

NAMCO

EA120 Magnetic Proximity Switch

Engineered with SNAP-LOCK[®] Technology



Why?

- The nuclear industry continues to implement a number of regulatory and design changes.
- Performance to specification under the harshest of temperature and seismic conditions.
- Our magnetic proximity switch for valve position indication engineered with SNAP-LOCK[®] technology has handily exceeded seismic performance requirements.
- Our patented SNAP-LOCK[®] technology ensures no chatter in the switch, whether open or closed.
- Our switch with an integrated quick disconnect provides the highest reliability and smallest footprint solution.

Qualification Test Sequence

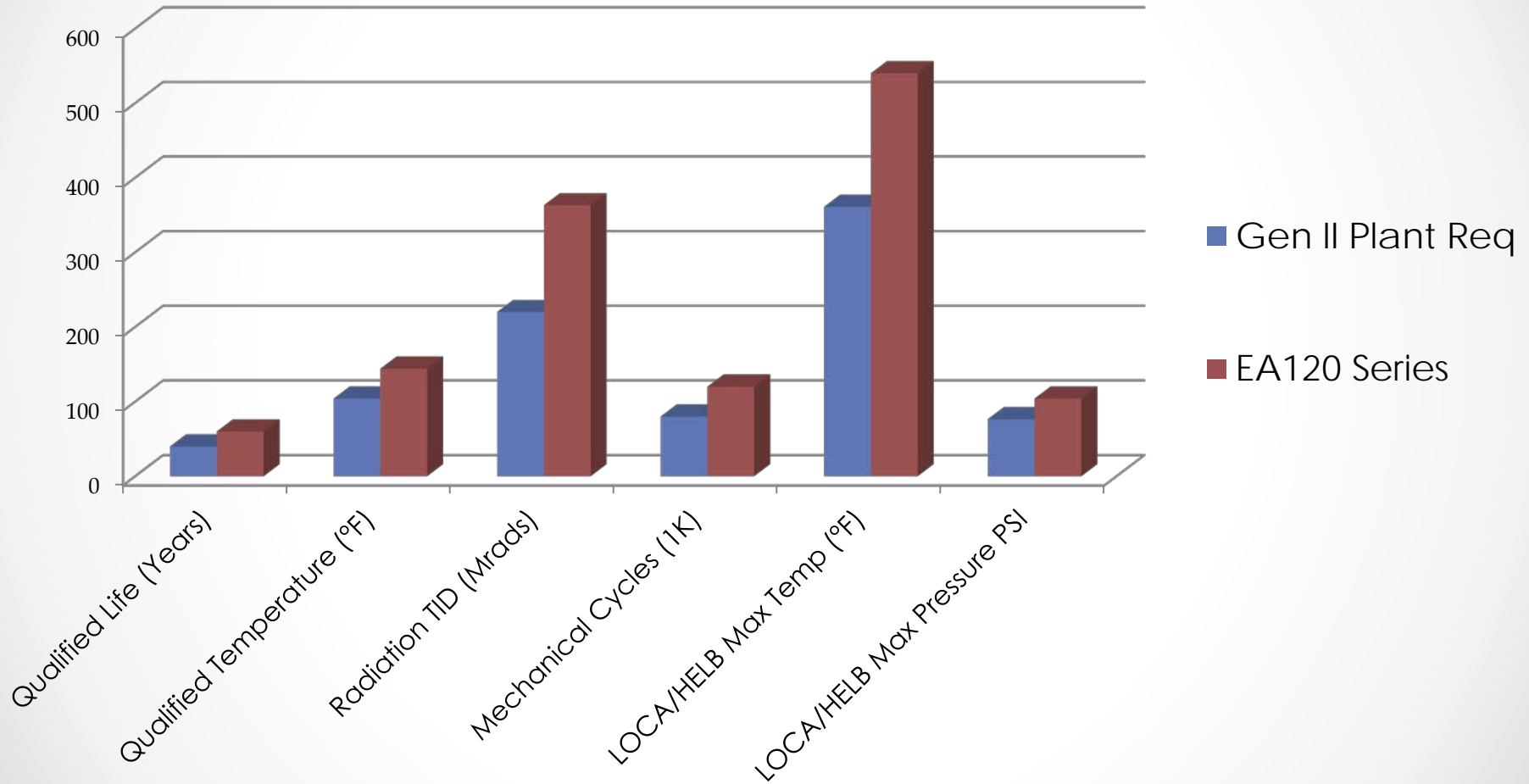
Test	Description
Thermal Cycle Aging	Test per IEEE 572-1985/2006
Mechanical Connect/Disconnect Cycle Aging	160 cycles Connect/Disconnect with EGS QDC & Switch specimens 3a/b, 4a/b
Wear Aging (Mechanical and Electrical Cycling)	150k operating cycles. Electrically (100mA) Switching, PF=1.0):@ 50VDC, and @ 120VAC
Thermal Aging	Normal Temperature 130°F Abnormal (Group 1) 72hrs @ 150°F Abnormal (Group 2) 20days @ 250°F Operating Life of 60 years
Radiation Testing (Normal and Accidental Dose)(RA)	270 Mrad (Beta) (tested 1 to 1 as Gamma) 100 Mrad (Gamma), dose rate <1Mrad/hr
Thermal Cycle Aging	Test per IEEE 572-1985/2006
Pre-vibration Resonance Search	Per IEEE382 and IEEE344, identify any resonance frequencies (5-100-5Hz, 2 octaves, 90min)
Vibration Aging	0.75g, 90 minutes in each axis, sine sweep

