Honeywell

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CABLE-PULL SWITCH: PULL-FORCE TESTING

A Test Report

Methodology and Results

Cable-pull safety switches provide a readily accessible emergency stop signal from any point along the installed cable length. The pull force required for an operator to activate the switch can vary due to machinery layout.

Honeyell tested its cable pull-switches to some of those offered by the leading brands in the markets to evaluate whether the switch brand or form factor causes any variations in the pull force required to activate the unit. The Honeywell CPS family of cable-pull switches were designed to allow operators to use reasonable amount of actuation force to activate the switch in case of an emergency. The design also offers a wide cable tensioning tolerance zone to allow for expansion and contraction to reduce unintended unit trips.

Testing was performed on four conveyor layouts and cable spans at the Honeywell R&D facility in Mason, Ohio. The conveyor layouts were chosen to provide a representative sample of common conveyor installations and cable length. The layouts utilized both eyelets and pulleys as cable-support devices. See Engineering Loop Test Set-Up on page 3 for layout of R&D facility.

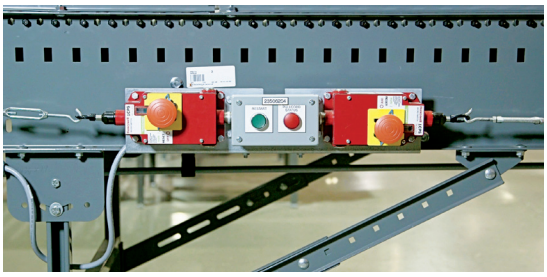
- Test Set-Up #1 is a simple straight run
- Test Set-Up #2 has two 90-degree turns and is routed around additional equipment
- Test Set-Up #3 presented an inside radius turn
- Test Set-Up #4 is a long straight run using a different types of pulley and supports with several elevation changes during the run

Each test run was measured to determine its overall length, following the perimeter of the conveyor, as well as variations in height and depth. Data were recorded at three locations: the approximate 25 percent, 50 percent, and 75 percent distances from the cable-pull device. Locations are approximate as all test data were measured at the mid-point between to cable supports (i.e., eyelets or pulleys). See Engineering Test Set-Up Descriptions on page 3 for detailed measurements of each test set-up.

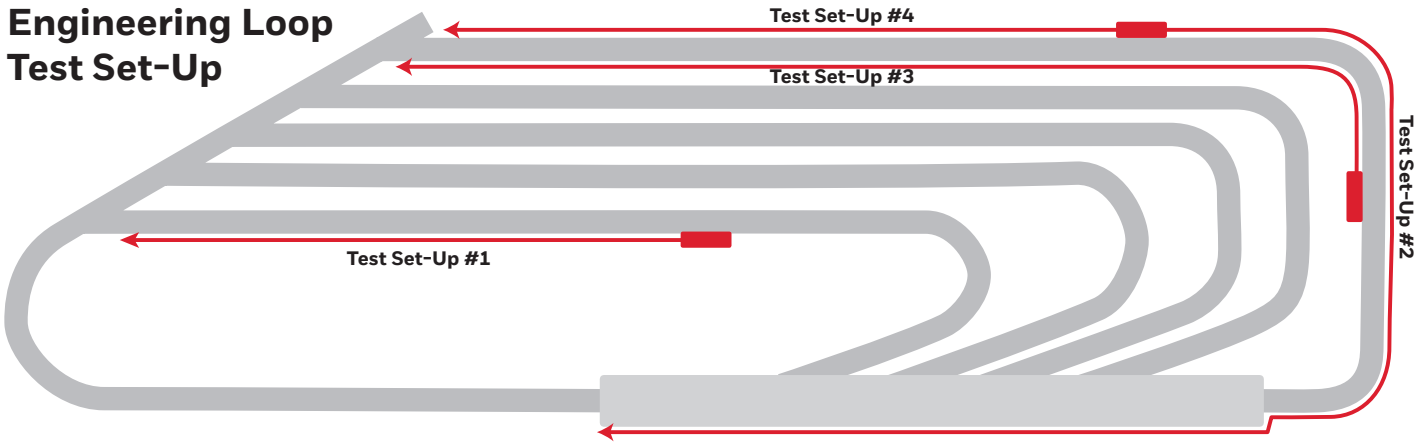
Each cable-pull switch was mounted to a bracket using the appropriate size hardware. The cable was attached to the switch eyelet using a J-hook turnbuckle, and the cable was adjusted to set the switch in a proper tension condition. The bi-directional cable-pull switches were mounted with the cables in both directions properly tensioned or utilized a spacer to hold one actuation shaft in the proper tension position. The cable-pull switches were not electrically energized when the force testing data was collected.

