INTRODUCTION

SunLock uses stainless steel machine screws (also called bolts) in a variety of assemblies. These are usually threaded into aluminium. This technical bulletin describes how the screws are prevented from loosening (i.e. how the thread is locked).

PREVENTING A BOLT FROM LOOSENING

SunLock uses two methods to prevent bolts from loosening.

- Correct fastener torque (20 - 50 N·m)
- Growth of an aluminium oxide layer

Correct torque

The most effective and reliable method of preventing any nut or bolt from loosening is to tighten the thing properly to start with. *Carroll Smith's nuts, bolts, fasteners and plumbing handbook, 1990, page 116.*

For SunLock, please tighten bolts to 20 - 50 N·m, as per the SunLock technical bulletin on fastener torque.

Growth of an aluminium oxide layer

SunLock is fabricated from mill finish aluminium (non-anodised). As a bolt is tightened, the aluminium oxide layer is scraped away by the incoming stainless steel thread. After installation, the oxide layer re-forms, bonding slightly to the stainless bolt and "locking" it in place. This has a similar effect to thread-locking fluid.

NOTE ON LOCK WASHERS

SunLock no longer uses serrated (or star) washers as they are only effective when located between two soft surfaces (such as aluminium) that the teeth can bed into. In SunLock the lower face of the machine screw is hard stainless steel, which the serrated washer cannot "lock" onto. In this case, the lock washer is not helping. SunLock mid-clamps and roof-clamps have been in use without serrated washers for over six months with no reported issues of thread loosening.

Similarly, SunLock does not use helical spring washers, as the spring force created by the washer is far less than the axial tension in the bolt. They effectively act as a flat washer.

REFERENCES

Barrett (1990) Fastener Design Manual, NASA

Smith (1990) Carroll Smith's nuts, bolts, fasteners and plumbing handbook, Motorbooks International

Tomotsugu (2008) Bolted joint engineering: Fundamentals and Applications, Beuth

FURTHER INFORMATION

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