

15

mechanical connections for concrete reinforcing
concrete reinforcing rod permitting implementa
said process, and to a mechanical connection
reinforcing rods thus produced. It will find an
in particular, in the field of concrete building
building construction.

20

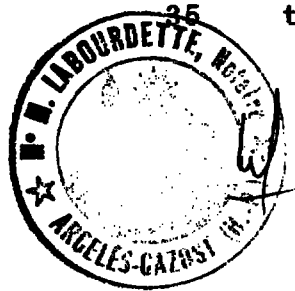
To connect concrete reinforcing rods, in
practice to produce junctions, the role of which
the transmission of the tensile stress; the con
further be convenient to use and inexpensive.
have proposed various solutions to ensure th
connection of concrete reinforcing rods.

25

First of all, there is the overlapping
technique has several drawbacks; in particular,
large length of concrete reinforcing rod, up t
for example, has to be has to be left projecting
junction can be effected subsequently, and thi
and difficult, sometimes even impossible, to fo
to the large rod diameters encountered.

30

Another technique proposed consists
mechanical connection. We know, for example, of
threading system, wherein the ends of t



15

document weakens the concrete reinforcing rod, as earlier, and the rod has to be overdimensioned to the localized weakness in the area of the threads.

20

Another mechanical connection technique is this involves crimping the ends of the reinforcing rods joined together. For this purpose, use is made into which are fitted the two ends of the reinforcing rods. Using a jack and a press, the rods are crimped onto the concrete reinforcing rods.

25

This technique presents high risks of failure on account of the crimping operation, which is delicate and difficult to verify. This defect considerably reduces the mechanical strength of the connection. It is difficult, on site, to place a press in the required position to crimp the socket to be crimped. In addition, the use of this technique is costly.

30

Document FR-1-1 047 189 discloses a fastener for metal wires and bars, wherein the fastener takes the form of a frustoconical upset head, which is cold stamped, this being after the wire or bar is introduced into the fixing pieces. The shape of the head is such that it is what gives the fastener the necessary strength.



following which permanent strain must not exceed

15

In other countries, these standards are severe. For example, in the United States, the standard corresponds to 80% of the elastic limit. Similar standards are also applied in the nuclear field.

20

Such tests, when they are carried out are delicate to implement, as they necessitate the use of torque wrenches, which increases the cost of the tests made.

25

Furthermore, if the different members have not been precision machined, the mechanical connection made during these tests are conducted, to conform to the criteria of these standards. The connection then has to be made again, which has an appreciable effect on the cost. However, high precision manufacturing processes require specialized labour and special attention, with the result that the solution is not an economical one.

30

The main object of the invention is to provide a process for producing mechanical connections for concrete reinforcing rods, a concrete reinforcing rod permitting implementation of the said process, and a mechanical connection for concrete reinforcing rods thus produced which offer the advantages



15

tightening equipment is required, which is appropriate for use on site.

Financially speaking, the technique according to the present invention necessitates a limited amount of means and conventional means that are not inconvenient.

20

One of the objects of the invention is to provide a process for producing mechanical connections between reinforcing rods, a concrete reinforcing rod and the implementation of the said process, and a connection for concrete reinforcing rods thus produced make it possible to conform to the very severe criteria laid down in certain standards and regulations requiring test stresses representing the elastic limit.

25

30

One of the objects of the present invention is to provide a process for producing mechanical connections between concrete reinforcing rods that makes it possible to produce mechanical connections in which all the threads of the reinforcing rods are tested, which is of great importance in terms of quality control, and which provides a substantial guarantee for the structure.

Hitherto, the known techniques did, admittedly,



15

cross-section " Φ " and the ends of which are three internally threaded connecting sleeves, is characterized by the fact that:

20

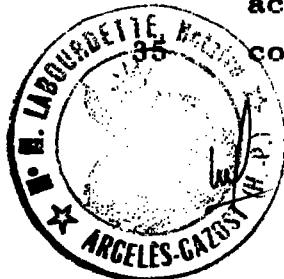
- prior to threading, the end or ends of the reinforcing rods to be connected undergo cold upsetting in order to produce a reinforced area having a diameter greater than the said nominal cross-section " Φ ",
- the threading is carried out on the said reinforced area such that the diameter " d_1 " at thread bottom is equal to or greater than the said nominal cross-section " Φ ".