Qualification Test Sequence

Test	Description
Seismic Qualification Tests (SQ)	<ul style="list-style-type: none">• RIM OBE - 2 sine sweep sat 2/3 SSE in each axis (2/3 of 6.6g = 4.4g) from 2 to 64 to 2 Hz at a rate of 1 octave/min.• RIM SSE - 2 to 32HZ single freq sine beat test at 1/3 octave intervals at 6.6g (6.0g+10% margin) plus any resonant frequency found up to 100Hz.• RMF SSE (Hard Rock High Freq) - 32 to 64 Hz and single-freq sine beat tests at 1/6 octave intervals 6.6g (6.0g +10% margin)• RMF Test (5 OBE + 1 SSE) per IEEE 344
Pressure Cycle Test (PC)	15 cycles @ 0 to 83 psig
LOCA/HELB (LS)	<ul style="list-style-type: none">• Max Temp. of 540°F HELB• Max Temp. of 480°F LOCA; Max Pressure of 104 psig LOCA• Relative Humidity of 100% LOCA & HELB• Spray 1: 2700 ppm Boric Acid + Phosphoric Acid, ~4.5pH. Started at approx 23 minutes and continued for 3hrs. LOCA• Spray 2: 2480 ppm Boric Acid + Trisodium Phosphate, 7.8 to 8.8pH, starting at approx 3hrs 22minutes and continued for 23 hrs LOCA• Post Accident 1.1 year per Zone 1 profile, shortened to 30 days by Arrhenius methodology. LOCA

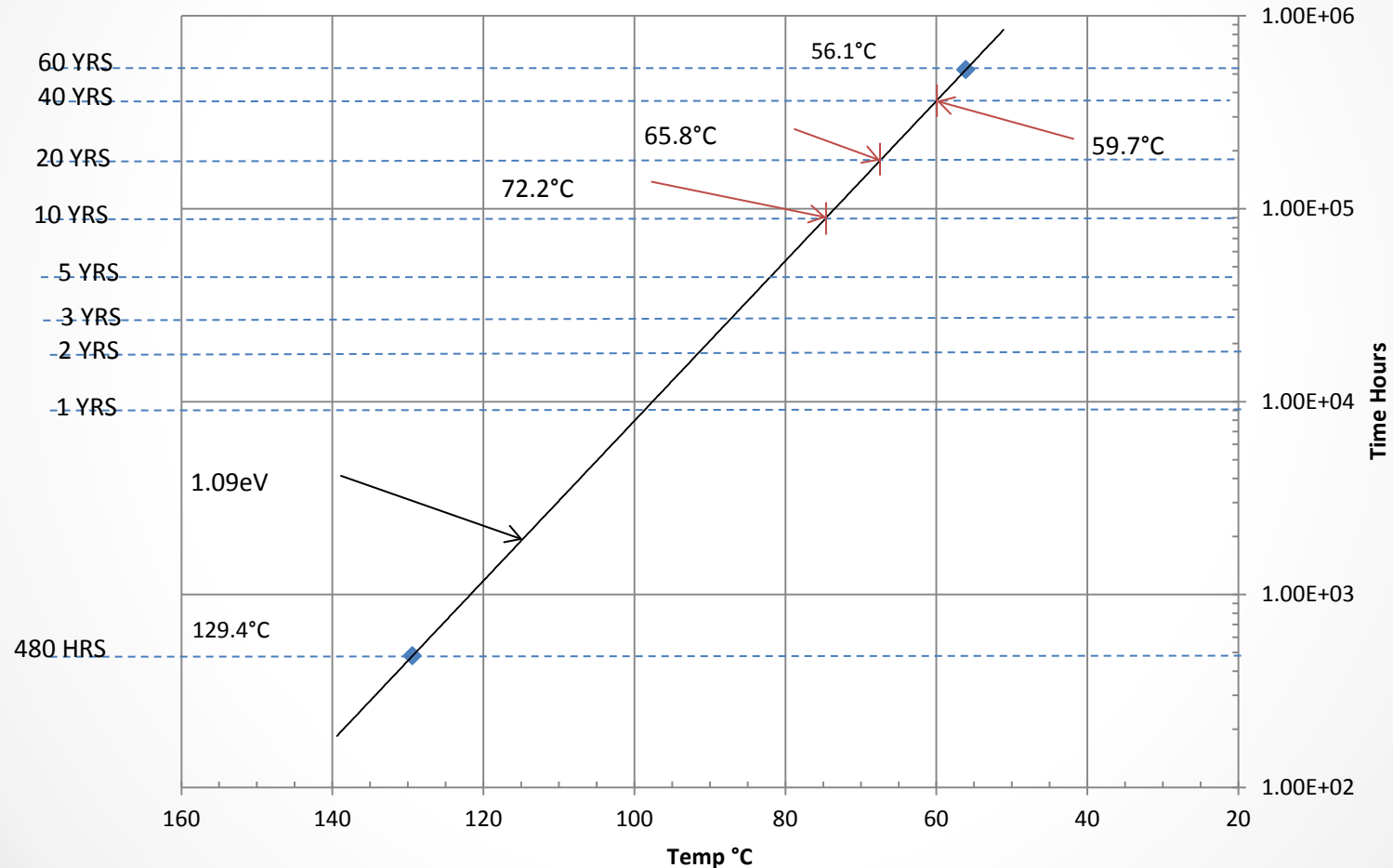
EA120 Series vs. Current Gen II

Installation Qualification Testing



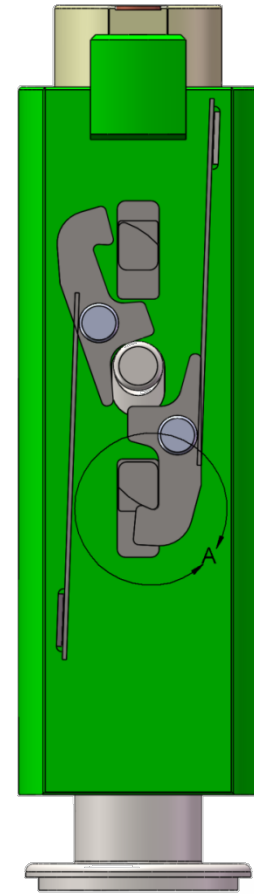
Thermal and Radiation Aging

- Aged for 480 Hours at 129.4°C
- Equivalent to 56.1°C for 60 Years
- Beta Accident Dose tested at 1:1 ratio as Gamma
- TID of 363 Mrads Gamma



