

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 kVA _{3φ}	Capacitor Bank Voltage Rating:	600 Volts _{φφ}																									
Rated Capacitor Bank Current:	481 Amps	Capacitor Unit Frequency Rating:	60 Hz																									
Nominal Bus Voltage Rating:	480 Volts _{φφ}	Derated Capacitor Bank Rating:	320 kVA _{3φ}																									
Capacitor Bank Current (actual):	384.9 Amps	Total Harmonic Nonlinear Load:	500 kVA _{3φ}																									
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 kVA _{3φ}																									
Filter Full Load Current (rated):	503.9 Amps	Utility Side Voltage Distortion (V _h):	1.00 %																									
Transformer Nameplate Rating:	1500 kVA _{3φ}	<i>(Utility Harmonic Voltage Source)</i>																										
Transformer Nameplate Impedance:	6.00 %	Nonlinear Load Harmonic Current:	180.4 Amps																									
Nonlinear Load Harmonic Current:	30.00 % Fund	Maximum Total Harmonic Current:	223.1 Amps																									
Utility Harmonic Current:	42.7 Amps																											
CAPACITOR BANK DUTY CALCULATIONS:																												
Harmonic Filter Bank RMS Current:	460.8 Amps	Capacitor Bank Voltage (Fundamental):	502.8 Volts _{φφ} 290.3 Volts _{φG}																									
Harmonic Capacitor Bank Voltage:	55.6 Volts _{φφ} 32.1 Volts _{φG}	Maximum Peak Voltage (Fundamental):	558.4 Volts _{φφ} 322.4 Volts _{φG}																									
RMS Capacitor Bank Voltage:	505.8 Volts _{φφ} 292.0 Volts _{φG}	Maximum Peak Current:	626.2 Amps																									
CAPACITOR LIMITS: (IEEE Standard 18-2002)		FILTER CONFIGURATION:																										
	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>Limit</th> <th>Contingency</th> <th>Actual</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Peak Voltage:</td> <td>100%</td> <td>120%</td> <td>93.1%</td> <td>558</td> </tr> <tr> <td>RMS Current:</td> <td>100%</td> <td>135%</td> <td>95.8%</td> <td>461</td> </tr> <tr> <td>KVAR:</td> <td>100%</td> <td>135%</td> <td>80.7%</td> <td>404</td> </tr> <tr> <td>RMS Voltage:</td> <td>100%</td> <td>110%</td> <td>84.3%</td> <td>506</td> </tr> </tbody> </table>		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	<div style="text-align: right;">480 Volt Bus</div>	
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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 _{φG}																									
TOLERANCE EVALUATION, QUALITY FACTOR, AND PARALLEL RESONANCE CHECK:																												
Capacitor Tolerance:	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">-</td> <td style="text-align: center;">+</td> </tr> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">0.00</td> <td style="text-align: center;">10.00</td> </tr> </table>		-	+		0.00	10.00	$f_{tuned} = f_{nominal} \times \frac{1}{\sqrt{(1+t_r)(1+t_c)}}$	Tuning Range																			
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Reactor Tolerance:	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">2.50</td> <td style="text-align: center;">2.50</td> </tr> </table>		2.50	2.50	4.43 4.76																							
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Filter Reactor X/R Ratio:	4.00	Quality Factor:	18.80																									
		Resulting Parallel Resonance:	4.15 (x Fundamental)																									
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