

"ROCK ANCHOR"

Expanding Mechanical Anchors For Securing Tie Rod into Concrete and Rock

Expanding anchors can be used for a variety of applications, **They are:**

- Easy to install.
- Instantly loadable.
- Economical due to the load capacity of the tie rod.

Additional features are:

- The length of the steel bars can be adapted to individual requirements on the actual site, because the course thread runs the whole length of the tie bar.
- The tie bar which will take a load of 100kn (axial safe working load), comes in lengths of up to 6 metres.

Field of Application:

- Consolidation of friable rock.
- **Securing** of loose blocks of rock.
- Fixing of steel components, new concrete sections, formwork on **Concrete and Rock**

The Expanding Anchorage

a) Effect of Expanding Anchorage

The expanding anchorages are made up of 2 or 4 expanding segments (held together by means of a clip), and a cone nut provided with the correct thread for the tie bar, which is pulled into the segments under load. During this process, it is important that the teeth of the segments make contact with the bore hole wall when the slightest pressure is exerted during installation. This is to ensure that on stressing the anchor locks immediately.

The full effect of the expanding wedge does not take place until the stressing load is applied. Therefore, it is useful to pre-load the expanding anchor to check on the one hand the carrying capacity, and on the other, to prevent any movement of the cone nut in the expanding segments.

b) Loading Capacity of the Expanding Anchorage

The anchoring force is transmitted in a very concentrated manner (point anchorage) via the teeth of the expanding segments onto the bore hole wall under high bearing pressure. During this process, the wedge nut is pulled into the pressure segments as the load increases.

c) Type of Loading

The anchors shall be loaded only in the axial direction and with static loads. Vibrations in the anchorage medium and strong stress reversals at anchors may lead to a partial de-tensioning of the anchor due to the high local stress at the bore hole wall. If vibrations are to be expected, it is advisable to use a resin anchor or to provide an additional bond to the anchorage medium through grouting.

The carrying capacity of the expanding anchorage is therefore dependant on:-

i) The Strength of the Anchorage Medium (mainly concrete and rock)

Compressive strength, shear strength, modulus of elasticity, size, cover and open seams of the anchorage medium influence the carrying behaviour of the expanding anchorage.

ii) The Bore Hole Diameter

The expansion of the anchor and thus the interlocking with the bore hole wall is dependant on the bore hole diameter. The anchorage load is higher, the slower the cone nut is pulled into the expanding segments under load. Expanding anchorage and bore hole diameter must be perfectly matched. The diameter of the bore hole must be 1mm to a maximum of 3mm larger than the diameter of the expanding anchorage. The influence of both factors on the actual carrying capacity in a given anchorage medium can be checked only by conducting suitable tests in situ.

IMPORTANT NOTICE

This information must be read in conjunction with the **EXPANDING ANCHORAGES INSTALLATIONS FOR TEMPORARY USE** information sheet as issued by **The Manufacturer**. Your attention in particular is drawn to the statement contained in the last paragraph overleaf.



Direct Chemicals
PO BOX 3786, Bracknell
Berkshire, RG12 7TH
Tel: 0118 989 2666
Fax: 0118 989 0929
Email: sales@dichem.co.uk
Web: www.dichem.co.uk



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Expanding Anchorages Installations for Temporary Use.

15mm Expanding Anchorages are designed to work by the action of a cone and wedge mechanism, causing the wedge shells to compress the material in which it is installed (concrete or rock).

The following instructions are given as a general guide and should not be taken as comprehensive:

- The borehole should be drilled using a rotary impact bit and blown clean using compressed air.
- The borehole diameter should be controlled, such that its range of diameters is within the band 35-37mm, with 35mm providing the highest pull out force.
- After installation, the anchorage should be 'locked' by sharply pulling the wedge to the shells or screwing the bar to 'home'.
- A preload of 5-10 tonnes should be applied, in particular, if no initial information is accepted.

Specially for Formwork:

- The depth of the borehole should be at least 200mm in reinforced concrete.
- When the vibration is present, the load within ties held by expanding anchorages should be constantly monitored.

If all the above conditions are adhered to for 15mm threadbar an ultimate load capacity of between 130 and 160 kN should be possible in 40 N/mm² concrete. In competent non-jointed rock of typical strengths (80-100 N/mm²), the full 190 kN ultimate of the bar may be realised.

The manufacturers give this information in good faith, but has no control over the ultimate site installation and usage conditions. The final decision regarding factors of safety must therefore be the responsibility of the Engineer in charge.



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