CLIMBERS' CORNER

Using Tree-Grip™ Dead-Ends with Common-Grade "Cable"

By Mark Adams

At this writing, *ANSI A300 (Part 3): Support Systems—Cabling, Bracing, and Guying* has gone through a public comment period and is in the process of being prepared for publication. One procedure involved in tree cabling that is often misunderstood is the use of Tree-Grip™ dead-ends as the termination for 1 × 7 common-grade cable. The literature does not state specifically whether Tree-Grip dead-ends can be used on 1 × 7 common strand, and there are mixed interpretations about this topic in the general workforce. One common misconception is that Tree-Grip dead-ends and common-grade strand cannot be used together, because when the strand comes under tension, common grade, which is relatively soft compared to extra-high-strength grade, will compress, and the Tree-Grip dead-end will slide off the strand. Another misconception is that common grade has a different coating from extra-high-strength grade and the Tree-Grip dead-end will therefore not hold on common grade. Both of these theories are wrong. Preformed Line Products (PLP) has performed tensile tests with all four sizes of their Tree-Grip dead-ends with the respective sizes of common-grade strand (Figure 1), and, in all cases, the holding strength of the Tree-Grip dead-ends exceeded the strength of the respective-sized cable. Tree-Grip dead-ends can be used with common-grade strand with no strength reduction in the overall system.

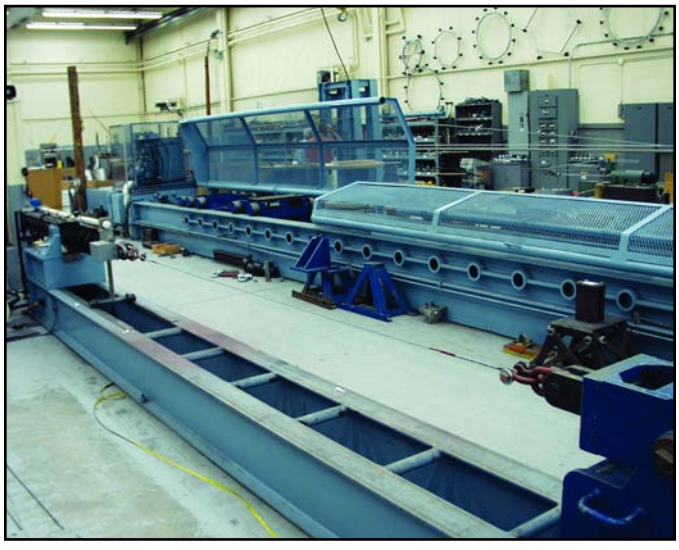

Figure 1. Tensile tests were conducted by Preformed Line Products on all four sizes of their Tree-Grip dead-ends.

History of Tree-Grip Dead-Ends

John Hofstetter, director of marketing and sales for Preformed Line Products, says that PLP was formed shortly after World War II and served the power utility industry. PLP manufactured a prefabricated, helical dead-end that provided a constant radial gripping of the strand. As the company grew, it branched into other industries such as metal buildings, towers, and communication, and, in the late 1960s, PLP discussed selling dead-ends to the tree industry for use in installing cable support systems. The idea received a lot of resistance from within the tree industry, however, and PLP eventually dropped the idea. Tree workers took pride in forming a handmade splice with common cable, and they were reluctant to abandon what they considered to be a skilled craft.

Some individuals apparently were intrigued by the efficiency of the dead-end system, however. In the mid-1970s, Davey Tree approached PLP and asked them to proceed with developing dead-ends that could be used for cabling trees. In 1978, PLP

A Note on Terminology

Arborists refer to the procedure of installing flexible support systems in the canopy of trees as "cabling" and refer to the steel support itself as "cable." But, according to information provided by Jersey Strand and Cable, Inc., what arborists refer to as "cable" is more correctly called "strand." A cable is made up of a plurality of strands. A strand is made up of a plurality of wires. A wire is a (usually round) filament of metal. What arborists call "cable" is a plurality of wires and thus is a strand—not a true cable. For the purpose of this article, however, the terms "cable" and "strand" are generally used together to help the reader become familiar with the correct terminology.

