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INSTITUTE OF MACHINE DESIGN FUNDAMENTALS

OPINION

Experimental studies on the work and durability of Sadder polymer screw base eco and Sadder polymer hammered-in eco head Standard and Excellent

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Subject of the opinion

Experimental studies of the work and durability of Saddar polymer screw base eco and Saddar polymer hammered eco head of the Standard and Excellent type compared to screwed on, screwed and hammered head of steel available in DIY Home & Garden retail chains.

Standard

Standards and recommendations for production, testing and operation have not been developed for the tested objects. In the circumstances of testing and determination of durability, strength and operational features, recommendations and research methodology were developed covering:

- a. description of external factors determining the criteria for work of hammered-in and screwed ground spikes and bases bolted to concrete or terrace boards,
- b. characteristics of Saddar's facilities: eco hammered-in head, eco-screws and standard ground bases of the Standard and Excellent type,
- c. characteristics of steel objects hammered ground head and steel bases screw to concrete or terrace boards,
- d. experimental tests on the installation of Saddar products: eco hammered-in head, eco-screws and Saddar standard bases of the Standard and Excellent type,
- e. experimental installation of hammered steel head and steel bases bolted to concrete/boards,
- f. experimental tests of durability based on breaking off the mounting pole embedded using Saddar's eco hammered-in head, eco-screws and Saddar standard bases of the Standard and Excellent type,
- g. experimental tests of durability based on breaking off the mounting pole embedded using steel hammered-in and screwed ground head and bases bolted to concrete,
- h. experimental testing of wooden fencing (full spans) made with Saddar's eco hammered-in head, eco-screws and Saddar standard bases of the Standard and Excellent type,
- i. experimental testing of wooden fencing (full spans) made with steel hammered-in and screwed ground head and bases bolted to concrete,
- j. quality and repeatability of experimental tests.

Method of implementation

Experimental studies were carried out in natural conditions for various ground types. The research program included:

Deposition/assembly test

The study consisted of assessing energy and unit and total loads guaranteeing the assembling of objects in the ground depending on the type of ground as well as assessing the correctness and quality of assembly.

Pole breaking test

The test consisted in assessing the value of the external force destroying a properly installed object. The test was to assess the service life of one attachment point. The tests were carried out for loads operating at the height of: 0.15 m, 1.0 m, 1.5 m.

Span breaking test

The test consisted in assessing the external force necessary for use in order to permanently destroy the ground foundation created on the basis of ground objects:

eco hammered-in head, eco-screws and Saddar standard bases of the Standard and Excellent type as well as steel hammered-in and screwed ground head and bases bolted to concrete/boards.

Conclusions

Tests on Saddar's eco hammered-in head, eco-screws and Saddar standard bases of the Standard and Excellent type have been successfully completed.

The manufacturer's compliance with the high production regime was proven, which was reflected in the geometric repeatability and strength parameters of the material. The plastic used has high impact properties.

Tested Saddar's eco hammered-in head, eco-screws of the Standard and Excellent type are characterized by 10% higher strength and stiffness parameters compared to standard products and comparable to premium class hammered-in steel head.

The strength and stiffness parameters Saddar standard ground bases of the Standard and Excellent type were increased by 11% compared to steel bases screw to concrete/boards.

The levels of energy necessary for the destruction of a ground object determined in post breakout tests (span breakage): Saddar's eco hammered-in head, eco-screws and Saddar standard ground bases of the Standard and Excellent type are higher by 19% (15%) respectively compared to standard products and by 11% (7%) compared to steel hammered-in head and steel premium bases screw to concrete/boards.

The characteristics of the destruction of steel objects have a gradual course with a clear marking of the limit of permanent (plastic) deformation. Saddar ground objects are characterized by constant strength until the material coherence is exceeded, followed by brittle cracing. This means that in order to destroy Saddar's eco hammered-in head, eco-screws and Saddar standard ground bases of the Standard and Excellent type, it is necessary to use proportionally higher unit forces. The found reference levels guarantee stable and durable operation of Saddar ground objects and ensure compensation of phenomena resulting from the material damage characteristics.

Bearing in mind the demonstrated, it was found that Saddar's eco hammered-in head, eco-screws and Saddar standard ground bases of the Standard and Excellent type are characterized by desirable functional and operational features. The aging tests has allowed us to determine the service life for 20 years. Tests of UV stability of the material did not show degradation of the structure and changes in the using features of Saddar's eco hammered-in head, eco-screws and Saddar standard ground bases of the Standard and Excellent type.