5" SlowStop Store Front Bollard IBC 1607.8.3 Testing 21-MAY-2021



Purpose:

To confirm conformance to International Building Codes and anchoring strength of the SlowStop 5" Store Front Bollard when installed with anchors with an embedment less than 4".

Experiment Design:

Shortened Hilti KH-EZ anchors were used to simulate pull out resistance in 4" residential concrete slab. 3/4" Hilti KH-EZ anchors with a length of 4-1/2" were used to anchor the SlowStop 5" Store Front Bollard in the concrete. The SS5Y-42-SF Bollard has a base plate thickness 5/8", causing each anchor to have a 3.875" embedment in the concrete.



Figure 1 – Anchor Length

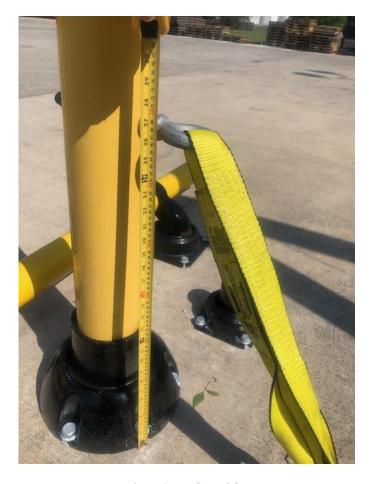


Figure 2 – Eyelet Height



Figure 3 – Bollard Rigging

A production SS5Y-42-SF SlowStop Store Front Bollard was installed in 3000-3500 psi 6" thick concrete. A hole was drilled in the bollard pipe to connect rigging to pull (in effect a push due to the connection point on the opposite side) the bollard with 6,500 pounds of force using a lever chain hoist. An S type load cell was rigged in line with the pulling force in order to measure actual force.

Results:

The SS5Y-42-SF was held at approximately 6,500 pounds of force for 5 minutes. The resulting concrete after the test was left unmarred with no signs of spalling or cracking near the critical anchors.



Figure 4 – Cement After Test

Conclusion:

Given the resulting data, it may be concluded that the SS5Y-42-SF is suitable to be used in residential slabs confirming conformance with IBC 1607.8.3 when the 5" SlowStop Store Front Bollard is anchored properly in 4" thick residential concrete.

APPENDIX A - Load Cell Calibration Certificates

S-Type Pull Force

OMEGA ENGINEERING 1NC.

LOAD CELL FINAL CALIERATION

0.00 - 10000.00 LBS Excitation 10.000 vdc

Job: WHM0030957 Serial: 381452

Tested By: ED Model: LCCD-10K Date: 5/22/2019 Tenperature Range: +0 to +150 F

0.00 - 10000.00 LBS Specfile: LCCD Calibrated:

Force	Unit Data mVdc	Normalized Data
0.00 5000.00 10000.00 5000.00	- 0.070 14.939 29.950 14.947 - 0.070	0.000 15.009 30.020 15.017 0.000
alance	- 0.070	mVdc

Balance	- 0.070	mVdc
Sensitivity	30.020	mVdc
In Resist	447.00	Ohms
Out Resist	352.30	Ohms
59K Shunt	14.913	mVdc

Change at 0.00 LBS (-INPUT to -OUTPUT)

Calibration Factors:

Sensitivity = 3.002 mV/V 59K Shunt = 1.491 mV/V

ELECTRICAL LEAKAGE: PASS

= +EXCITATION ELECTRICAL WIRING/CONNECTOR: RED

BLACK = -EXCITATION GREEN = +OUTPUT WHITE = -OUTPUT

This Calibration was performed using Instruments and Standards that are traceable to the United States National Institute of Standards Technology. Description Range 20K LB LOAD STD TEN 0 - 10000.00 LBS Reference Cal Cert C-2740

C-2740 177438-A Unit Under Test 34401A DMM UUT 34401A DMM STD C-2404 WCS44931L 3146A20228 Pressure Monitor C-3006 WCS41717I. US36107898

Q.A. Representative : El Suchman g. Date: 5/22/2019

This transducer is tested to & meets published specifications. After final calibration our products are stored in a controlled stock room & considered in bonded storage. Depending on environment & severity of use factory calibration is rocommended every one to three years after initial service installation date. COMMENTS: FINAL TEST IN TENSION.

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