IUEC SAFETY ALERT

COUNTERWEIGHT THEORY

Counterweight Theory

Counterbalance, Balanced Load and Overhauling Loads

NEIEP Semester 200

Hoistway Structures 240 - Car and Counterweight Assembly and Roping

Counterweight Theory

Counterweights are typically hung to counter-balance the weight of the car plus 40% of capacity load. In some cases, there may be a counterweight higher than 40% of capacity load. Some gearless installations are at 42.5% depending on the company. Also, machine size may dictate a counterweight to be equal to the car weight plus 50% of capacity load. It is possible to use a smaller machine with 50% counterweight; because at full load up and empty car down, the lifting weight presented to the machine will be the same.

Hoistway Structures 255 – Elevator Cab Modernization, Refinishing and Floor Covering

Weight Considerations

All throughout this process, you need to keep in mind the weight changes that are involved. When working on traction cars, you need to be aware of the initial car weight and the original value of counterbalancing. On hydraulic cars you need to be aware of the pressure P.S.I. (pounds per square inch) the car is running at and the pressure relief setting

Industry Terms & Definitions

Counterweight

- A weight which counter-balances the weight of an elevator plus approximately 40% of the capacity load

Counterbalance

- A weight or force that balances or offsets another as when two objects of equal weight, power, or influence are acting in opposition to each other. The objects are then said to be in counterbalance.

Balanced Load

- When the load on the car side of an elevator or dumbwaiter sheave equals the weight on the counterweight side. Usually specified at from 30% to 50% of the contract capacity load to attain this condition.

Overhauling Load

- The negative load imposed on the hoist machine resulting from the overbalance of either the car or counterweight, depending on which is heavier

Recommendations & Lessons Learned

Always follow the company safety policy
Always perform a JHA/JSA – give special consideration to counterbalance as tasks progress

New Construction

- FESH Section 11 – Moving Working Platforms
  - 11.1 Running Platforms
    - (d) When required the running platform shall be counterweighted for the weight of the car platform assembly and its expected load. Counterweights shall be secured from bouncing or being lifted out of the frame
- DO NOT add all weights until car assembly is sufficient to maintain counterbalance
- Upon final completion of installation, you may need to add or subtract weight to achieve proper counterbalance. Be sure to counterbalance per manufacturers recommendations
- Place a balance load in the car to verify the car and counterweight are at the specified weight
- Use an ammeter in the armature circuit to measure current while running past the counterweight in the up and down direction at the center of the hoistway. The ammeter will show the same amount of current if proper balance is achieved.

Modernization

- FESH Section 1 – General Safety
  - 1.1 Employee Responsibilities
    - (af) On modernization, when removing old material from elevator platforms, make sure counterbalance is properly adjusted before proceeding
- Maintain proper counterbalance and reduce inspection operation speeds to prevent overhauling
- Upon final completion of modernization, you may need to add or subtract weight to achieve proper counterbalance