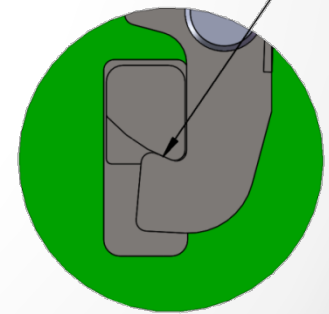
SNAP-LOCK[®] Technology

- The EA120 Series' Reimagined SNAP-LOCK[®] mechanism is designed to stay locked under seismic loads in all directions, just like its older EA180 and EA740 counterparts.
- Steeply Curved Latches:
 - Allow for disengagement of the contacts only when the latch is rotated about its pivot point.
 - Generate even more locking force when loaded in the direction that would cause the switch to disengage or chatter.



DIRECTION OF
CONTACT ENGAGEMENT
AND SWITCH ACTUATION

STEEPLY CURVED
LATCH INTERFACE



DETAIL A

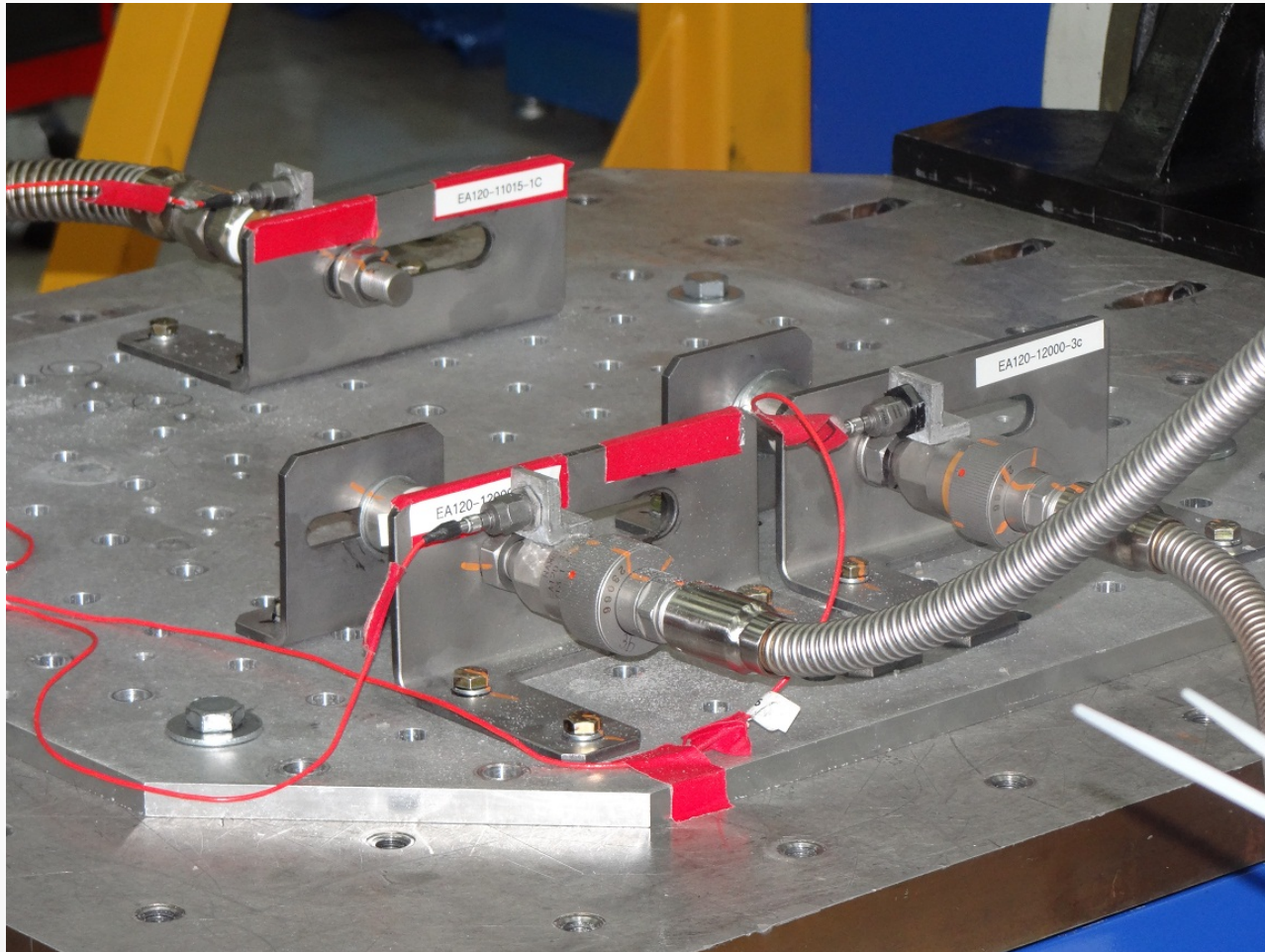
Built for the Nuclear Environment

- Namco's Patent Pending Integrated Connector Receptacle reduces the overall length of the switch.
 - Makes installation in tight spaces easier.
 - Reduces cantilevered mass that could cause unnecessary resonance in our switch or our customers product.
- One piece design:
 - Eliminates water ingress points. The only required seal is the time proven EGS connector interface.
 - Reduces assembly stresses, eliminating failures caused by twisting of wires during installation of threaded receptacle.

