

A. Protective End Cap for External Pipe Threads.

This invention relates generally to thread protectors, and more specifically to a protective end cap for protecting external pipe threads at the end of a pipe, tubing, casing or the like.

- 5 U.S. Patent No. 4 079 756 discloses a plastic protective end cap having a radially inwardly curved end portion overlapping the end surface of the threaded end of a pipe. Although the plastic curved end portion offers some protection to the threaded end of the pipe
- 10 from light, axially directed impact forces, damage to the threaded end may occur if such forces are large. Such damage may necessitate retapping the damaged threads, or cutting off the damaged pipe end and rethreading it.

- It is further known to provide metal end caps
- 15 having inner peripheral threads for threadingly engaging external pipe threads. Axially directed impact forces on such metal end caps can cause thread damage, resulting in locking or cross-threading of the external pipe threads which may prevent removal of the end cap.
- 20 Such damage may necessitate retapping the damaged threads, or cutting of the end cap and rethreading the pipe end.

- According to the present invention, there is a protective end cap for protecting an externally threaded
- 25 end portion of a pipe comprising a metal sleeve having a first radially inwardly directed end portion adapted to substantially overlap the end portion of said pipe, a substantially rigid metal insert adapted to be disposed in use between said inwardly directed end portion of said
- 30 sleeve and said end portion of said pipe, and a resilient plastic core having a first portion adapted to be disposed between said sleeve and the threaded portion of said pipe and a second impact absorbing inwardly directed end portion disposed between said metal insert

and said inwardly directed end portion of said sleeve
and further comprising thread means on the inner
periphery of said core threadingly engageable with an
externally threaded end portion of said pipe when the
5 cap is screwed on to the end portion of said pipe.

The cap may also comprise means on said sleeve and
said core for locking said sleeve and said core together.

Said second impact absorbing portion of said core
may have a thickness greater than the pitch of said
10 external threads, said metal insert may be at least
partially embedded in said core, said second impact
absorbing portion may have an integral closure member
for closing off said core.

In the detailed description of the invention
15 presented below, reference is made to the accompanying
drawing, in which:

Figure 1 is a segmental perspective view of a
protective end cap mounted on external threads at the
end of a pipe;

20 Figure 2 is a segmental enlarged section view taken
substantially along line 2-2 of Figure 1;

Figure 3 is a segmental view in section illustrating
the modification of Figure 2 which forms the main feature
of the protective end cap of this invention;

25 Figure 4 is a segmental section view of a
protective end cap showing a different way of securing
the inner core to the outer sleeve;

Figure 5 is a segmental end view of the end cap of
Figure 4; and

30 Figure 6 is a segmental section view of an end cap
showing a splined connection between the inner core and
outer sleeve.

With reference to Figures 1 and 2, a protective end
cap is disclosed for protecting external Butress
35 type threads 12 on the end portion of any suitable pipe

conduit, casing or the like designated 14. End cap 10 is formed from two interlocking parts, an outer sleeve 16 and an inner core 18.

5 Outer sleeve 16 is preferably made from any suitable rigid material such as steel. Sleeve 16 is preferably of a cylindrical configuration throughout most of its length. The sleeve further has a radially

inwardly curved outer end portion 20 overlapping the end surface 22 of pipe 14 when the end cap is mounted on the end of a pipe.

5 Inner core 18 is preferably made of any suitable high-impact plastic. Core 18 has an inner threaded tapered surface 24 for threadingly engaging tapered external threads 12 on pipe 14 when end cap 10 is screwed onto the end of the pipe. The interengaging threads 12, 24 hold the end cap on the pipe and provide a seal so
10 that moisture does not contact the pipe threads. Core 18 further has an outer peripheral surface 26 and curved outer end portion 28 conforming to a portion of the inner peripheral surface 30 of sleeve 16. End portion 28 further has a radially inwardly extending section 27
15 interposed between sleeve end portion 20 and pipe end surface 22 of a width or thickness approximately 0.10 cm (0.04 inch). Core 18 also has a left or inner end rim 29 of greater diameter than sleeve end 33 to protect the sleeve end from damage from external forces or blows, and
20 to prevent the sleeve end from damaging exposed pipe threads on other pipes during handling. End rim 29 has a tapered edge 31 for deflecting blows directed against the rim.

Sleeve 16 and core 18 are secured or locked
25 together by any suitable means such as bonding, an interference fit, or as shown in the drawing, one or more openings 32 in the sleeve receiving complementary projections 34 on the core when it is pressed into mating engagement with the sleeve. The inner diameter of sleeve
30 16, outer diameter of core 18, and inner tapered threaded surface 24 of the core are designed, along with rigid sleeve 16, to place the external and internal threads 12, 24 respectively under sufficient force to sealingly secure end cap 10 to pipe 14 when the end cap
35 is screwed tightly thereon by any suitable tool, such as

a pipe wrench or the like, not shown. Although openings 32 and projections 34 are shown as circular, they, of course, can be of any other suitable shape, such as square, rectangular, or the like.

