

- 1 -

IMPACT-TYPE ANCHORDescription

The invention relates to an impact-type anchor, consisting of a partially slit metal sleeve and an expander body that can be driven into the metal sleeve, according to the preamble of claim 1.

The known impact-type anchors of the above-mentioned type (DE-U 76 12 316, DE-U 76 36 399) are generally made of a solid material within which an internal thread is provided, the central bore of which thread tapers conically towards the leading end. Inserted into that central bore is an expander body that is driven into the narrowing bore using a drive-in tool in order to expand the impact-type anchor. In the region of the narrowing bore the impact-type anchor has longitudinal slits to form expansible legs. The known impact-type anchors are usually made of solid material, the bore with the internal thread and the slits being produced by a machining process. There have also been attempts to construct the impact-type anchor in such a manner that it is possible to manufacture it using a stamping/bending process. Such an impact-type anchor is known, for example, from DE-U 74 24 831. In that impact-type anchor the tapering internal bore is formed by indentations that are so arranged that, in the inner faces of the expansible shells resulting from the longitudinal slitting,

transverse ribs occur spaced from one another, the height of which transverse ribs increases from rib to rib towards the insertion end. In the case of high expanding pressure forces, however, the indentations are deformed so that the expanding forces applied by the expander body are not converted into corresponding holding forces of the impact-type anchor. The known impact-type anchor is therefore not suitable for anchoring in highly rigid materials, such as, for example, concrete.

The problem underlying the invention is to construct an impact-type anchor according to the preamble so that it can be manufactured inexpensively using a process not involving machining but has the high pull-out values of an impact-type anchor manufactured from solid material.

That problem is solved by the features given in claim 1.

To manufacture the impact-type anchor, first the outline of the developed form of the metal sleeve is stamped out of a metal strip in a stamping and bending tool, the two sections that form the expansible leg initially being contiguous with one another in the axial direction. In further steps in the bending tool the turns of the thread are stamped in and the second section of the expansible leg is bent up against the first section. In order to connect the two sections to one another non-displaceably, for example, a punched point can be struck outwards from the outer face of the second section, which punched point presses into the outer face of the first section. The sheet metal blank is then rolled up to form a sleeve and is optionally joined at the seam using a tongue connection. Adjustment of the expansible legs having double wall thickness to a continuously uniform diameter necessarily gives rise to a bending inwards of the first section of the expansible legs resulting in a

narrowing internal bore. An expander body can then be driven into that narrowing internal bore to expand the impact-type anchor. The thickened region of the expansible legs that is formed as a result of the two sections resting one against the other allows a degree of expansion that corresponds to twice the thickness of the wall of the sleeve.

In order to convert that degree of expansion into pull-out force, it is necessary according to the invention for the two sections resting one against the other to be connected to one another non-displaceably. Without such a connection the folded-over second section of the expansible leg would be sheared off from the first section at the bend even at a low tractive force that would as such be obtainable as a result of an expansion by twice the wall thickness of the expansible legs. As a result of the non-displaceable connection of the two sections, for example by way of a punched point, spot weld or by tooththing that is formed by transverse ribs, the shearing force acting on the bend is reduced. The pull-out force can thus be increased considerably before shearing off occurs and accordingly the holding force of the plug can be increased. With the impact-type anchor according to the invention, the same holding values are obtainable as in the case of impact-type anchors made from solid material, the manufacturing costs, however, being considerably less as a result of the non-machining production in a stamping and bending tool.

In order to obtain a uniformly tapering internal bore, it is advantageous to provide the inner face of the second section that rests against the first section with a chamfer that corresponds to the angle through which the first section is bent inwards.

Further advantageous constructions are given in the subsidiary claims and in the description.

Embodiments of the invention are illustrated in the drawings, in which:

- Figure 1 shows the impact-type anchor with an inserted expander pin,
- Figure 2 shows the outline of the stamping,
- Figure 3 shows the connection of the two sections of the expansible leg by means of a spot weld, and
- Figure 4 shows the connection of the two sections of the expansible leg by means of toothing that is formed by transverse ribs.

