

Title: Continuity coupling

DESCRIPTION

The present invention relates to a continuity coupling for joining ends of reinforcing bars for subsequently embedding in concrete.

A mechanical coupling joining two rebars in lengthwise relation has to meet stringent performance requirements not only in respect of ultimate tensile strength at least equal to that of the rebars, but also rigorous permanent set tests. The latter are particularly difficult to achieve utilising a threaded connection between two components of a coupler even when tightening up to an abutment with a controlled tightening torque. However, tightening up to an abutment has a disadvantage with male and female fixed start threads in that the relative angular position of the male and female parts on completion of tightening is predetermined. This can prove disadvantageous since with mechanical couplers it can result in the positively adjustable engagers (bolts) being positioned in a location where it is awkward to access the bolts for tightening.

The present invention aims to provide a coupling system in which the relative angular position of two

1 components of a coupling can be selected to suit the
2 application and yet which will achieve the specified
3 performance requirements.
4

5 Accordingly, one aspect of the present invention
6 provides a mechanical coupling for joining two
7 reinforcing bars, the coupling comprising a first
8 sleeve-like member for receiving fixedly a first rebar
9 and having a female thread, a second sleeve-like member
10 for receiving fixedly a second rebar and having a male
11 thread, the male and female threads on the respective
12 members being interengagable, and means operable after
13 threading together of the male and female threads to
14 effect gripping engagement between the male and female
15 threads.
16

17 The said means serves to lock the respective members in
18 a desired relative angular orientation.
19

20 We prefer the respective sleeves to be adapted to be
21 coupled mechanically to the respective rebar using a
22 plurality of positively adjustable engagers as has been
23 described in our earlier British Patent Specification
24 Nos 2220241 and 9200446. Thus, engagement of the male
25 and female parts serves to couple the rebars together
26 lengthwise.
27

28 According to a preferred embodiment said means serves
29 to expand the male thread within the female thread. In
30 such an embodiment it is envisaged that the rebar
31 carrying the female threaded member is embedded in
32 concrete for subsequent connection by the male threaded
33

member. An alternative is envisaged in which the female thread could be contracted around the male thread, in which case it is envisaged that the rebar carrying the male threaded member will be embedded in concrete for subsequent connection by the female threaded member.

In one embodiment expansion is by means of a wedging action between an annular coupling part or one or more part annular coupling part carrying the male thread and a bore thereof accommodating an axially moveable wedging member. One or both of the bore or the wedging member being tapered whereby axial movement of one relative to the other gives rise to an expansion of the male threaded coupling part. Such an arrangement enables extremely stringent permanent set performance requirements to be met.

More particularly, the wedging member is a tapered plug. The wedging member is moved axially by a threaded actuator, preferably threadingly engaged with the wedging member and preferably actuated through the other end of said second sleeve. It is preferred to use a wrench which incorporates a torque limitation device. It has been found that a torque of 70-100 Newton metres applied to the actuating member and acting through the mechanical advantage of the wedging member will provide the required strength of connection meeting the required permanent set requirements. In contrast with an

abutment type coupler a torque loading of 325 Newton metres is required.

Accordingly another aspect of the invention provides a method of coupling together two reinforcing bars for concrete by means of a continuity coupling comprising first and second sleeve-like members provided with respective male and female threads of a mutually complimentary threaded connection, the method comprising:-

- a) threading together the first and second sleeve-like members one of which is fixedly secured to one reinforcing bar (usually already embedded in concrete),
- b) using the threaded connection to place the second sleeve-like member in the desired angular position relative to the first sleeve-like member,
- c) actuating means to effect a radial gripping engagement between the male and female threads to prevent rotation between the first and second members and thereby locate them in the desired angular relation, and
- d) fixedly securing the other reinforcing bar to the second sleeve-like member.

More particularly, step c) comprises turning a threaded member threadingly engaged with a wedging

member to expand the male thread within the female thread. More particularly still, the threaded member is turned by a wrench having a preset upper torque exertion limit.

5 The present invention will now be described further, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a sectional side view of coupling components according to the present invention,

10 Figure 2 is a sectional view taken on A-A of Figure 1,

Figure 3 is an enlarged cross-sectional view showing part of the coupling components assembled, and

15 Figure 4 is a typical socket wrench for use in connecting the couplers.

Referring to the drawings, a continuity coupling comprises what will be referred to as male and female coupling sleeves 1, 3, the male coupling sleeve having a male thread 5 and the female having a female thread 7. Each sleeve has a bore 8 to receive the end of a
20 respective rebar (not shown) and in each case the sleeve is connected to the respective rebar using radially spaced engagers which may comprise a combination of longitudinal ridged members (not illustrated) and
25 positively adjustable engagers 9 received threadingly in the side wall of the sleeve, with or without inserts.

In the illustrated embodiment two such positively adjustable engagers are shown in each sleeve. The method by which the sleeves are connected to the rebars is described in earlier patent specifications and it is not the subject for the present invention so has not been described in further detail and it is sufficient to say that the connection means meets the requirements for strength and permanent set.