5 In accordance with the present invention the end cap shown in Figs. 1 and 2 is modified as shown in Fig. 3, in which an annular metal insert 36, such as a washer, is embedded in or associated with section 27 of core 18. Washer 36 may be embedded in section 27
10 during the molding operation. Alternatively, section 27 may be provided with an annular slot, and washer 36 split to allow contraction of the washer for insertion into the groove. When released, the washer expands filling the slot. Curved end portion 20 of sleeve 16 and
15 section 27 of core 18 protectively overlap the pipe end surface 22 with metal washer 36 in alignment with the pipe end surface. Accordingly, any external force directed against the curved end 20 of the sleeve by any means such as dropping the pipe on the capped end, for
20 example, is absorbed by curved end portion 20, section 27 and metal washer 36 as they are forced toward the pipe end surface 22. This force absorption prevents damage to the external and internal threads 12, 24, respectively. Such damage, if not prevented, might necessitate
25 retapping the external threads 12, or cutting off the damaged end of pipe 14 and rethreading it.

Core 18 of the end cap is further provided with a closure member 46 integral with and depending from section 27 to prevent dirt or the like from entering
30 a pipe 14 when the end cap is mounted thereon. Closure member 46 is a thin membrane having one or more tear flaps 48 defined by score lines 50. Each flap 48 further has an opening 52 extending therethrough to provide proper ventilation of the pipe opening or cavity. The
35 opening 52 further allows insertion of a finger or the

like therethrough to enable tearing out the flap 48 along its score lines 50. Removal of the flaps 48 allows insertion of any suitable end cap removing tool, not shown, into the pipe for hammering a shoulder 54 on section 27 of the core for removing an end cap 10 that is stuck on the pipe, i.e. cannot be removed by unscrewing the end cap. In Figure 2, closure member 46 is the same width as, and an extension of, section 27 whereas in Figure 3 it extends from section 27 between washer 36 and sleeve end portion 20. Preferably, the inner surface of member 46 is in alignment with the outer surface of washer 36 to provide a guide for insertion of washer 36 into a receiving slot in section 27.

Radially extending section 27 may be of greater thickness. It may, for example, be of a thickness approximately one and a half times the pitch of the pipe threads, or approximately 0.46cm (0.18 inch).

Referring to Figures 4 and 5 another means for locking together a sleeve 16 and core 18 is shown. The locking means comprises notches 40 along the outer curved end portion 20 of sleeve 16 for receiving flexible fingers 42 on core 18. The fingers 42 have tapered ribs 44 which are flexed downwardly as the fingers are pressed through notches 40, and then flex upwardly in front of curved portion 20 of sleeve 16 to lock the sleeve to the core.

With reference to Figure 6 means such as key-grooves 41 on sleeve 16 and splines 43 on core 18 are shown for guiding the core into the sleeve of an end cap so that projections 34 or fingers 42 on the core will line up with and enter openings 32 or notches 40 respectively in the sleeve.

The invention has been described in detail with particular reference to preferred embodiments, but it

will be understood that variations and modifications can be effected within the spirit and scope of the invention as described. For example, instead of providing a cylindrical sleeve 16, the sleeve could be tapered or frusto-conically formed. In such a modification, the outer peripheral surface 26 of core 18 would also be tapered or frusto-conical to conform to the inner surface 30 of the sleeve. Also, core 18 could be formed without tear flaps 48, or without a closure member 46.



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Claims:

1. A protective end cap for protecting an externally threaded end portion of a pipe comprising a metal sleeve having a first radially inwardly directed end portion adapted to substantially overlap the end
5 portion of said pipe, a substantially rigid metal insert adapted to be disposed in use between said inwardly directed end portion of said sleeve and said end portion of said pipe, and a resilient plastic core having a first portion adapted to be disposed between
10 said sleeve and the threaded portion of said pipe and a second impact absorbing inwardly directed end portion disposed between said metal insert and said inwardly directed end portion of said sleeve and further comprising thread means on the inner periphery of said core
15 threadingly engageable with an externally threaded end portion of said pipe when the cap is screwed on to the end portion of said pipe.
2. A protective end cap as claimed in claim 1 and further comprising means on said sleeve and said core
20 for locking said sleeve and said core together.
3. A protective end cap is claimed in claim 1 or claim 2 wherein said core has a thickness greater than the pitch of said external threads.
4. A protective end cap as claimed in claim 3 wherein
25 said core has a thickness of one and a half times the pitch of said external threads.
5. A protective end cap as claimed in any one of claims 1-4 wherein said metal insert is at least partially embedded in and carried by said core.
- 30 6. A protective end cap as claimed in any one of the preceding claims wherein said second impact absorbing portion has an integral closure member for



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closing off said core.

7. A protective end cap for protecting an externally threaded end portion of a pipe substantially as hereinbefore described with reference to Figure 3 of
 - 5 the accompanying drawings.
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