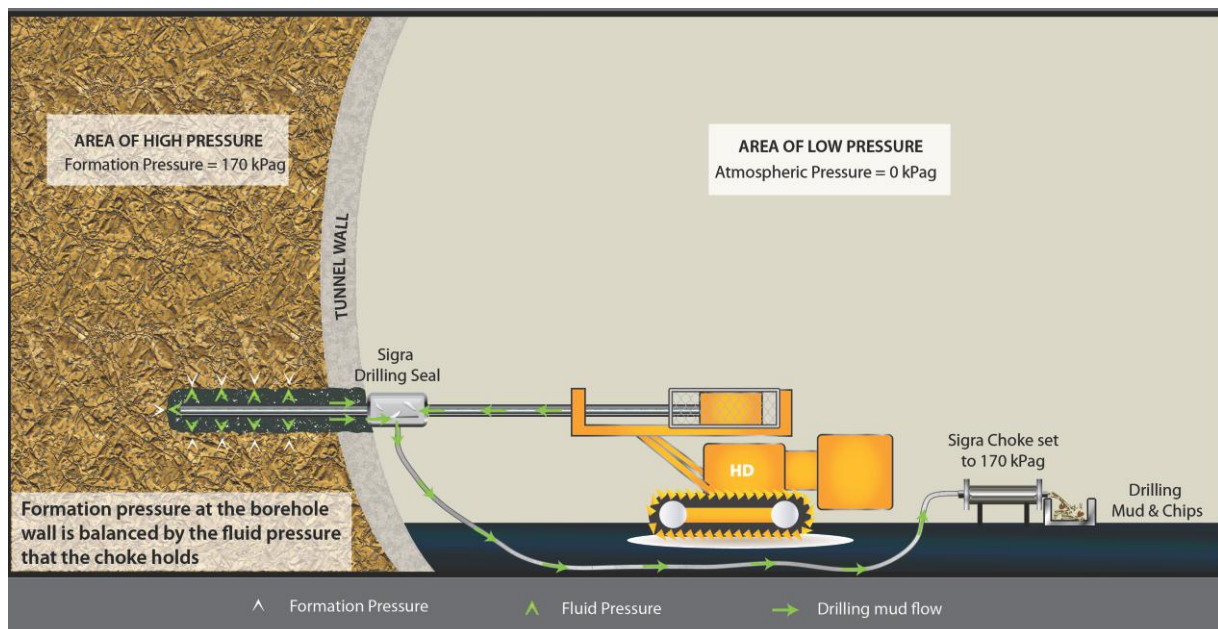
What is Managed Pressure Drilling?

Managed pressure drilling involves controlling the pressure within a borehole so that excessive fluid is not lost into the ground nor produced into the borehole. By controlling pressure within the borehole, problems with piping of unconsolidated material into the hole and liquefaction of material around the hole are avoided. Borehole stability is also improved.

In deeper underground mining operations the control of borehole pressure is frequently essential for the safety of the operation as high pressure gas and water may be present.

In tunnelling operations the control of borehole pressure throughout the drilling process enables the installation of spiles, ground freezing pipes or grouting systems such as tube-a-manchettes, while maintaining pressure within the borehole. This approach enables stable zones to be created ahead of underground excavation. This approach may also be used in the creation of stable ground ahead of cross passage excavation between tunnels.

Managed pressure drilling may also be used to permit the drilling and installation of anchor holes through retaining walls or sheet piles where drilling must take place from below the water table.



Managed Pressure Drilling Schematic

Sigra Managed Pressure Drilling Equipment

Sigra has manufactured managed pressure drilling equipment since 1994 when it developed a system to drill into gassy coals and rock in coal mines. This was capable of operating at 7 MPa pressure. The key to the successful operation of this equipment was its elastomeric choke that permitted the passage of cuttings and fluid through it while maintaining a constant pressure within the borehole.

A range of well control systems were then, and are, produced to control shallow gas (to 1500 m) in exploration drilling operations from surface. These were based upon the same choke technology and also incorporated an annular blow out preventer to shut in the well in the event of it becoming unbalanced.

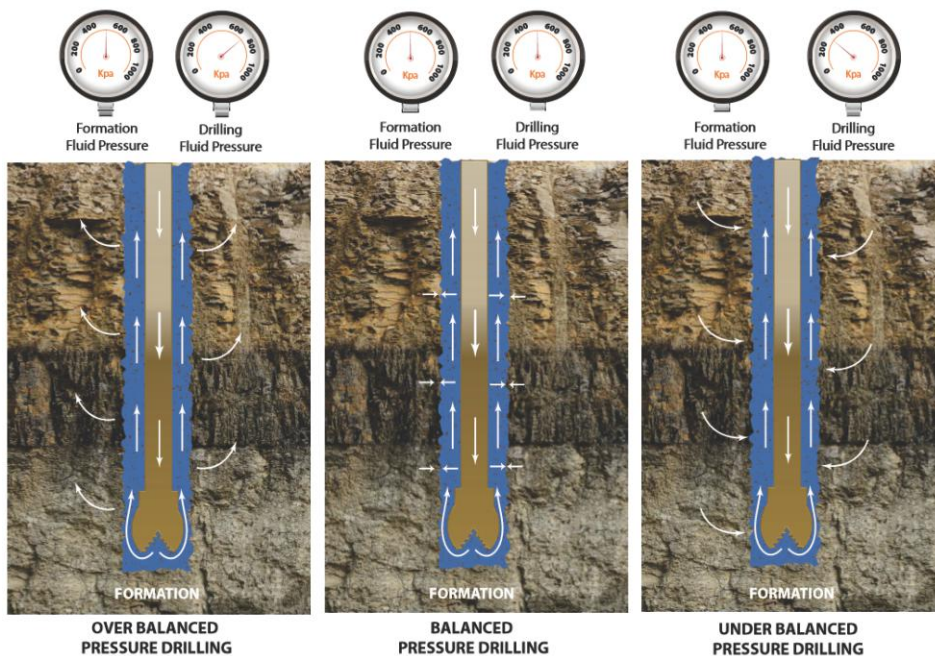
Sigra has developed and deployed a managed pressure drilling system for civil applications. This is designed to operate at lower pressures and to be able to handle bigger cuttings sizes. The device attaches to a wellhead (standpipe) and only permits the exit of fluid from the hole through the choke at a preset controlled pressure. Thus an entire drilling operation and the insertion of suitable pipes may be conducted at a controlled pressure.

The equipment includes a valve at the standpipe, an annular blow out preventer and a lip or positively energised seal system to drill through. It also uses an elastomeric choke which can pass cuttings up to 40 mm diameter at pressure tolerance of 5% of the set choke pressure.

Sigra can custom design and manufacture a balanced pressure drilling system to suit the application.



Sigra managed pressure drilling equipment installed for cross tunnel drilling and consolidation grouting. Lantang Tunnel, Hong Kong



How managed pressure drilling works