SCAFFOLD & ACCESS INDUSTRY ASSOCIATION

Power for Suspended Scaffolds

To avoid damage to hoist motors and provide the proper torque for lifting a load, one must pay careful attention to power supply. This should be addressed at the job survey stage. The hoist manufacturer provides an operating range of voltages for the hoist. This range is the allowable voltage measured while running with load. It is NOT the voltage measured at the end of the power supply cord at the platform while stationary.

Motor torque varies by the square of the voltage drop. If the voltage drop is 10%, the motor torque is .9 x .9 = 81%. This means a 1000 lb. rated load hoist will only be able to lift 810 lbs. The low voltage will cause premature degradation of the insulation and other electrical parts.

Expected voltage drop when using 1000 feet of 10 or 12 AWG electric cables.
Amps= (number of hoists) x (hoist amp rating)

10 AWG cord, 1000 feet long					
	5 amps	7.5 amps	10 amps	12.5 amps	15 amps
Voltage Drop	6.2	9.3	12.4	15.5	18.6
Available Voltage after drop from initial 220 V	213.8 V	210.7 V	207.6 V	204.5 V	201.4 V
12 AWG cord, 1000 feet long					
	5 amps	7.5 amps	10 amps	12.5 amps	15 amps
Voltage Drop	10.25	15.375	20.5	25.625	30.75
Available Voltage after drop from initial 220 V	209.75 V	204.625 V	199.5 V	194.375 V	189.25 V

V = Volt

Remember: The longer the cord the lower the voltage. The lower the voltage the higher the amperage. The Higher the amperage the higher the Heat!!!

Use of a generator for hoist power supply

When working in remote locations, such as on bridges, generators offer a means of power supply. Proper selection is important. The size of the generator should be a minimum of 3 times the total hoist motor Kw or HP. Always check with your hoist supplier first.

To accelerate a suspended load from a standstill to full speed requires a factor of at least 3. For example, two 1.1 Kw hoists require a minimum generator of 2 x 1.1 x 3 = 6.6 Kw. Choose a generator with automatic voltage regulation (AVR) to minimize power fluctuations. Voltage spikes could damage sensitive electronics in your hoist, and low voltage could cause the motor to overheat. Another option to generators is air compressors with air hoist.

Transformers

There are several different types of transformers. The intended use of the transformer will determine the type of transformer that is required.

- Booster transformers

Low voltage is a common, easily corrected problem that can arise when using suspended scaffolds. Poor power supply voltage, excessive cord length, or other power demands on the circuit create a low voltage problem at the hoist that must be fixed to prevent overheating. Heavier gauge cords or booster transformers offer a solution. They may be a single 15% boost or multistep by means of a selector switch. Typically, a 1 ½ HP motor needs a 1 ½ KVA booster, so a pair of such hoists should have a 3 KVA booster minimum.

Remember power supply varies from day to day depending on demand. When a booster transformer is used, it should be placed at the supply so that the higher voltage is boosted rather than the lower voltage found at the platform. The voltage should be checked at the hoist while raising the platform and then while lowering. Keeping the booster at the source instead of the stage reduces the weight of the platform.

Too much boost may create overvoltage when lowering. Voltage must stay within the manufacturer's stated acceptable voltage range.

- Single Phase 'Step Down' ground producing transformers

110-volt power tools are commonly used on a suspended platform. Never use the ground wire and one 'hot wire' of a 3 wire 230-volt system to achieve this. Doing so is against the electrical code and will result in loss of the equipment ground that protects workers from electrical shock.

With a 3-wire system, a transformer must be used to obtain 110 volts. Suppliers offer safe accessories to provide 110-volt grounded power with GFCI protection to avoid shock hazards. They are weatherproof with compatible plugs for easy installation.

- Buck/Booster Transformers

Buck/Booster transformers are the most common transformers used in suspended scaffolding applications. As the name implies, these transformers can have two different uses, and they are usually preset by the manufacturer to either raise or lower voltage. "Bucking" power is done to decrease voltage by a certain amount, while booster transformers raise voltage by a certain amount to correct poor voltage condition.

Often used to test a hoist in a repair shop, a bucking transformer reduces voltage. One can check the operation of a hoist at low voltage by creating it. These transformers are also useful in situations such as parking garages, where there may be 277 volts available, which must be lowered to the proper range needed for a scaffold hoist. In this case, a 15% buck booster would lower the voltage to about 235 volts, which is within the standard operating range of most electric traction hoists. A bucking transformer may have a selector switch to lower voltage in steps.

"Booster" transformers are the most common use of buck/boost transformers. If power cord voltage drop is excessive, or if initial line voltage is too low, a booster transformer is necessary. For example, with 200-volt line voltage, power boosted by 10% would provide 220 volts to work with.

Be sure which type of transformer you need.

- "Step-up" and "Step down" Transformers

"Step-up" transformers are generally the type that increase voltage from 110 volts to 220 volts. They are used when 110 volts is the only available power, and a 220-volt hoist is to be used. "Step down" transformers are generally used as a platform power supply for power tools and radios. These transformers usually have two 110-volt GFCI outlet with U ground connector. It is very important that these transformers are sized according to the largest power tool that is likely to be used on board a suspended platform. Grinders and polishers require a lot of power and can burn out an improperly sized transformer.

When using a "step-up" transformer (110v to 220v), the amperage load from the input side is doubled. Generally, this means that only one hoist can be attached to a "step-up" transformer. Never yoke two hoists to a step-up transformer. The best option is to use the correct voltage for what the hoist needs.

Extension Cords

The length of extension cords greatly affects the supply voltage. When operating 2 hoists on a platform using a yoke, the resistance of a 500ft, 1/3 extension cord will cause a voltage drop of about 20v. If the source voltage is 208v the resulting running voltage at the hoist will be 188v.Every connection between cords can reduce your voltage.

Terminology: Recap

Following are some terms relevant to power on suspended platforms:

- Step Down – A step down transformer is used to convert 220 volts to 110 volts. This transformer is used when 110 volts are required to operate hand tools on the work platform with the use of a GFCI outlet box. (Typically located on platform)
- Buck / Boost – transformers that reduce (buck) or raise (boost) line voltage 5-20%. Used to protect equipment from being damaged. The function of a transformer is only to correct power source.
- Step Up – A step up transformer is used to convert 110 volts to 220 volts. This transformer is used when 220 volts are not available on the jobsite to operate the equipment. (Can only operate on hoist per transformer. Transformer of this type must use separate power cords and separate breakers. (DO NOT YOKE)
- Line Voltage: Line voltage is the amount of voltage measured at the hoist before the unit is turned on. This is done with an in-line meter between the supply cord and the hoist pigtail.
- Start Voltage: Start voltage is the amount of voltage measured at the hoist when the motor is first turned on. It is the in-rush of power that the motor uses to get off the start winding and engage the run winding. This is done with an in-line meter between the supply cord and the hoist pigtail. (Readings are taken under full load)
- Run Voltage: Run voltage is the most critical amount of voltage measured at the hoist while running in the up direction. This is done with an in-line meter between the supply cord and the hoist pigtail. (Readings are taken under full load)