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ARAB ENGINEERING BUREAU

## 23 POWER FACTOR CORRECTION

### 23.1 GENERAL REQUIREMENTS

#### 23.1.1 Scope

- 1 Every installation shall have a power factor within the range of 0.9 lagging to unity. A Lagging power factor less than 0.9 shall be improved by the installation of suitable correction equipment. The low voltage Capacitor banks to be installed and connected to the MDB / M.L.V.P in order to improve the power factor and to maintain the overall power factor between 0.9 Lag and unity.
- 2 Individual Power factor correction capacitor can also be connected to major inductive equipment's in order that the overall compensation by means of group correction and individual correction shall achieve the required minimum power factor of 0.90 Lag measured at MSB / MDB panel.
- 3 The target power factor for all Electrical design purpose shall be Minimum 0.90 lag. Design calculation for power factor correction equipment shall be submitted for the following categories of installation
  - (a) All industrial installation irrespective of load
  - (b) All Agricultural farms irrespective of load
  - (c) All bulk customers of any category
  - (d) All Commercial, Government and mixed use installations, of demand load of 210Kw / 350A and above.
  - (e) All residential building and Developments with central air-conditioning system and having an overall demand load of 210Kw / 350 A and above.
  - (f) All residential building and Developments where a private substations is insisted by KAHRAMAA.
- 4 Detuned Capacitors shall be installed where the non-linear loads constitute a major part of the load based on design verification and /or site audit.
- 5 Note: If the percentage non-linear load in the installation exceeds 15% of total load then detuned capacitor shall be used.
- 6 The assessment shall be made for any characteristics of equipment likely to have harmful effect on KAHRAMAA supply network, shall be audited and remedial measures considered for the installation. The provisions under section 3 requirements of safety shall be complied. Any other method of power factor compensation shall be approval by KAHRAMAA prior to installation.
- 7 Capacitor banks and associated components shall be suitably designed and selected to ensure reliable and continuous operation at a maximum system voltage of 440V and at a maximum ambient temperature of 50°C.
- 8 If a permanently connected capacitor unit is applied for induction motors, the capacitor unit rating must not exceed 90% of the load reactive power of the motor. The above is required in order to avoid the occurrence of self-excitation on run-down condition of motor.

#### 23.1.2 Clarification

- 1 The benefit to this type of application is as follow:
  - (a) The reactive power requirements of the motor are only supplied when the motor is running this effectively provides automatic control power factor.

- (b) Total equipment costs are reduced as the motor controller performs the capacitor switching function.
- (c) The voltage profile to the motor is improved. A major drawback to this type of capacitor application, however is improper sizing of the capacitor can lead to motor failure; too large of a capacitor leads to self-excitation of the motor, which can result in motor insulation failure. Self-excitation occurs when the capacitive reactive current from the capacitor is greater than the magnetizing current of the induction motor. When this occurs, excessive voltage can result on the terminal motor. This excessive voltage can cause insulation degradation and ultimately result in motor failure.

END OF PART

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