

SEQUENCE OF OPERATION GUIDELINE

EXHAUST FAN SYSTEM-MULTIPLE FANS

Document: Exhaust-Multiple Fan
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NOTES:

1. THIS SEQUENCE IS INTENDED TO PROVIDE THE DESIGN PROFESSIONAL WITH A BASIC GUIDELINE OF MINIMUM REQUIREMENTS FOR A TYPICAL MUTLI FAN EXHAUST SYSTEM. THIS SEQUENCE SHALL BE CAREFULLY REVIEWED AND EDITED WITH RESPECT TO APPLICATION-SPECIFIC PROJECT REQUIREMENTS AND PROPOSED MODIFICATIONS SHALL BE REVIEWED WITH FSU STAFF.
2. THE INTENT IS FOR THIS SEQUENCE TO BE INCLUDED IN THE CONTRACT DRAWINGS.
3. REFERENCE STANDARD CONTROL DIAGRAMS IC-17

PROVIDE THE FOLLOWING FOR EXHAUST FAN SYSTEMS.

1. VARIABLE FREQUENCY DRIVE AND BYPASS DAMPERS WITH STATIC PRESSURE CONTROL.
2. AUTOMATIC FAN ROTATION AND FAN FAILURE STANDBY CONTROL.
3. NORMAL TWO FAN OPERATION WITH A DESIGNATED STANDBY FAN OPERATION.

SAFETY CONTROL SEQUENCES: PROVIDE THE FOLLOWING SAFETY FUNCTIONS.

START-STOP SEQUENCES: PROVIDE THE FOLLOWING OPERATIONAL AND INTERLOCK FUNCTIONS WHEN THE EXHAUST SYSTEM IS STARTED OR STOPPED, UNLESS OTHERWISE NOTED. THESE SEQUENCES SHALL BE FUNCTIONAL FOR ANY REASON THE EXHAUST SYSTEM STARTS-STOPS IN ANY MODE OF OPERATION (ALL VFD MODES, ALL AUTOMATIC AND SAFETY FUNCTIONS, AND LOCAL MANUAL START-STOP).

1. BYPASS DAMPERS: OPEN BYPASS DAMPERS TO THEIR MINIMUM 25% POSITION UPON INITIAL STARTUP. CLOSE DAMPERS UPON EXHAUST SYSTEM STOP.
2. FANS: RAMP FAN UP TO MINIMUM SPEED AND ENABLE STATIC PRESSURE CONTROL. SHUT DOWN FANS UPON EXHAUST SYSTEM SHUTDOWN.

FAN SPEED CONTROL: PROVIDE STATIC PRESSURE SENSORS MOUNTED IN EXHAUST DUCTS AS INDICATED ON FLOOR PLAN. CONTROL THE VARIABLE SPEED DRIVE FROM MINIMUM TO MAXIMUM SPEED TO MAINTAIN THE STAITC PRESSURE SETPOINT. IN THE EVENT THE REMOTE STATIC PRESSURE BECOMES UNRELIABLE, REVERT CONTROL TO THE STATIC PRESSURE SENSOR LOCATED AT THE EXHAUST PLENUM AND INITIATE AN ALARM. IN THE EVENT MORE THAN ONE STATIC PRESSURE IS SHOWN, THE BAS SHALL CONTROL TO THE SENSOR THAT IS FARTHEST FROM SETPOINT

BYPASS DAMPER CONTROL: IN THE EVENT THE FANS HAVE REACHED THEIR MINIMUM SPEED AND THE STATIC PRESSURE REMAINS HIGH, BEGIN MODULATING THE BYPASS

DAMPERS BETWEEN THEIR MINIMUM AND MAXIMUM OPEN POSITION. CONTINUE MODULATING THE BYPASS DAMPERS UNTIL THEY REACH THEIR MINIMUM SETTING 25% (ADJ) AT WHICH TIME THE FANS WILL BEGIN RAMPING UP TOWARDS THEIR MAXIMUM SPEED.

SINGLE EXHAUST FAN FAILURE: IN THE EVENT ONE OF THE EXHAUST FANS FAIL, IMMEDIATELY START THE STANDBY EXHAUST FAN. THE STANDBY FAN WILL REMAIN ON AND BE RE-DESIGNATED AS THE NEW PRIMARY FAN. THE FAILED FAN SHALL MAINTAIN ITS ALARM CONDITION UNTIL A BAS RESET IS INITIATED TO BRING THE FAILED FAN OUT OF ITS ALARM CONDITION. NOTE: REGARDLESS OF STANDBY FAN ALARM STATE THE BAS SHALL MAKE AN ATTEMPT TO START THE STANDBY FAN IN THE EVENT OF A LEAD FAN FAILURE.