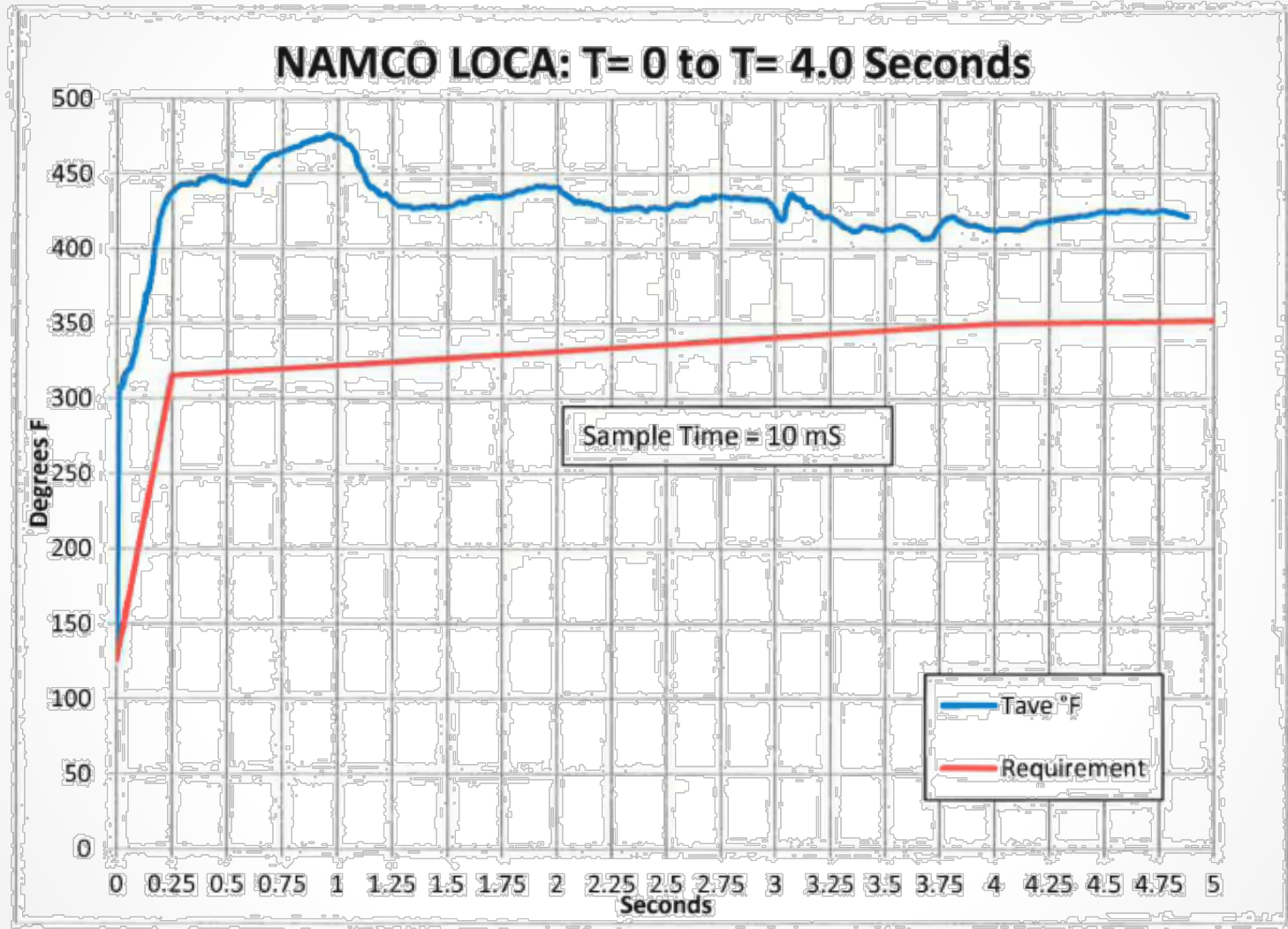


Seismic Testing

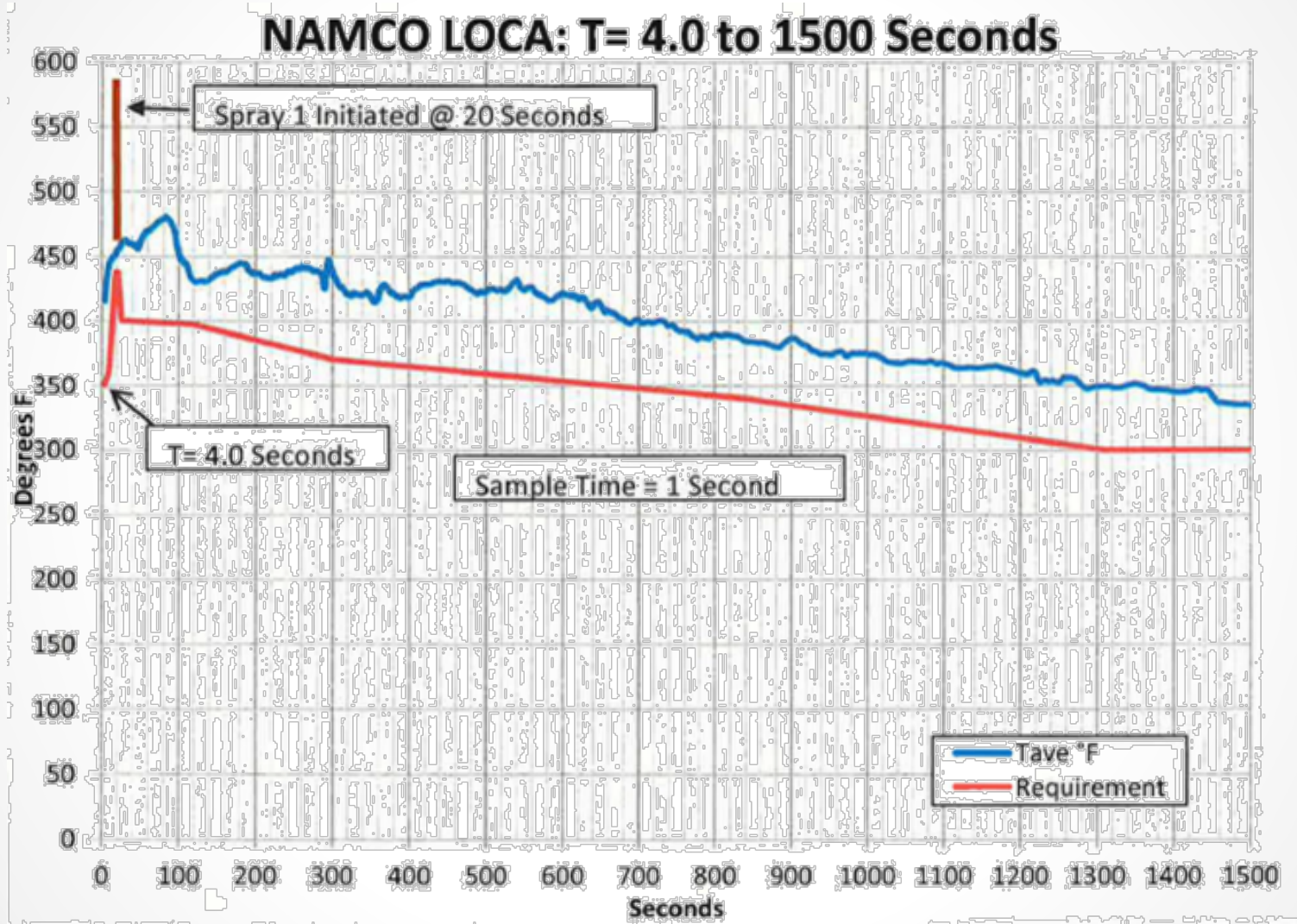
Engaged/Disengaged with Conduit



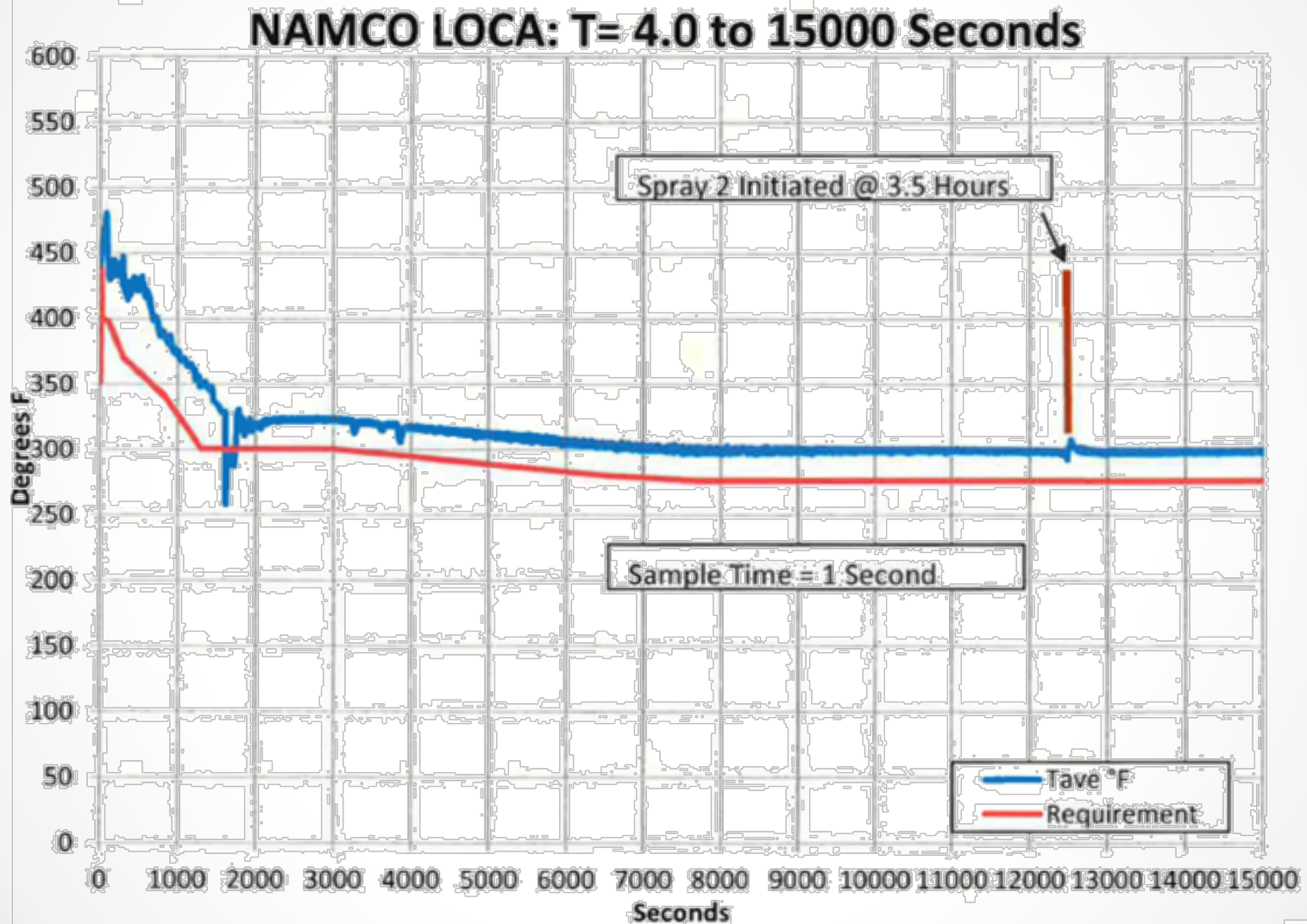
LOCA First 4 Seconds



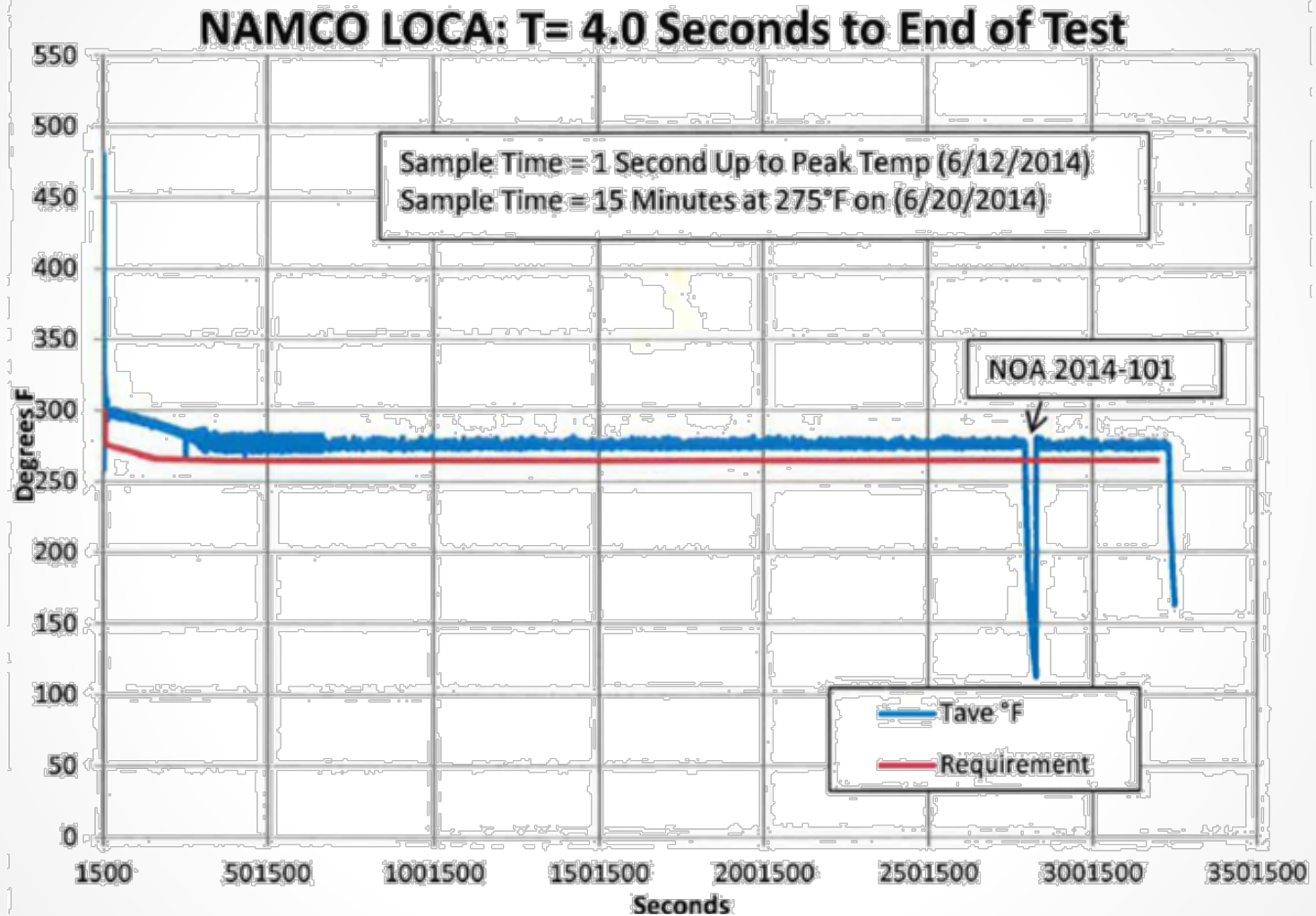