To ensure more accuracy in the test results, pull-force measurements were taken using a Shimpo FGE- 100XY digital force gauge and repeated three times at each location. See Pull-Force Testing Methodology diagram on page 3 for the pull-force measurement process.

The test results show that in most of the test cases, conducted in accordance with the Engineering Test Set-Up Descriptions on page 3, the pull force required by Honeywell CPS to activate the emergency stop signal is comparable to those of the other evaluated switch brands and models. See the Test Results table on page 4 for measured pull-force values.



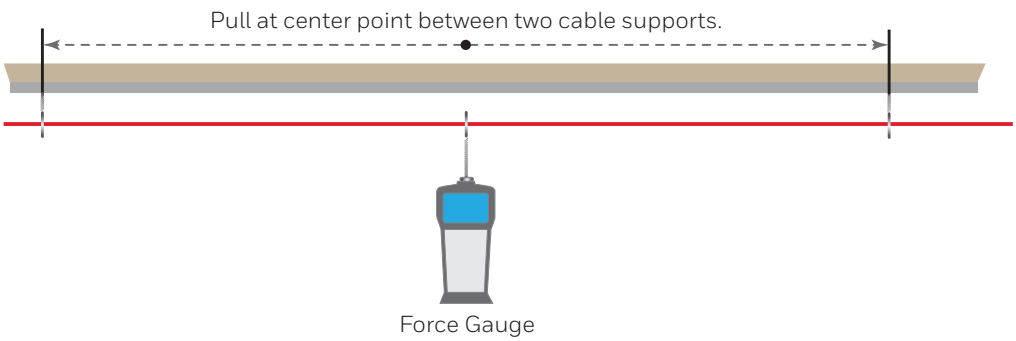
Engineering Loop Test Set-Up

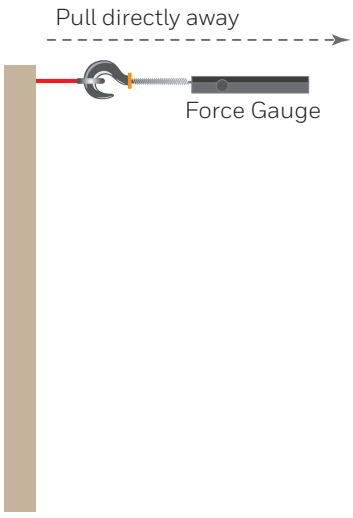


Engineering Test Set-Up Descriptions	Distance	Distance Between Eyelets/Pullies at Test Points
Set-Up #1, Honeywell R&D Facility drawing location		
25% Test Point: 2 eyelets before test point, none under tension **50% Test Point:** 2 additional eyelets before test point, none under tension **75% Test Point:** 3 additional eyelets before test point, all under tension **Cable End Point:** 4 additional eyelets, all under tension	61' 6"	25% Test Point: 10' 4" 50% Test Point: 9' 75% Test Point: 3'
Set-Up #2, Honeywell R&D Facility drawing location		
25% Test Point: 2 eyelets and 6 four-way rollers before test point, 1 eyelet and all rollers under tension **50% Test Point:** 4 additional eyelets before test point, 2 under tension **75% Test Point:** 4 additional rollers (90° turn), 1 additional eyelet (low tension), 2 additional rollers, and 1 additional eyelet before test point, all under tension	120' 8"	25% Test Point: 6' 4" 50% Test Point: 3' 75% Test Point: 11' 9"
Set-Up #3, Honeywell R&D Facility drawing location		
25% Test Point: 1 eyelet (tensioned), then 3 pulleys (tensioned), then 2 additional eyelets (no tension) before test point **50% Test Point:** 5 additional eyelets before test point, none under tension **75% Test Point:** 3 additional eyelets before test point, none under tension	129'	25% Test Point: 5' 9" 50% Test Point: 9' 4" 75% Test Point: 15' 5"
Set-Up #4,Honeywell R&D Facility drawing location		
25% Test Point: 3 eyelets (no tension) then 1 pulley (minor elevation change) before test point **50% Test Point:** 1 additional eyelet and 2 pulleys before test point, none under tension **75% Test Point:** 3 additional pulleys before test point, none under tension	90'	25% Test Point: 6' 8" 50% Test Point: 8' 9" 75% Test Point: 9' 8"

