CALIFORNIA STATEWIDE
UTILITY CODES AND STANDARDS PROGRAM

2016 Title 24 Codes & Standards Enhancement (CASE) Proposal

ASHRAE Electricity Savings – Escalator and Moving Walkway Speed Control

CEC Pre-rulemaking Workshop, June 12th, 2014

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Pre-Rulemaking Workshop: Agenda

- Code Change Overview
- Proposed Code Change Language
- ASME A17.1
- Code Change History
- Summary of Current Code Requirements
- Typical Practices
- Methodology
- Initial Data and Findings
- Cost Effectiveness
- Stakeholder Meeting Feedback
- Specific Stakeholder Requests

Proposed Code Change Overview

Escalator and Moving Walkway Speed Control

- Adds a prescriptive requirement that new escalators and moving walkways must be equipped with speed control technology under the guidelines set forth in ASME A17.1, 2013.

- Updates the ACM Reference Manual to reflect changes to the baseline building.

Proposed Code Change Language

SECTION 140.9 – PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

(d) Prescriptive requirements for escalators and moving walkways

Escalator and moving walks shall automatically slow to the minimum permitted speed in accordance with ASME A17.1/CSA B44 when not conveying passengers.

- We are currently considering adding a condition based on building type to exempt escalators that may not be cost effective due to high pedestrian traffic rates or low hours of operation.
  - Hotels
  - Transportation Function Areas (Airports, transit stations, etc.)
  - Open to suggestion

ASME A17.1 2013, Section 6.1.4.1.2

Requirements for Intermittent Speed Escalators:

- Acceleration and deceleration shall not exceed 1.0 ft/sec^2
- Rated Speed (100 ft/min) is not exceeded
- Minimum speed not less than 10 ft/min
- Passenger Detection provided at both landings
- Must reach full speed before passengers board
- Deceleration does not occur until 3 times the length of time for passenger transfer between landings
- Means to detect failure of passenger detection.
- If failure is detected, run at full rated speed only

Proposed Code Change History

- This measure is being proposed in order to reduce electricity use in escalators and moving walkways when they are in use.
- Intermittent speed escalators and moving walkways are popular in Europe, and a few have already been installed in California with a special variance.
- ASME has established specific requirements to minimize the additional risk associated with varying escalator speed during operation

Current Code Requirements

- There are currently no existing requirements for escalator speed in Title 24.
- Title 8 Section 4.6.4.41 currently requires escalators and moving walkways to comply with the ASME A17.1 2004 edition, which prohibits speed variation once escalators have already been started up.
- Title 8 is in the process of being revised to comply with ASME A17.1 2013, which will eliminate the conflict.

Typical Practices

- Currently escalators and moving walkways run at full speed during all hours of operation in the state of California, whether they are loaded or not

- Research has not identified any reported safety issues associated with the intermittent speed escalators already running in Europe

Methodology for Savings Analysis

- Energy and Demand Impacts
  - Energy savings and Demand Impacts are being determined by comparing the energy usage of the proposed conditions to the energy usage of the existing conditions.
  - The energy saving methodology takes into consideration the following:
    - Average hours of operation
    - Average escalator sizes
    - Estimated average pedestrian traffic rates
    - The limits set forth in the proposed ASME code

Methodology for Cost Analysis

- Incremental cost estimates obtained from Kone.
  - $6,000 for new construction
  - $15,000 for retrofit

- Assume 2% reduction in maintenance costs.
  - Does not include reduction in maintenance contract cost. Typical maintenance of basic escalator contract cost is $400/month

Example Per Unit Savings Estimates

Variable	Example A	Example B
Operating Hours (TOTAL)	4,380 hrs/yr (12 hrs/day)	8,760 hrs/yr (24 hrs/day)
Unloaded Operation Time	1,095 hrs/yr (3 hrs/day)	4,563 hrs/yr (12.5 hrs/day)
Base Case: Escalator runs at full speed during unoccupied operation		
Power Used During Unloaded Operation	4.67 kW	4.67 kW
Annual Electricity Use During Unloaded Operation	5,115 kWh/yr	21,311 kWh/yr
Standards Case: Escalator runs at reduced speed during unoccupied operation		
Power Used During Unloaded Operation	0.92 kW	0.92 kW
Annual Electricity Use During Unloaded Operation	1,005 kWh/yr	4,186 kWh/yr
Annual Savings		
Power Savings During Unloaded Operation	3.75 kW	3.75 kW
Annual Electricity Savings	4,110 kWh/yr	17,125 kWh/yr

Initial Data and Findings (continued)

- California Estimates
  - Escalator installation projections are based on a 2005 study's national projections for the year 2015, and then modified by an estimated growth factor of 1.5% to obtain projections for 2017.
  - National projections were multiplied by population ratio of California to the U.S. (12%) to get a rough estimate for the 2017 escalator projections for California.

Cost Effectiveness

Variable	Example A	Example B
Expected new installations 2017	74	74
Expected additional cost of new installation	$6,000	$6,000
Power Used During Unloaded Operation	202	202
Annual Electricity Use During Unloaded Operation	$15,000	$15,000
Cost of all implementation	$3,474,000	$3,474,000
Annual Savings		
Annual Electricity Savings per unit	4,110 kWh/yr	17,125 kWh/yr
Annual Electricity Savings statewide	1,141,075 kWh/yr	4,754,897 kWh/yr
Simple Payback	**25.52 years**	**6.12 years**

Feedback From IOU Stakeholder Meeting

- Stakeholder meeting held May 7th
  - Title 8 update will ALLOW this measure, not require it
  - Sensor issues still exist
    - Black clothing is not always picked up
    - Approach angles vary
  - The general consensus that this measure should be prescriptive instead of mandatory
  - Still potential safety concerns
  - Notes and presentations from stakeholder meeting available at Title24Stakeholders.com.

Request for Additional Feedback

- We would greatly appreciate any information you are able to provide to assist our efforts
  - technical information
  - market trends and forecast
  - cost data
- Title 24 stakeholders.com RFI
- If you would like to provide additional feedback or information, send an email to Jbaffa@aswb-engineering.com

Questions?

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