Installation verticality inspection plan for elevator guide rails

elevator-guide-rail

SHANGHAI MICROCRE OPTICS-MECH TECH CO.,LTD

Telephone: 400-812-7833 | 021-58391850

Address: 1478 Nanfeng Road, Fengcheng Town, Fengxian District, Shanghai, China | Postal code: 201411

Contact email: shanghai@yr17.net

Service email: rockwei@yr17.net

Application template; not a claim of a completed customer project.

Scope

For installation verticality of elevator T-rails (60 m shaft, example/teaching data) and sampling of joint steps. The autocollimator establishes the reference path from the pit, each rail section is measured in angle and compared with the shaft plumb reference, with densified stations at joints.

Equipment and configuration guidance

• Long-focus photoelectric autocollimator (0.1″ class)

• 250 mm reflector base with rail-face adapter fixture (example)

• Shaft plumb reference (plumb line or laser plummet)

• Feeler gauge and joint densification markers

Principle and calculation

Integrate $\Delta h = L \cdot \tan\theta$ into lateral offset; per-section verticality is the offset difference between section ends. With L=250 mm, 1″≈1.212 μm (example/teaching data); joint steps are read directly from densified station height differences and corroborated by the feeler gauge.

On-site checklist

• Plumb reference stability checked

• Section splice closure computed

• Joint stations covered and corroborated by feeler gauge

Suggested records

• Full-height verticality curve and section offset table

• Joint step records

• Rail adjustment advice

Limitations

Does not cover car running dynamics, noise or rail lubrication state; under shaft draughts and large temperature differences, shorten each measuring section and state the environment window.

Detailed teaching example

Elevator Guide Rail Plumbness Inspection · Tutorial Case

Scenario and task

Teaching demonstration, not a real customer project: plumbness survey of an elevator guide rail in 250 mm segments; data are instructional settings.

Workflow overview

Vertical fixing → Vertical axis → Slider climbs → Log tilts → Plumbness evaluation

Preparation and measurement steps

01. Fix the teaching rail section vertically on the stand

02. Place the autocollimator at the rail base with a vertical optical axis

03. Step a 250 mm slider upward along the rail

04. Record the rail-face normal tilt per segment

05. Cumulate and convert for plumbness results

Teaching example readings

• Bridge span L=250 mm; segment 1 autocollimator reading θ□=-0.6″

• Segment 2 autocollimator reading θ□=-0.6″

• Segment 3 autocollimator reading θ□=+1.2″

Calculation procedure

Height conversion: Δh = L·tan(θ·π/648000)×1000 (μm). Segment 1: 250×tan(-0.6″)=-0.73 μm; Segment 2: 250×tan(-0.6″)=-0.73 μm; Segment 3: 250×tan(+1.2″)=+1.45 μm. Cumulative heights: 0→-0.73→-1.46→-0.01 μm; peak-to-valley PV=+0.00−(-1.46)=+1.46 μm.

Example result and interpretation

Tutorial result PV≈1.46 μm, demonstrating segmented measurement of rail plumbness.

Example verification checklist

• Slider rollers seat well on the rail face

• No rail support movement during readings

• Survey front and side rail faces separately

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