MINOVA

MINING

Cable bolts

TYPE KL 15.5 AND KL 15.5 K

Certificate issued by the "INOVA" Technical Innovation Centre Ltd. No. 99/4/2017

DESCRIPTION

Cable bolts are made from cable of Ø15.5 mm and 1+6 structure in accordance with PN-71/M-80236 standard. The following types of bolt can be distinguished:

- Cable KL 15.5 (Plain Cable)
- Cable KL 15.5 K (Bird cage cable bolt)

The cable lay of KL 15.5 K bolt was modified to form birdcage like bulbs of 100mm in length and 26 ÷ 28 mm in diameter. This ensures a better force distribution affecting the cement grout around the cable. When filled with grout the cages act like stiff bulbs in relation to the cement face.

APPLICATION AND USE

Cable bolts KL 15.5 and KL 15.5 K are designed to be used to reinforce ground and rock near mining excavations and in particular near workings in weak strata with lower strength or entering mining pressure zones.

ADVANTAGES

- Fast bolting using the barrel and wedge system
- Possibility of applying a technical solution for pre-tensioning
- Ability to use various types of plates in the anchor sets

TECHNICAL DATA

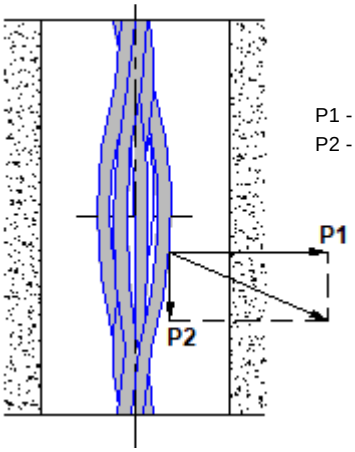
DESIGN DATA

The bulbs remain non-cracked despite considerable forces affecting the cable as radial forces occurring in the wires, which could potentially crush the cement in the bulbs, are relatively light when compared to axial forces.

The shape of the cable considerably affects force distribution around the cable caused by cable displacement in the rock.

The bulbs cause considerable forces perpendicular to the hole wall compressing the grout and at the same time reduce compressive forces parallel to the hole axis.

Force distribution around cable bulb



P1 - compressive force
P2 - shearing force

As a result, cage cables bolts perform better in the rock, i.e. cable movement in the rock, caused by load intensity, is smaller when compared to plain cable.

MECHANICAL PROPERTIES

Cable bolts should have the following mechanical properties:

- Rm = min 1420 MPa
- Rm = min 1620 MPa
- Rm = min 1800 Mpa

Approval tests have shown that cement grout hardening is 3 times stronger for KL15.5 K cage cable bolts than plain cable bolts, while the bolt length stays the same.

BOLT DATA

Details	Value
Cable diameter	15.5 mm
Cage diameter	26 ÷ 28 mm
Cage distance	200, 300, 400, 500, etc (recommended distance 500 mm)
Bolt length	1 ÷ 10 m
Capacity required by regulations	min 150 kN
Useful load	260 kN

Square washers, round profiled or flat washers are made of 8 or 10 mm metal plate, and come in sizes from 150 to 300 mm.

If elements of mining equipment need to be attached, use washer plates with a side hole or an eyelet.

Three-part clamping ring along with the bearing washer make the roof set.

M30 tensioning sleeve and M30 nut are used to apply the initial tension to the bolt.

APPLICATION METHOD

- Drill the hole of appropriate length and Ø > 25 mm for plain cable or Ø > 38 mm for cage cable bolts.
- Prepare the cable to be installed (attach a vent pipe of Ø6 or Ø8 mm to the cable).
- Insert the cable into the hole letting 15 to 20 cm of the cable out of the hole.
- Mount and fix the injection head.
- Prepare cement and water grout in the mixer.
- Inject the grout until cement wash appears in the vent tube or the air stops flowing out.
- After 24 hours fix the bearing washer, M30 sleeve and nut (if included) and the clamp.
- If the bolt comes with M30 tensioning sleeve and M30 nut, the initial tension of at least 30 kN should be applied using a torque wrench with the torque of at least 60 Nm.

Installation procedure may differ when adhesives or other equipment is used to install the bolt.

PACKAGING AND TRANSPORTATION

Bolts can be tied in 10 pcs. benches and additionally packaged in bundles of 10 benches.

The plates are stapled in 10pcs sets with wire and stacked on pallets.

The other elements are packed in containers.

Based on an agreement between the supplier and the recipient, an individual method of packaging is allowed.

APPROVALS AND CERTIFICATES

- KL 15.5 and KL15.5 K cable bolts have Certificate of Conformity No. 99/4/2017 issued by “INOVA” Technical Innovation Centre Ltd. in Lubin.

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