LOCA 4 to 1500 Seconds



LOCA 4 to 1500 Seconds

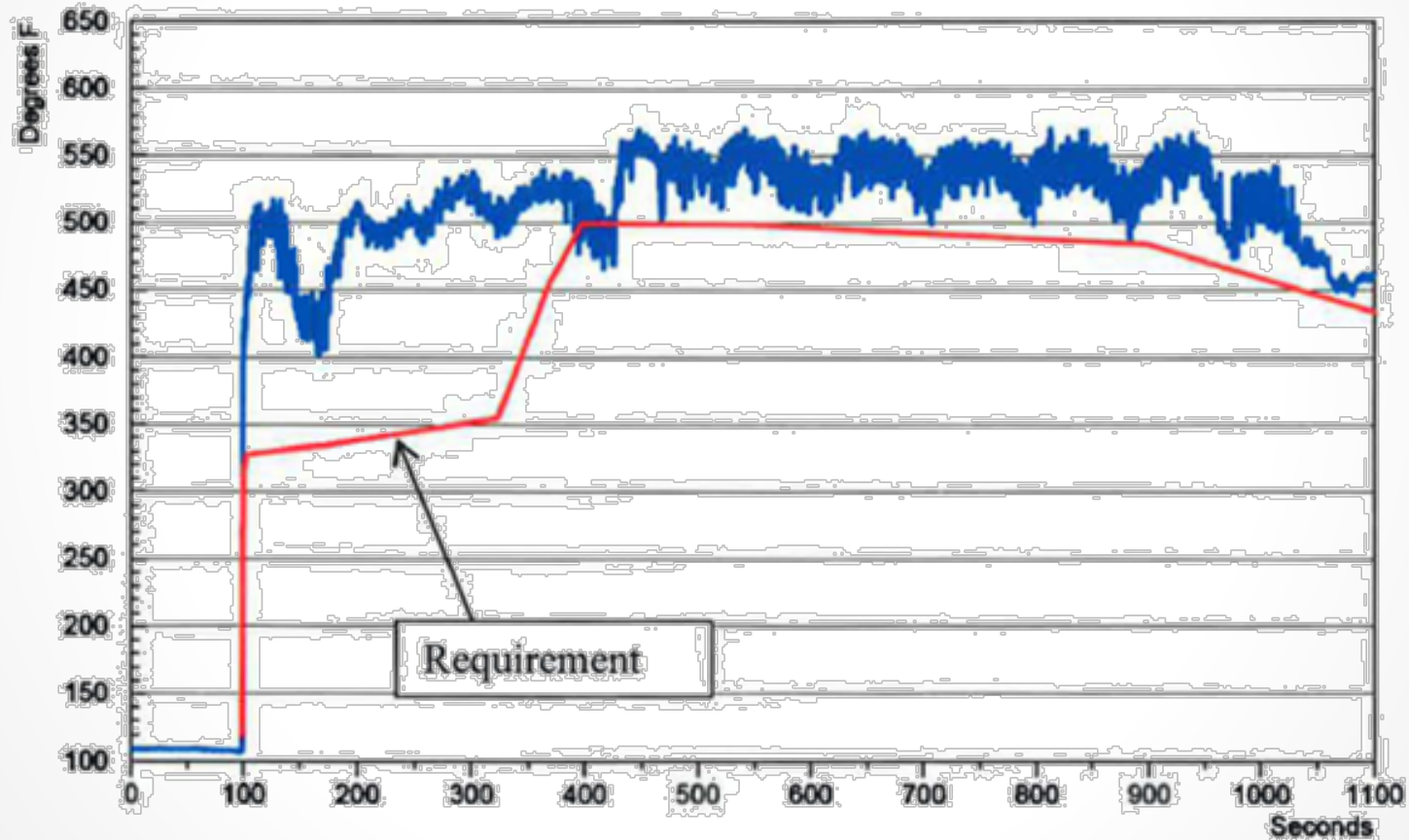


LOCA 4 Seconds to End of Test



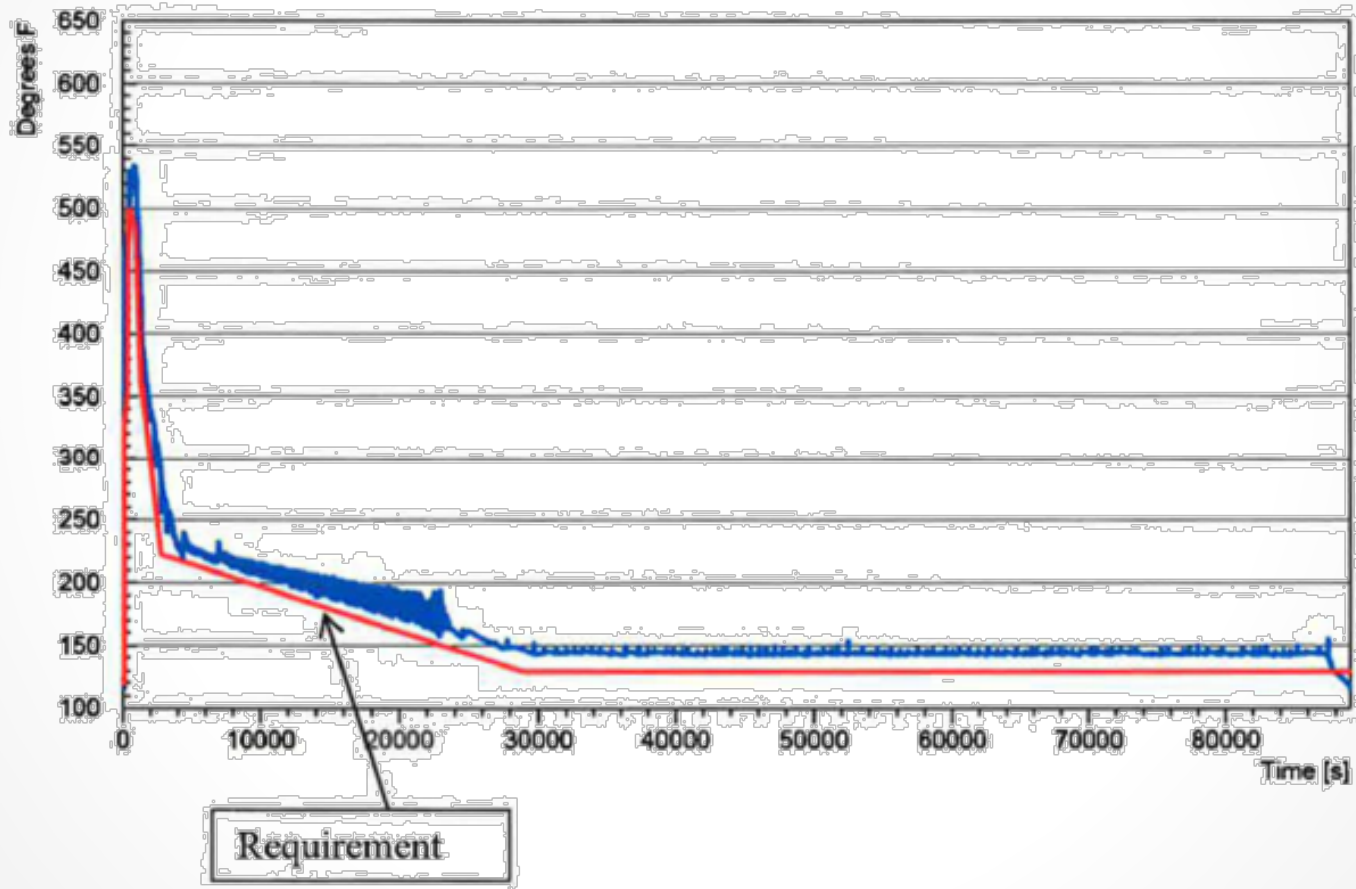
MSLB Temperature - First 1,000 Seconds

High Speed Thermocouple
