1.0 PREFACE:
The discussion hereafter deals with electrical power issues only.

2.0 INTRODUCTION AND SCOPE:
Temporary power requirements represent the minimum levels of electrical capacity, phase balance, and tolerance bands, required by the elevators to run under a defined temporary power mode of operation.

Temporary power requirements for a specific installation must be stated in a contract specification, or must be negotiated between the elevator installer and the electrical contractor.

It is important to note that the per car KVA required, and other aspects of the temporary power system, depend on many variable factors, such as the following:

- Elevator Control Mode of Operation under temporary power.
- General “Type” of motor drive system.
- Line regenerative or non-line regenerative drive system.
- System inefficiencies.
- Maximum platform to CTW load imbalance during temporary power operation. (Traction Elevator)
- Maximum Platform Load (Direct Driven Hydraulic Elevator)

3.0 ELEVATOR OPERATION MODE:
It is very important to distinguish the use of the elevator under “temporary power operation.” There are two basic operations, which are very different within the context of required temporary power:

- Platform Construction Operation.
- Elevator Used for Construction (ASME A17.1/CSA B44, Section 5.10).

Platform Construction Operation is strictly for the elevator installer’s use. This mode is primarily restricted to low speed, inspection operation, although higher speed operation may be required or expected as the elevator construction proceeds.

Elevator Used for Construction is a more significant operation mode. Often, it is desirable to expedite the temporary turnover of freight cars, for building construction and worker transportation.

The expected operating parameters of the elevator should be clearly defined in terms of speed and acceleration, regardless of the intended use of the elevator under Temporary Power.

4.0 GUIDELINE FORMS:
Temporary Power Guideline Forms are available on pages 4-19 and 4-20 to assist in the communication between the elevator installer and the responsible electrical system designer.

On the Temporary Power Guideline Forms, minimum power requirements should be given for inspection operation, which is a continuous pressure mode of low speed hand operation, where the speed of the elevator does not exceed 0.75 M/S (150 FPM), and other constraints, such as platform to counterweight load imbalance, are noted.

For automatic, independent or attendant operation at greater than inspection speed, it may be considered reasonable and acceptable to operate the elevator at less that nominal rated performance. This means that top speed under temporary operation may be reduced from the final rated speed of the elevator.

Similarly, maximum acceleration demand may be de-tuned for temporary power operation.

These control modifications result in reduced peak KVA requirements of the elevator, which lessens the peak KVA demand on the temporary electrical system.

However, rated platform load for Elevator Used for Construction use should never be de-rated for temporary power operation. The elevator should always be capable of handling its rated capacity (refer to ASME A17.1/CSA B44 Section 2.16).

For drive system types that are AC-line regenerative, utilize caution for operation at greater than inspection speed. The temporary power source must be capable of absorbing regenerative power from the elevator.

5.0 DRIVE SYSTEM TYPES:
Depending on the type of elevator drive system, the amount of apparent power, or KVA, required during temporary power operation, will vary. A brief description of typical drive types and the relationship to temporary power follows:
5.1 Motor Generator Drive Type:

- Three-phase temporary power is required.

The MG set acts like a “Rotating KVA Transformer” with a “primary” side operating at line voltage, and a “secondary” providing variable kW to the load.

In this type of drive system, power is directly proportional to speed and platform load imbalance.

Frequency variance and voltage low-line tolerances can be somewhat relaxed under temporary power operation, with this type of drive system.

This type of drive system regenerates overhauling energy back into the power system. The maximum level of regenerated power should be clearly noted on the guideline form.

5.2 DC SCR Drive:

- Three-phase temporary power is required.

The line current drawn by a DC SCR drive is directly proportional to the DC motor armature amps. Therefore, required temporary KVA may be somewhat higher for this type of drive system. DC SCR Drive systems usually include a per car three phase isolation transformer. The transformer draws inrush current upon the application of power. With this type of drive system, it is important to specifically consider the number of elevators to be operated under the temporary power, because each elevator’s transformer will remain connected to the temporary power source, if the per car mainline disconnecting means is closed.

The temporary power over-current protection device should be designed to accommodate the total transformer inrush current.

Frequency tolerance for SCR drives is still very critical, since the SCRs are line synchronized.

Voltage low-line tolerance can be relaxed somewhat for inspection operation, or reduced high-speed operation, but not for rated speed operation.

This type of drive system regenerates overhauling energy back into the power system. The maximum level of regenerated power should be clearly noted on the guideline form.

5.3 AC Variable Voltage (ACVV):

- Three-phase temporary power is required.

Although no longer commonly applied, this type of drive system is mentioned here for reference.

Running an ACVV under inspection operation results in very high line current, and consequently, may be the worst case of elevator type under temporary power operation.

5.4 AC VVVF, PMAC and DC PWM, Non-Regenerative:

- Three phase temporary power or single-phase temporary power may be required, depending on the manufacturer of the controller and control system.

Required power is proportional to both platform load imbalance, and speed of operation.

The requirements of the temporary power (single phase or three phase) should be clearly noted on the temporary power form. The expected speed of operation should be carefully considered. Speed will be limited if only single-phase power is available.

This type of system dissipates overhauling energy into grid resistors. Therefore, there is no concern about absorption of regenerated power by the temporary power system.

5.5 AC VVVF, PMAC and DC PWM Regenerative:

- Three phase temporary power or single-phase temporary power may be required, depending on the manufacturer of the controller and control system.

Required power is proportional to both platform load imbalance, and speed of operation.

The requirements of the temporary power (single phase or three phase) should be clearly noted on the temporary power form. The expected speed of operation should be carefully considered. Speed will be limited if only single-phase power is available.

This type of drive system regenerates overhauling energy back into the power system. The maximum level of regenerated power should be clearly noted on the guideline form.

5.6 Hydraulic Elevators:

- Hydraulic pump units typically utilize three phase motors. Therefore, three-phase temporary power is necessary.
Motor load is only required for the up direction operation. The amount of temporary KVA will be based strictly on the platform load, and this can be estimated by calculation.

The pump motor starting method may have some effect on the temporary power system. The important point to consider is that of the source over-current protection means, and it's tripping characteristic, related to the expected starting current of the pump motor.

Three methods of motor starting are generally applied on hydraulic elevator controls:

- Across the line starting:
  
  Worst case of peak starting current, per rated motor HP.

- Wye-delta starting:
  
  Much better, starting current limited to lesser value

- Electronic Motor Starter:
  
  Staring current can be limited to an adjustable, low value.

For each of the above systems, notation of type, and peak motor starting amps should be listed on the temporary power form.

6.0 GENERAL COMMENTS:

6.1 Source Impedance and Harmonic Distortion:

Temporary power supplies typically have less capacity than that of the final system installation. As such, the temporary source impedance is considerably higher than the final source impedance. Therefore, the line voltage distortion due to non-linear, harmonic generating drives, will be somewhat higher during temporary operation, than on the final building power distribution system.

The building contractor should be made aware of the drive type applied in the elevator controls, so that any necessary provisions can be made within the facility, in case of any concern related to harmonic voltage distortion, during operation of the elevators under temporary power.