The impact-type anchor 1 illustrated in Figure 1 consists of a metal sleeve 2 that has a through bore 3 that is at first cylindrical and then in the region of the portion provided for expansion tapers conically towards the leading end. An internal thread 4 is provided in the rear region of the bore 3. An expander body 5 is inserted in the bore 3, which expander body has a cylindrical section and, adjoining the latter, a truncated cone 6 that tapers towards the leading end.

The tapering of the bore 3 after the internal thread 4 is achieved by the fact that the expansible legs 7 are bent inwards, the inner faces of the expansible legs forming an angle of inward bend α of from 5 to 7° towards the central axis of the impact-type anchor. A second section 7b of the expansible legs 7 is folded over onto the outer face of the first section 7a in such a manner that, after

the folding over, the outer face of the second section 7b has approximately the same outer diameter as the impact-type anchor has in the region of the internal thread. As a result of the folding over, an expansible region is formed that corresponds to twice the wall thickness of the sleeve 2. In order to prevent the two sections 7a, 7b from shearing off at the bend 8 in the case of high pull-out forces, the two sections are connected to one another by means of a punched point 9 to be shear-resistant.

The metal sleeve 2 is manufactured in a stamping and bending tool in which first the outline 10 of the stamping illustrated in Figure 2 is stamped out. The section 7b is then folded over at the bend 8 onto the outer face of section 7a to form the expansible leg 7. The sections 7a, 7b are separated from one another by a slit 11. At the same time the section 7a is given a slightly conical profile to enable the section 7a to be bent inwards through the angle α as the blank is subsequently rolled up to form the sleeve 2. On being rolled up, the sleeve 2 is joined at the seam 14 by the tongue 12 arranged on one longitudinal edge and the recess 13 arranged on the other longitudinal side. As a result of the two slits 11 and the seam 14, in the embodiment illustrated three expansible legs are formed after the rolling up.

The internal thread 4 can either be cut after the rolling up or can be produced by stamping in the turns of the thread in the stamping and bending tool. The punched point 9 can also be made either after rolling up the sleeve or even after folding together the two sections 7a, 7b.

Figure 3 shows a construction in which the shear-

resistant connection between sections 7a and 7b is obtained by means of a spot weld 15. In Figure 4 the shear-resistant connection is effected by means of tothing that is formed by transverse ribs 16 on the outer face of section 7a and on the folded-over inner face of section 7b, which transverse ribs 16 engage with one another. In order to obtain uniform tapering of the bore 3 in the region of the expansible legs, the inner face of the folded-over section 7b has a chamfer 17 that corresponds to the angle of inward bend α .



Patent Claims

1. Impact-type anchor, consisting of a metal sleeve that has an internal thread for screwing in a screw and is partially slit to form expansible legs, having a through bore that is at first cylindrical and then in the region of the portion provided for expansion tapers towards the leading end, into which bore an expander body can be driven to expand the impact-type anchor, the metal sleeve being stamped out of a sheet metal blank and then rolled up to form a sleeve joined at its seam, characterized in that the expansible legs (7) have a first section (7a) that is bent inwards, onto the outer face of which first section there is bent round a second section (7b), and the two sections (7a, 7b) that rest one against the other have a shear-resistant connection to one another.
2. Impact-type anchor according to claim 1, characterized in that the two sections (7a, 7b) of the expansible legs (7) are connected to one another by means of a punched point (9).
3. Impact-type anchor according to claim 1, characterized in that the two sections (7a, 7b) of the expansible legs (7) are connected to one another by means of a spot weld (15).
4. Impact-type anchor according to claim 1, charac-



- 8 -

terized in that the two sections (7a, 7b) of the expandable legs (7) are connected to one another by means of tothing that is formed by transverse ribs (16) that engage with one another.

5. Impact-type anchor according to claim 1, characterized in that the inner face of the section (7b) that rests against the outer face of the section (7a) is provided with a chamfer (17) that corresponds approximately to the angle (α) through which the first section (7a) bends inwards.

6. Impact-type anchor according to claim 1, characterized in that the angle (α) through which the first section (7a) bends inwards is of from 5 to 7°.