(Advertised Reaction Time = 10.0 ms)

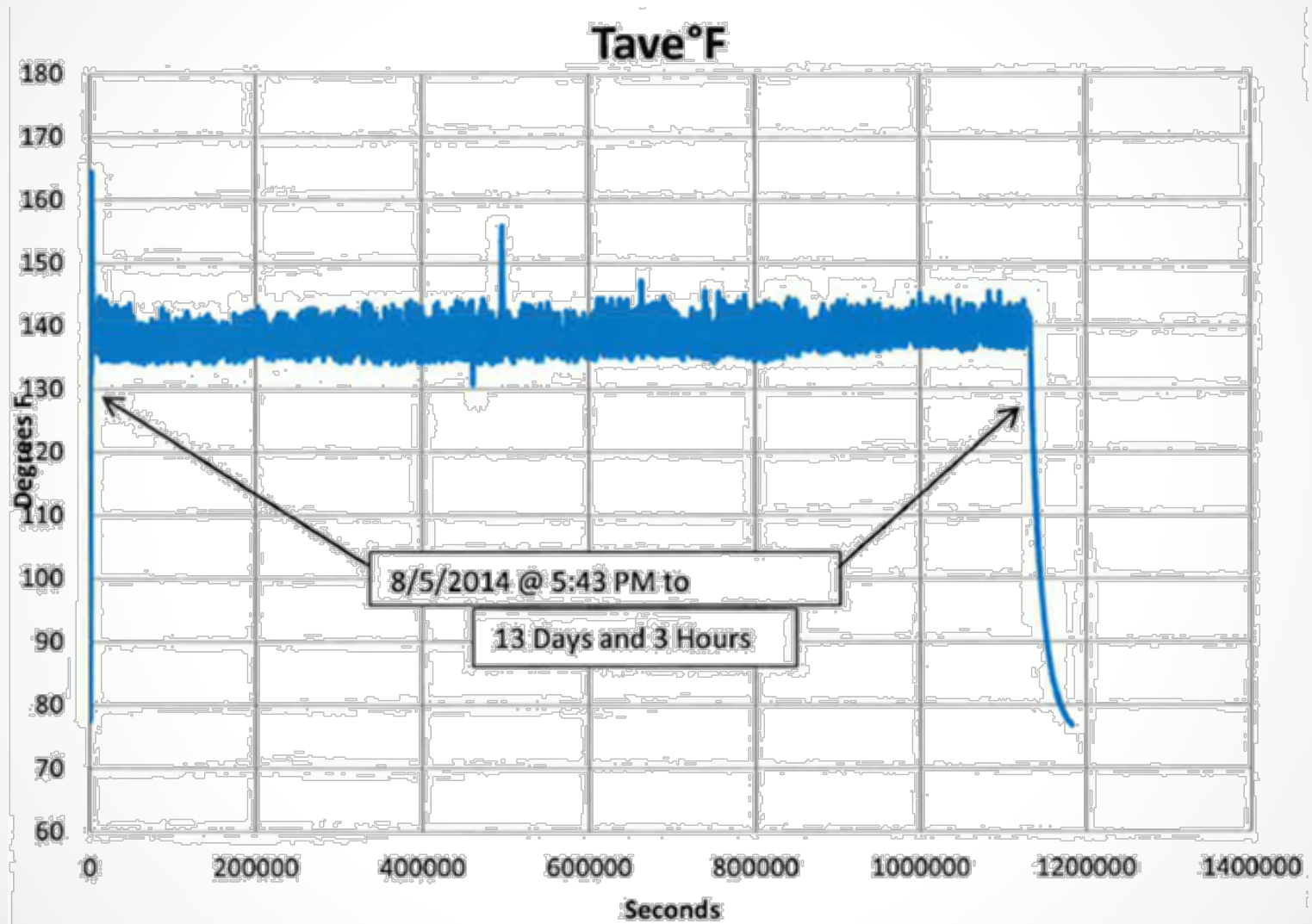


MSLB Temperature - First 24 Hours

Average of two Type K Thermocouples
(Advertised Reaction Time Approximately 3.5 seconds.)



MSLB Full Temperature - 13 Days & 3 Hours



Conclusions

- SNAP-LOCK® Technology is a proven tool in preventing chatter in limit switches whether in the older mechanically actuated EA180, EA170 and EA740 switches or in the next generation magnetically operated proximity switch.
- An Integrated connector reduces size, weight and potential leak paths. Creating a switch that is easier to install, and less susceptible to vibration, assembly stresses, or water intrusion.

For innovation and integrity, choose Namco.