25

The concrete reinforcing rod, permitting implementation of the process according to the invention, having a nominal cross-section " Φ ", is characterized by the fact that at least one threaded upset end, the said threaded end having a reinforced cross-section with a diameter greater than the said nominal cross-section " Φ ", has a diameter " d_1 " at thread bottom equal to or greater than the said nominal cross-section " Φ ".

30

Furthermore, the mechanical connection for reinforcing rods obtained by implementing the process according to the present invention, including a connecting sleeve having at least one internal



annexed drawings, wherein:

15

- figure 1 schematically represents the connection of two concrete reinforcing rods according to an example of the present invention;

- figure 2 illustrates a mechanical connection between concrete reinforcing rods;

20

- figure 3 illustrates a third example of a connection for concrete reinforcing rods in the anchor point;

- figure 4 schematically represents a device for pre-stressing the concrete reinforcing rods according to the present invention;

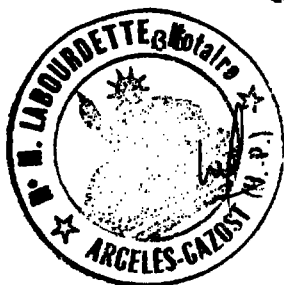
25

- figure 5 schematically represents a variant of the pre-stressing device of figure 4.

The present invention relates to a process for making mechanical connections for concrete reinforcing rods, to a concrete reinforcing rod permitting implementation of said process, and to a mechanical connection for concrete reinforcing rods thus produced, which will find application, in particular, in the field of concrete element construction.

30

In this field, use is made of through bolts.



requirements and they have numerous drawbacks.

15

The mechanical connection according to invention enables two concrete reinforcing rods, be fixed end to end, substantially coaxially, as in figure 1. An internally threaded connecting used to receive the respective threaded ends, reinforcing rods 1 and 2.

20

As regards the externally and internally portions, two solutions can be contemplated, namely of rod ends having the same thread, right-hand or left-hand. In this case, tightening has to be carried out on rod 1 or 2; or else the use of externally threaded sleeves having reverse thread pitches, right-hand and left-hand, the same applying to internally threaded sleeve. In this case tightening is carried out by rotating connecting sleeve 3. Implementation of the invention does not have any limitations in this respect.

25

30

However, if a single thread is provided on concrete reinforcing rods 1 and 2, the tensile strength is reduced at the thread of one of the rods. This phenomenon can be explained by the fact that the section of the rod is reduced at this point.



equal strength, the concrete reinforcing rods use
15 framework of the present invention will be of sm
section, which will make for substantial financ

According to the main feature of the presen
the end of the concrete reinforcing rod to be
reinforced, prior to threading, by upsetting
20 cold.

Emphasis should be placed upon the limited n
operation, unlike the usual practices in this
traditional cold upsetting technique requires
changes to be obtained in the machined part of mo
25 For example, a diameter of 40 mm subjected to co
according to traditional techniques results in a
55 mm. Now, such a deformation of the materi
produce the results hoped for, and a loss of
incurred. The latter is essentially localized in
30 change of diameter. Tensile tests show that failu
this region.

According to the invention, the end is rei
the length of the threaded portion by cold upse
procures an increase in diameter equal to or le
and, in particular, between 10 and 30%.



TABLE 1

15

Nominal ϕ in mm	Thread d_1 in mm	d_1 in mm
-------------------------	-----------------------	----------------

16	20	2
----	----	---

20

20	24	2
----	----	---

25	30	2
----	----	---

25

32	36	1
----	----	---

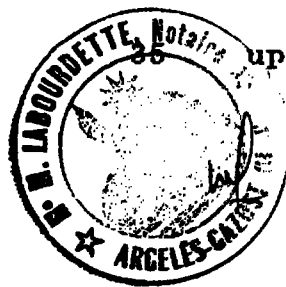
40	45	1
----	----	---

50	56	1
----	----	---

30

56	64	1
----	----	---

The values indicated show that the amount of upsetting can be all the smaller in terms of pe



steels with a high carbon and manganese content
15 therefore, thus very vulnerable to thermal shock.
upsetting is thus to be recommended.

The length of the threaded portion provided
of the concrete reinforcing rods will have to be
substantially to the diameter of the said rod
20 provide a safety margin, as thread lengths of 0.5
diameter suffice to withstand traction. They could
be greater.

The mechanical connection according to the
invention can also be implemented in the case of
25 concrete reinforcing rods, which cannot be displaced.
illustrated in figure 2. In this case, one of the rods
comprises a threaded portion 4 of double length
around an upset end, and sleeve 3, initially positioned
threaded portion 4, will be displaced by rotation.
30 the threaded portion of concrete reinforcing rod
of threaded portions 4 and 5 will be in the same position.