Note: *25%, 50% & 75% test points are approximate as pull test was measured at the closest mid-point of two cable support devices.*

Pull-Force Testing Methodology





Test Results

Set-Up #1												
	25 %				50 %				75 %			
	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.
Honeywell 1CPS	7.4	7.4	7.4	7.4	7.9	8	7.9	7.9	19.4	19.5	19.7	19.5
Allen-Bradley Lifeline 4	6.4	6.4	6.6	6.5	7.3	7.5	7	7.3	17.3	17.5	17.9	17.6
Honeywell 2CPS	7.8	7.9	8	7.9	8.6	8.5	8.5	8.5	20.8	21.5	21.7	21.3
ABB LineStrong3D	9.1	8.7	9.1	8.9	9.8	9.6	9.5	9.6	24.3	25.1	25.2	24.9
Set-Up #2												
	25 %				50 %				75 %			
	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.
Honeywell 1CPS	13	12.4	12.9	12.8	24.6	25.4	25.7	25.2	23.6	23.5	23.9	23.7
Allen-Bradley Lifeline 4	18.9	19.7	19.4	19.3	38.3	38.7	39	38.7	42	37	35.9	38.3
Honeywell 2CPS	15.4	15.3	15.5	15.4	29.2	31.4	31.3	30.6	28.7	29.6	29.6	29.3
ABB LineStrong3D	20.7	20.6	17.7	19.7	34	34.5	35.4	34.6	35.3	35.5	35.1	35.3
Set-Up #3												
	25 %				50 %				75 %			
	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.
Honeywell 1CPS	15.7	15.1	15.9	15.6	13.2	13.4	13.7	13.4	10.7	10.5	10.8	10.7
Allen-Bradley Lifeline 4	15.8	15.8	15.7	15.8	13.5	13.5	13.8	13.6	10.3	10.7	10.7	10.6
Honeywell 2CPS	13.9	13.8	13.9	13.9	11.2	11.5	11.8	11.5	9.1	9.4	9.4	9.3
ABB LineStrong3D	17.1	17.3	18.2	17.5	14.7	14.8	14.5	14.7	12	11.6	11.8	11.8
Set-Up #4												
	25 %				50 %				75 %			
	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.	Pull #1	Pull #2	Pull #3	AVG.
Honeywell 1CPS	9.8	10	9.5	9.8	9.8	10.6	10.5	10.3	10.3	9.9	10.2	10.1
Allen-Bradley Lifeline 4	9.3	9.6	9.3	9.4	9.4	9.7	9.4	9.5	9	9.1	8.9	9
Honeywell 2CPS	11.6	11.2	11	11.3	11.4	11.7	11.1	11.4	10.5	10.8	10.8	10.7
ABB LineStrong3D	15.4	15.2	14.6	15.1	14.5	15.4	14.5	14.8	14.1	14.8	14.9	14.6

Notes:
All data collected using a Shimpo Model FGE-100XY Digital Force Gauge.
All force values are in pounds.
Percentages represent the test point distance from cable-pull switch compared to full cable length.
Pull-force measurements are taken at the center point between two cable supports/guides nearest to the test point distance percentage.

For more information, refer to the MICRO SWITCH Cable-Pull Switch datasheet.

Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit sensing.honeywell.com or call:

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004795-1-EN | 1 | 01/19

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