Harmonic Filter Calculations: Enter Title Here…

SYSTEM INFORMATION:

Harmonic Filter Specification (e.g., 5):	5 th	Power System Fundamental Frequency:	60 Hz
Three-Phase Capacitor Bank Rating:	500 $kVAr_{3\varphi}$	Capacitor Bank Voltage Rating:	600 $Volts_{\varphi\varphi}$
Rated Capacitor Bank Current:	481 Amps	Capacitor Unit Frequency Rating:	60 Hz
Nominal Bus Voltage Rating:	480 $Volts_{\varphi\varphi}$	Derated Capacitor Bank Rating:	320 $kVAr_{3\varphi}$
Capacitor Bank Current (actual):	384.9 Amps	Total Harmonic Nonlinear Load:	500 $kVA_{3\varphi}$
Filter Tuning Harmonic (e.g., 4.7):	4.7 th	Filter Tuning Frequency (x Fundamental):	282 Hz
Capacitor Bank Reactance (wye):	0.7200 Ω	Capacitor Bank Capacitance (wye):	3684.15 μF
Capacitor Bank Reactance (delta):	2.1600 Ω	Capacitor Bank Capacitance (delta):	1228.05 μF
Harmonic Filter Reactor Reactance:	0.0326 Ω	Harmonic Filter Reactor Inductance:	0.0865 mH
Filter Full Load Current (actual):	403.2 Amps	Fundamental Frequency Compensation:	335 $kVAr_{3\varphi}$
Filter Full Load Current (rated):	503.9 Amps		
Transformer Nameplate Rating:	1500 $kVA_{3\varphi}$	Utility Side Voltage Distortion (V_h):	1.00 %
Transformer Nameplate Impedance:	6.00 %	*(Utility Harmonic Voltage Source)*	
Nonlinear Load Harmonic Current:	30.00 % Fund	Nonlinear Load Harmonic Current:	180.4 Amps
Utility Harmonic Current:	42.7 Amps	Maximum Total Harmonic Current:	223.1 Amps

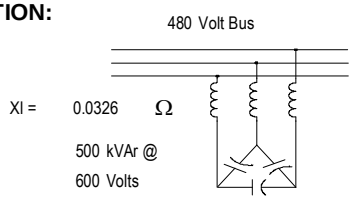
CAPACITOR BANK DUTY CALCULATIONS:

Harmonic Filter Bank RMS Current:	460.8 Amps	Capacitor Bank Voltage (Fundamental):	502.8 $Volts_{\varphi\varphi}$
			290.3 $Volts_{\varphi G}$
Harmonic Capacitor Bank Voltage:	55.6 $Volts_{\varphi\varphi}$	Maximum Peak Voltage (Fundamental):	558.4 $Volts_{\varphi\varphi}$
	32.1 $Volts_{\varphi G}$		322.4 $Volts_{\varphi G}$
RMS Capacitor Bank Voltage:	505.8 $Volts_{\varphi\varphi}$		
	292.0 $Volts_{\varphi G}$	Maximum Peak Current:	626.2 Amps

CAPACITOR LIMITS: (IEEE Standard 18-2002)

	Limit	Contingency	Actual	Value
Peak Voltage:	100%	120%	93.1%	558
RMS Current:	100%	135%	95.8%	461
KVAr:	100%	135%	80.7%	404
RMS Voltage:	100%	110%	84.3%	506

FILTER CONFIGURATION:



HARMONIC FILTER REACTOR DESIGN SPECIFICATIONS:

Filter Reactor Reactance:	0.0326 Ω	Filter Reactor Inductance:	0.0865 mH
Fundamental Frequency Current:	403.2 Amps	Harmonic Current:	223.1 Amps
RMS Current Requirement:	460.8 Amps	Voltage Requirement:	277.1 $Volts_{\varphi G}$

TOLERANCE EVALUATION, QUALITY FACTOR, AND PARALLEL RESONANCE CHECK:

	-	+	Tuning Range
Capacitor Tolerance:	0.00	10.00	4.43
Reactor Tolerance:	2.50	2.50	4.76

$$f_{tuned} = f_{nominal} \times \frac{1}{\sqrt{(1+t_r)(1+t_c)}}$$

Filter Reactor X/R Ratio: 4.00

Quality Factor: 18.80

Resulting Parallel Resonance: 4.15 (x Fundamental)