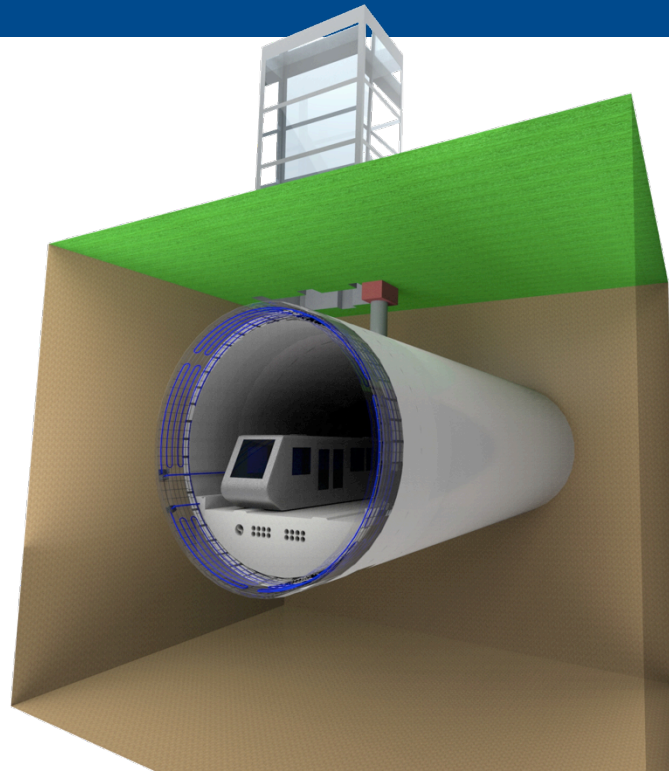


ENERTUN – Energy tunnel segmental lining

The concept developed here is an improved tunnel precast segmental lining equipped to exchange heat with the ground in order to heat and cool adjacent buildings. A circuit of pipes is installed in each segment in the factory before precasting and a fluid circulates through them allowing for heat exchange with the ground.



IPC Codes



Keywords

Energy tunnel

Heat exchange

Heating and cooling of buildings

Geothermal energy

Renewable energy

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ENERTUN – Energy tunnel segmental lining



Description

Here is presented an improved tunnel segmental lining, precast in the factory, to be used for tunnels constructed by TBM. The segments are equipped with a system of pipes to exchange heat with the subsoil.

It is composed by:

- a structural concrete element;
- a system of pipes for the heat exchange.

The concrete segment can be equipped with a single circuit of pipes on the ground side to exchange heat with the soil (ENERTUN GROUND), a single circuit of pipes on the tunnel side to exchange heat with the tunnel internal air (ENERTUN AIR) or a double system of pipes to exchange heat with both

sides (ENERTUN AIR&GROUND).

Each equipped segment is connected to the adjacent one through hydraulic connections to form a ring of segmental lining.

The system allows maximising the heat exchange and reducing the hydraulic head losses.

The system can be used to extract heat from the ground to heat the adjacent buildings or inject heat into the ground to provide air conditioning (metro tunnels or tunnels in urban areas) or to reduce costs of cooling deep mountain tunnels.

Applications

- Metro line tunnels
- Shallow tunnels
- Deep tunnels
- Underground sewage systems

Advantages

- High heat exchange
- Low hydraulic head losses
- Rapid installation
- Low cost