The strand that arborists use for cabling trees is further classified as 1 × 7, left-hand lay. The "1" refers to the number of strands in the product. The "7" refers to the number of wires in each strand. Thus, 1 × 7 strand is composed of one strand, and that one strand consists of seven wires (one inner wire and six outer wires). It seems that the confusion between "cable" and "strand" is caused by the fact that, in this particular type of product (1 × 7 construction), the finished item is technically a single "strand" (composed of seven individual wires), yet it looks very similar to a true "cable." "Left-hand lay" refers to the direction in which the outer wires are laid, or formed, in a helical revolution (twisted) around the central core wire.

The term "common cable" (strand) does not mean just any cable that can be purchased at a hardware store or that is lying around the shop. Common-grade strand is one of five grades of strand that are defined by ASTM A475 and that must meet very specific manufacturing and physical properties. The five grades of strand are (from weakest to strongest): utilities grade, common grade, Siemens-Martin grade, high-strength grade, and extra-high-strength grade. The stronger the strand, the more carbon it has and the less flexible it becomes.

produced the first Tree-Grip dead-ends, manufactured specifically for the tree industry, and by 1985 there were three different sized Tree-Grips, 3/16, 1/4, and 5/16 inch.

Misconceptions About Tree-Grip Dead-Ends and Common-Grade Strand (Cable)

The new Tree-Grip dead-ends could be used with any of the five grades of strand (cable) (see A Note on Terminology, previous page), but there seems to have been some confusion regarding their specific use and installation.

Bob Rouse, director of accreditation for the Tree Care Industry Association (formerly the National Arborist Association), says that he found some old letters from NAA members who complained that the Tree-Grip dead-ends had either slipped or failed after installation. It seems that some of the people who wrote about the failure of Tree-Grip dead-ends when used on common strand (cable) may not have understood the necessity of using strand that meets ASTM A475. Don Blair, author of the book *Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal,* researched the cause of the early Tree-Grip failures and found that some arborists had put Tree-Grip dead-ends on 7 × 19 aircraft cable. The use of the wrong type of cable may have been one of the factors that led to the misconception that Tree-Grip dead-ends cannot be used with common strand (cable).

It also seems that some of the early users may have deviated from the installation procedures that are detailed in the product literature. Blair also discovered that the cause of several other Tree-Grip dead-end installation failures was that no thimble had been used in the cable-loop (eye) of the Tree-Grip dead-end. Blair stresses that, regardless of whether common-grade or EHS-grade strand (cable) is used, it is imperative to install a thimble in the cable-loop of the Tree-Grip dead-end. Although either a light- or heavy-duty thimble may be used, both Blair and PLP recommend that heavy-duty thimbles be used whenever practicable. PLP also stresses that the length of the Tree-Grip dead-end must not be altered or shortened in any way, and both legs of the Tree-Grip must be completely wrapped onto the strand.

Several other factors may have contributed to the misconception that Tree-Grip dead-ends cannot be used with common cable (strand). Much of the early and current literature is vague and/or incomplete about the compatibility of Tree-Grip dead-ends and various types of strand. In the old NAA standards (now superseded by the ANSI standards), it is not specifically stated which cable is to be used with the Tree-Grips. ANSI A300-2000 simply states that "dead-end grip terminations shall only be used on cable that meets the specifications of ASTM A475," so, unless the reader is familiar with ASTM A475, he or she will not know whether this includes common cable, EHS cable, or both. The publication *Best Management Practices—Tree Support Systems: Cabling, Bracing, and Guying* says common grade "… is terminated with an eye splice" and EHS ". . . is terminated with a manufactured dead-end grip." It is not stated whether common grade can also be terminated with Tree-Grip dead-ends, and the absence of this statement implies (incorrectly) that common grade cannot be used with Tree-Grip dead-ends.