EXHAUST SYSTEM ROTATION SEQUENCE: UPON SIGNAL FROM THE BAS TO ROTATE THE EXHAUST FANS, EXECUTE THE FOLLOWING SEQUENCE.

1. WHILE THE CURRENT LEAD FANS ARE STILL ACTIVE, RUN THE FANS DOWN TO 50% (ADJ).
2. OVERRIDE THE EXHAUST BYPASS DAMPER TO 50%
3. START THE NEW LEAD FAN
4. STOP THE OLD LEAD FAN AND DESIGNATE IT AS THE NEW STANDBY FAN
5. RELEASE FANS AND BYPASS DAMPER TO MAINTAIN STATIC PRESSURE SETPOINT
6. DELAY 10 SECONDS (ADJUSTABLE)
7. INITIATE ROTATION IN ACCORDANCE WITH A BAS SCHEDULE OR BY MANUAL INITIATION.

EXH #		POINTS	POINT TYPE		ALARM			INTEGRATED POINT	NOTES	
TYPE: IC-17			UNITS	ANALOG	DIGITAL	CONDITION				
SHORT NAME	POINT DESCRIPTION					EQUIP ALARM	HIGH LIMIT			LOW LIMIT
bbb_EXHxxA_SS	EXHAUST FAN-A START/STOP	ON/OFF		X	X					
bbb_EXHxxA_S	EXHAUST FAN-A STATUS	ON/OFF		X	X					
bbb_EXHxxA_VFD	EXHAUST FAN-A VFD OUTPUT	%	X							
bbb_EXHxxA_FLW	EXHAUST FAN-A AIR FLOW	CFM	X							
bbb_EXHxxB_SS	EXHAUST FAN-B START/STOP	ON/OFF		X	X					
bbb_EXHxxB_S	EXHAUST FAN-B STATUS	ON/OFF		X	X					
bbb_EXHxxB_VFD	EXHAUST FAN-B VFD OUTPUT	%	X							
bbb_EXHxxB_FLW	EXHAUST FAN-B AIR FLOW	CFM	X							
bbb_EXHxxC_SS	EXHAUST FAN-C START/STOP	ON/OFF		X	X					
bbb_EXHxxC_S	EXHAUST FAN-C STATUS	ON/OFF		X	X					
bbb_EXHxxC_VFD	EXHAUST FAN-C VFD OUTPUT	%	X							
bbb_EXHxxC_FLW	EXHAUST FAN-C AIR FLOW	CFM	X							
bbb_EXHxxSP1	STATIC IN DUCT-1	INWG	X			X	X			
bbb_EXHxxSP2	STATIC IN DUCT-2	INWG	X			X	X			
bbb_EXHxxSP_SP	STATIC IN DUCT SETPOINT	INWG	X							
bbb_EXHxx1_FLW	EXHAUST AIR FLOW DUCT-1	CFM	X			X	X			
bbb_EXHxx2_FLW	EXHAUST AIR FLOW DUCT-2	CFM	X			X	X			
bbb_EXHxx3_FLW	EXHAUST AIR FLOW DUCT-3	CFM	X			X	X			
bbb_EXHxx_BYPD1	EXHAUST FAN OA BYPASS DAMPER OUTPUT-1	% OPEN	X							
bbb_EXHxx_BYPD2	EXHAUST FAN OA BYPASS DAMPER OUTPUT-2	% OPEN	X							
bbb_EXHxxA_HZ	EXHAUST FAN-A VFD HERTZ	HZ	X					X		
bbb_EXHxxA_KW	EXHAUST FAN-A VFD KW DEMAND	KW	X					X		
bbb_EXHxxA_A	EXHAUST FAN-A VFD ALARM	KW		X	X			X		
bbb_EXHxxB_HZ	EXHAUST FAN-B VFD HERTZ	HZ	X					X		
bbb_EXHxxB_KW	EXHAUST FAN-B VFD KW DEMAND	KW	X					X		
bbb_EXHxxB_A	EXHAUST FAN-B VFD ALARM	KW		X	X			X		
bbb_EXHxxC_HZ	EXHAUST FAN-C VFD HERTZ	HZ	X					X		
bbb_EXHxxC_KW	EXHAUST FAN-C VFD KW DEMAND	KW	X					X		
bbb_EXHxxC_A	EXHAUST FAN-C VFD ALARM	KW		X	X			X		