# Evaluation of Heavy Duty Wedge-Loc Hardware for T-posts Using Simulated Fence Loads

conducted for

Wedge Loc Co.
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by

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## PURPOSE

The tests were performed at the request of Wedge Loc Co. to evaluate performance of Wedge-loc hardware to determine whether or not the components are sufficiently strong to withstand normal fence loads.

## TEST FENCE DETAILS

A diagonal corner arrangement, shown schematically in Figure 1, was constructed by representatives of the Wedge Loc Co. in the compound of the Agricultural Engineering Laboratory located at the University of Arizona's Campus Agricultural Center in Tucson. One eight foot corner T-post was driven into the soil such that approximately a five foot length remained above the ground surface. A second T-post, six feet in length, was driven in next to the first, effectively producing an I beam configuration as shown in Figure 2. The eight foot long brace T-posts, Wedge-loc hardware and diagonal braces were then set in position. Finally, wire cross braces were installed along the opposite diagonals to each of the main braces.

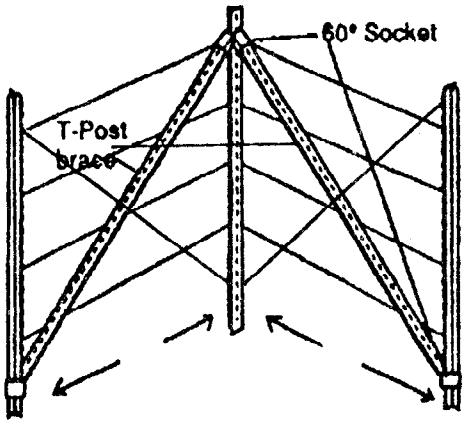


Figure 1. Corner Details

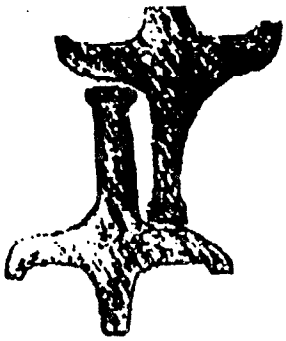

Figure 2. Top View of Corner Posts

Eight strands of smooth, twisted fencing wire were attached to the corner using double wraps around the posts. Half of the wires were placed in the direction of one brace, while the second set of wires were placed parallel to the other brace. Each of the eight wires was attached to the brace posts with standard wire clips. Approximately eight feet of wire extended beyond the brace posts.

## EXPERIMENTAL SETUP

Loads on the fence were applied using a hydraulic cylinder driven from a tractor. One end of the cylinder was coupled to a commercial strain gauge load cell, which in turn was attached to a stationary object. The other end of the cylinder was attached with a chain to the center of a 52 inch long section of thick walled pipe, three inches in diameter. The purpose of the pipe was to distribute the applied load evenly to the four fence wires which were attached to it at appropriately spaced intervals.

The test procedure consisted of applying a minimal load to the fence in one direction, and then checking that all of the wires were spaced correctly, and that each was receiving approximately equal pull. The test loads were applied in 500 pound increments until either a failure occurred, or the test was discontinued. Following application of each load increment, deflection of the top of the corner post was measured, and overall structural integrity of the fence corner was assessed.

## TEST RESULTS

An initial trial on one fence corner indicated that two weaknesses in the configuration existed. At a load of approximately 400-500 pounds the corner posts began to bend in the middle, towards the direction of pull. As the load was increased to approximately 1500 pounds, the diagonal brace developed a significant bow. The problem of bending in the corner posts could not be rectified, as this was directly related to the inherent bending strength of the corner T-posts. The buckling of the brace was eliminated by first weaving it through the second and third wires, and by then tying it to the diagonal wire brace at the point where they crossed. This shortened the effective length of the diagonal T-post, and dramatically increased its strength in buckling.

Resumption of loading showed these modifications to be effective as buckling of the diagonal brace was virtually eliminated. Increased loads, however, exposed an additional weakness in the corner configuration. This was the failure of the soil to support the brace post, and as a consequence it moved in the direction of pull. This was corrected by driving a section of one-half inch thick plate, which measured approximately 4 inches by 15 inches, into the soil at the base of the brace post, thereby effectively increasing the bearing area of the post.

Once the preliminary tests were completed, evaluation of a corner section, and hence the Wedge-loc components began. The test loads were first applied with the direction of pull parallel to the web of the I beam shape formed by the two corner posts (strong side test), and then perpendicular to the web (weak side tests). The results obtained for the heavy hardware components follow.

### Strong Side Test

The load was applied in 500 pound increments up to 2500 pounds. At this load the top of the corner T-post had moved approximately 1.6 inches. The bow in the corner had increased from the initial bow developed at 500 pounds, but this was not considered to be a significant problem. At this load all of the Wedge-loc components remained structurally sound. The load on the fence was then increased, and at a value of approximately 2800 pounds one wire wrap around the corner post slipped slightly, decreasing the load. Loading was resumed and at approximately 2900 pounds one of the fence wires failed and testing was discontinued. Visual inspection of the Wedge-loc components at the cessation of testing showed no apparent signs of failure.

Weak Side Test

To ensure that structural integrity of the corner was maintained a load of approximately 500 pounds was placed in the direction of the strong side test. The test load was then applied along the weak side direction in 500 pound increments up to 2000 pounds. At this load the top of the corner T-post had moved approximately 3 inches. Once again the bow in the corner post had increased from the initial bow, but this was not considered to be significantly more than in the strong side test. The load on the fence was removed and the Wedge-loc components were visually inspected. The top component was observed to have failed in shear, with the brace having pushed through the aluminum and was resting against the corner T-post. This failure did not compromise the structural integrity of the corner, however, and as such this was considered not to be a significant problem since the load carrying capacity of the corner had not decreased.

## CONCLUSIONS AND RECOMMENDATIONS

1. Based on the tests conducted on the corner section, it was concluded that the Wedge-loc hardware was not the weakest component of the fence. Rather failure of the corner T-post(s) in bending, failure of the diagonal brace in buckling, failure of the wire, and failure of the soil to support the load imposed on it by the brace post were considered to be more likely occurrences for the configuration tested than failure of the Wedge-loc components themselves.

2. Magnitudes of the loads applied during the testing were considered to be at least equal to, if not greater than, those that would be applied to such a fence under normal field conditions. As such the results are considered to be relatively representative of normal fencing situations.

3. It is recommended that additional construction hints, such as weaving of diagonal braces between the middle wires, tying the diagonal brace post to the wire diagonal, and providing additional support for the brace post at the soil surface, be included in the Wedge Loc literature. This will ensure that consumers are given the opportunity to construct a corner configuration having the maximum possible strength.