Finally, PLP has emphasized the use of EHS-grade strand because of its high strength-to-weight ratio and, at times, has unintentionally implied that Tree-Grips can be used only with EHS-grade strand. An early instruction sheet (dated 1988) states, "Tree-Grip dead-ends should be used with compatible strand …," but the only strand that is mentioned is EHS. Again, the absence of any mention of common strand (cable), even though common cable was in wide use in the arborist industry, implied (incorrectly) that Tree-Grip dead-ends could not be used with common-grade strand (cable).

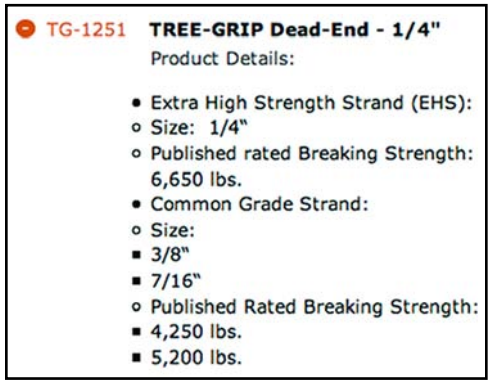

Figure 2. Product details on Preformed Line Products' Web site for the 1/4-inch dead-end.

The information on PLP's Web site is also confusing (Figure 2). This is intended to show the comparative strengths of 1/4-inch EHS-grade strand, and 3/8- and 7/16-inch common-grade strand, but the ►

impression is that the 1/4-inch Tree-Grip can be used with any of the three listed sizes of strand. This is wrong. One-quarter-inch Tree-Grip dead-ends can be used only with 1/4-inch strand that meets the specifications of ASTM A475.

Updates and Clarifications

All of this confusion should soon be clarified. John Markiewicz, market manager for Preformed Line Products, reports that PLP has completed testing of the four sizes of Tree-Grip dead-ends (3/16, 1/4, 5/16, and 3/8 inch) with the respective-sized, seven-wire strand. The conclusion of the test results states, "The developed holding strengths of the Tree-Grip dead-ends exceeded the minimum breaking strengths of their respective common-grade, 7-wire galvanized-steel strands." Also, the information on Preformed Line Products' Web site will be updated and will be presented in a format that is easier to understand.

Sharon Lilly, ISA's director of educational goods and services, reports that the interactive CD *Tree Maintenance* will soon be released and will reflect the procedure of using Tree-Grip dead-ends as the termination for common-grade strand (cable).

Bob Rouse, who, as part of his responsibilities at TCIA is secretary for the ANSI A300, states that the wording for the definition of "cable" in the 2006 revision of the A300 has been changed slightly to make the reader aware that both EHS- and common-grade cable conform to ASTM A475. Also, because the reader of the A300 would have to cross-reference several other entries to find all of the information about Tree-Grip dead-ends and common-grade cable, an annex may be added to explain that Tree-Grip dead-ends are designed to form a termination for 1 × 7, left-hand-lay cable that meets the specifications of ASTM A475 for zinc-coated, galvanized steel strands (cable). Both common-grade strand (cable), and EHS-grade strand (cable) meet these specifications and may be used with Tree-Grip dead-ends (Figure 3).

Tree-Grip dead-ends help reduce the time and cost associated with tree cabling and may be used with either common-grade or EHS-grade strands.

The following resources about selecting and installing tree cabling systems are available from ISA:

ANSI A300 (Part 3): Support Systems—Cabling, Bracing, and Guying [2006 revision available soon]

Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal

Best Management Practices—Tree Support Systems: Cabling, Bracing, and Guying

Introduction to Arboriculture Series: Tree Maintenance (CD-ROM).

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www.machinedesign.com/BDE/mechanical/bdemech7/bdemech7_4.html.

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The author would like to thank the following for their help and information in preparing this article: John Markiewicz and John Hofstetter, Preformed Line Products; Bob Rouse, Tree Care Industry Association; Louanne Hahn, Jersey Strand and Cable; and Don Blair, author of Arborist Equipment.