It must also be possible for mechanical connections
according to the present invention to be implemented in the
region of the anchor points for concrete reinforcing rods
as illustrated in figure 3. In this case, the threaded



15 produce threads with a very high degree of
precision.

Thus, to produce mechanical connections of
reinforcing rods according to the present invention
proceeds as follows:

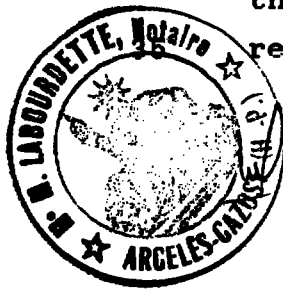
20 - prior to thread cutting, the end or ends,
concrete reinforcing rods 1, 2 to be connected are
to cold upsetting;

- then, the threads of the upset end or ends are
cut, in accordance with perfectly traditional thread
techniques,

25 - finally, the threaded upset end or ends,
concrete reinforcing rods are subjected to
compression, this being carried out prior to assembly
connection on site.

30 Figures 4 and 5 illustrate, by way of example,
apparatus that can be used for the purpose of applying
stress.

For the purpose of compressing the threaded
of concrete reinforcing rod 1, for example, there is
thereupon a threaded supporting sleeve 11;
reinforcing rod provided therewith is immobilized



15

supporting plate 7 are used. However, in this case body of concrete reinforcing rod 1 that is locked of any clamping device, schematically represented in figure, and the jack acts on supporting plate in the direction of arrows 10, this action being transmitted through the threaded supporting sleeve 11 to compress end 4

20

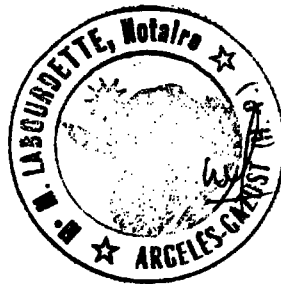
According to the criteria of the standard observed, mechanical compression is carried out by an equivalent force of between 70 and 95% of the elastic limit of the concrete reinforcing rod.

25

This process for producing concrete reinforcing rod thus makes it possible to obtain a rod 1 or 2 compressed, threaded, upset end 4 or 5.

30

Other embodiments of the present invention will reach of a man of the art, could, of course be contemplated without thereby departing from the scope thereof, as defined by the claims.



"4",

15

- the threading is carried out on the said area such that the diameter " d_1 " at thread bottom or greater than the said nominal cross-section

20

2. Process according to claim 1, characterized by the fact that the upsetting is carried out over the threaded portion of the said end (4, 5).

3. Process according to claim 1, characterized by the fact that upsetting is carried out corresponding to an increase in the diameter of the connected portion of less than 30%.

25

4. Process according to any one of the preceding claims, characterized by the fact that, following the upsetting of the upset end or ends (4, 5) and prior to the connection on site, the threaded upset end or ends is/are subjected to mechanical compression.

30

5. Process according to claim 4, characterized by the fact that mechanical compression is carried out by an equivalent force of between 70 and 95% of the yield strength of the concrete reinforcing rod.

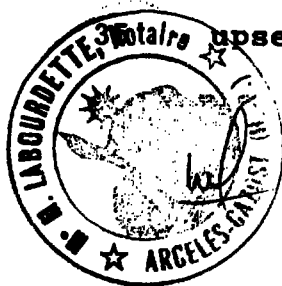
6. Concrete reinforcing rod which is used in application, in particular, in the concrete



concrete reinforcing rod (1, 2) is reinforced over
15 corresponding substantially to its diameter " Φ ".

9. Mechanical connection for a concrete reinforcement
which will find an application in the concrete
building construction field, obtained by implementing
process according to claim 1, including at least
20 connecting sleeve (3) having at least one internal
portion, as well as a concrete reinforcing rod
connection having a nominal cross-section " Φ " at
one end for connection,
characterized by the fact that the said end for connection
25 has at least one area reinforced by cold upsetting
a threaded portion and corresponding to the said
threaded portion, the said reinforced area having a
section with a diameter " d_1 " greater than the nominal
cross-section " Φ ", the said threaded portion having a
30 diameter " d_2 " at thread bottom and being provided with
said reinforced area such that the diameter " d_1 " is
or greater than the nominal cross-section " Φ ".

10. Mechanical connection for a concrete reinforcement
according to claim 9, characterized by the fact that the
upsetting corresponds to an increase in the diameter



Q

Q

Q

Q