In the illustrated embodiment the male thread 5 of sleeve 1 is formed on a component 11 having one end dimensioned to fit within the bore 8 of the sleeve 1 and is welded in place as illustrated at 13. The component 11 over at least a substantial length of threading is slotted as at 14 in planes passing through the axis of the coupling, and which in the illustrated embodiment defines four sectors 11a, b, c and d. This number has been found to be satisfactory although other numbers of sectors may be used according to the size of coupling. The component has an internal tapered bore 15 which in the illustrated embodiment receives a tapered plug 17 which itself has a threaded internal bore 18 engaged by a coach bolt 21 whose shank passes through a smaller bore 23 of the component and whose head is received in a countersunk bore 25. We prefer to use a socket head bolt. We prefer to use a socket wrench in the form of a T-bar 27 which will exert a tightening torque up to a

preset limit whereupon drive between the socket connection 28 and the T-bar end 29 will be interrupted. This avoids over tightening of the component.

5 In use, the coupling 3 carrying the female thread is secured to a rebar by way of the positive engagers and will usually be embedded in concrete. The threaded opening is normally protected by a plastic plug which abuts against the shuttering during the first phase of concreting. When the time comes to finish the
10 concreting the shuttering and the plastic plugs are removed exposing the threaded ends of the female coupler. The male thread is then threaded into the female bore 7, this can be done conveniently by hand, until it is virtually fully home. The coupler can then
15 be backed off to position the positive engagers 9 of the male coupler 1 in the best radial position for access. The next stage is to lock the couplers together and this is done by inserting the socket wrench 27 - into the bore 8 of sleeve 1 and turning the coach bolt to draw
20 the threaded plug into the bore expanding the stud into the female threads. This is continued until the preset torque on the wrench is achieved.

It has been found that a coupler designed in this manner provides the required ultimate tensile strength
25 as well as meeting the stringent requirements for permanent set which has not been possible with couplers

which offer the angular adjustment facility of the present invention.



1 CLAIMS

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3 1. A mechanical coupling for joining two reinforcing
4 bars, the coupling comprising a first sleeve-like
5 member for receiving fixedly a first rebar and having a
6 female thread, a second sleeve-like member for
7 receiving fixedly a second rebar and having a male
8 thread, the male and female threads on the respective
9 members being interengagable, and means operable after
10 threading together of the male and female threads to
11 effect gripping engagement between the male and female
12 threads.

13

14 2. A coupling as claimed in Claim 1 in which said
15 means serves to lock the respective members in a
16 desired relative angular orientation.

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18 3. A coupling as claimed in Claim 1 or 2 in which
19 said means serves to expand the male thread within the
20 female thread.

21

22 4. A coupling as claimed in Claim 3 in which
23 expansion is by means of a wedging action between an
24 annular coupling part or one or more partially annular
25 coupling parts carrying the male thread and an axially
26 movable wedging member accommodated in a bore of the
27 annular coupling part or partial annular coupling
28 parts.

29

30 5. A coupling as claimed in Claim 4 in which one or
31 both of the bore or the wedging member are tapered
32 whereby axial movement of one relative to the other
33 gives rise to an expansion of the male threaded
34 coupling part.

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1 6. A coupling as claimed in Claim 4 or 5 in which the
2 wedging member is moved axially by a threaded actuator.

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4 7. A coupling as claimed in Claims 1, 2 or 3 in which
5 the female thread is contracted around that male
6 thread.

7

8 8. A coupling as claimed in any preceding Claim,
9 wherein the first and second sleeve-like members are
10 fixed to respective rebars by positively adjustable
11 engagers extending through the side walls of the
12 respective sleeve-like members.

13

14 9. A method of coupling together two reinforcing bars
15 for concrete by means of a continuity coupling
16 comprising first and second sleeve-like members
17 provided with respective male and female threads of a
18 mutually complimentary threaded connection, the method
19 comprising:-

20

- 21 a) threading together the first and second sleeve-
22 like members one of which is fixedly secured to
23 one reinforcing bar (usually already embedded in
24 concrete),
25 b) using the threaded connection to place the second
26 sleeve-like member in the desired angular position
27 relative to the first sleeve-like member,
28 c) actuating means to effect a radial gripping
29 engagement between the male and female threads to
30 prevent rotation between the first and second
31 members and thereby locate them in the desired
32 angular relation, and
33 d) fixedly securing the other reinforcing bar to the
34



1 second sleeve-like member

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3 10. A method as claimed in Claim 9 in which step c)
4 comprises turning a threaded member threadingly engaged
5 with a wedging member to expand the male thread within
6 the female thread.

7

8 11. A method as claimed in Claim 10 in which the
9 threaded member is turned by a wrench having a preset
10 upper torque exertion limit.

11

12 12. A mechanical coupling for joining two reinforcing
13 bars constructed and arranged substantially as
14 hereinbefore described with reference to and as
15 illustrated in the accompanying drawings.

16

17 13. A method of coupling together two reinforcing bars
18 substantially as hereinbefore described with reference
19 to the accompanying drawings.

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