



**Addendum g to
ASHRAE Guideline 36-2018**

Public Review Draft

Proposed Addendum g to Guideline 36-2018, High-Performance Sequences of Operation for HVAC Systems

**First Public Review (November 2019)
(Draft shows Proposed Changes to Current Guideline)**

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(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE.)

FOREWORD

Changes in this addendum:

1. Removal of option to make all alarms configurable as latching or non-latching.
2. Removal of generic entry delays. Moved entry delays to each alarm instance.
3. Updating post-exit suppression timer initiation point from alarm entry to alarm exit.
4. Removal of resets for exit deadband and post-exit suppression delays upon alarm acknowledgement.
5. Reduce alarm levels for zone high/low zone temperature alarms from levels 2 and 3 to levels 3 and 4.
6. Reduce alarm levels for low primary airflow alarms from levels 2 and 3 to levels 3 and 4.
7. Reduce alarm levels for low discharge air temperature alarms from levels 2 and 3 to levels 3 and 4.
8. Extend VAV airflow sensor calibration alarm delay from 10 minute to 30 minutes, add an additional constant value threshold as a qualifier to initiate the alarm.
9. Add an additional constant value threshold as a qualifier to initiate leaking damper alarms.
10. Extend VAV low airflow alarm delays from 5 minutes to 10 minutes.
11. Add filter high limit differential pressure at design airflow (DP100) to the AHU sections for Information Provided by the Designer.
12. Add additional qualifiers for filter differential pressure alarms to reduce nuisance alarms.
13. Add filter differential pressure point and alarm to Single Zone VAV Air Handling Units.

This addendum addresses these issues:

1. Direction on how to determine the filter high limit differential pressure at design airflow, DP100.
2. Reduce the number of alarms that are classified as critical (Level 2).
3. Reduce the amount of required programming for each individual alarm to help ensure that the Guideline 36 sequences can be programmed into commodity control hardware.
4. Reduce nuisance alarms.

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.

Addendum g to Guideline 36-2018

(IP and SI Units)

Add Section 3.1.4.4 as follows:

3.1.4.4 Filter high limit differential pressure at design airflow, DP100

The filter high limit differential pressure threshold shall be determined as the maximum recommended filter pressure drop at design airflow by the filter manufacturer.

Add Section 3.1.5.2 as follows:

3.1.5.2 Filter high limit differential pressure at design airflow, DP100

The filter high limit differential pressure threshold shall be determined as the maximum recommended filter pressure drop at design airflow by the filter manufacturer.

Add Section 3.1.6.3 as follows:

3.1.6.3 Filter high limit differential pressure at design airflow, DP100

The filter high limit differential pressure threshold shall be determined as the maximum recommended filter pressure drop at design airflow by the filter manufacturer.

Revise Section 4.8 as follows:

4.8 Single Zone VAV Air Handling Unit

Required?	Description	Type	Device
R	Supply Fan Start/Stop	DO	Connect to VFD Run
R	Supply Fan Speed	AO	Connect to VFD Speed
O	Supply Fan Status	DI	Connect to VFD Status
R	Supply Air Temperature	AI	Duct temperature sensor (probe or averaging at designer's discretion)
R	Outdoor/Return Air Damper	AO	Modulating actuators
R	Outdoor Air Temperature	AI	Temperature sensor at outdoor air intake
O	Mixed Air Temperature	AI	Averaging temperature sensor
O	Return Air Temperature	AI	Duct temperature sensor

Required?	Description	Type	Device
<u>O</u>	<u>Filter Pressure Drop</u>	<u>AI</u>	<u>Differential pressure transducer across filter</u>
R	Cooling Signal	AO	Modulating CHW valve OR Variable-capacity compressor
A	Heating Signal	AO	Modulating HW valve OR Modulating electric heating coil
R	Zone Temperature	AI	Room temperature sensor
A	Local Override (if applicable)	DI	Zone thermostat override switch
A	Occupancy Sensor (if applicable)	DI	Occupancy sensor
A	Window Switch (if applicable)	DI	Window switch
A	Zone Temperature Setpoint Adjustment (if applicable)	AI	Zone thermostat adjustment
A	Zone CO ₂ Level (if applicable)	AI	Room CO ₂ sensor
	For units with actuated relief dampers but no relief fan, include the following points		
A	Relief Damper	AO	Modulating actuator
	For units with a relief fan, include the following points		
A	Relief Fan Start/Stop	DO	Connect to VFD Run
O	Relief Fan Status	DI	Connect to VFD Status
A	Relief Fan Speed	AO	Connect to VFD Speed
A	Relief Damper Open/Close	DO	Two position actuator
A	Building Static Pressure	AI	Differential pressure transducer between representative space and outdoors
	For units with a return fan, include the following points		
A	Return Fan Start/Stop	DO	Connect to VFD Run
O	Return Fan Status	DI	Current switch
A	Return Fan Speed	AO	Connect to VFD Speed
A	Exhaust Air Damper (if applicable – damper may be barometric)	DO	Two position actuator

Delete Section 5.1.12.3 as follows:

~~5.1.12.3 Entry Delays—All alarms shall have an adjustable delay time such that the alarm is not triggered unless the alarm condition is true for the delay time. Default entry delays:~~

- ~~1. Level 1 alarms: 1 second~~
- ~~2. Level 2 alarms: 10 seconds~~
- ~~3. Level 3 alarms: 1 minute~~
- ~~4. Level 4 alarms: 5 minutes~~

Revise Section 5.1.12.5 as follows:

5.1.12.5 Latching – ~~Any alarm can be configured as latching or non-latching.~~ A latching alarm requires acknowledgement from the operators before it can return to normal even if the exit deadband has been met. A non-latching alarm does not require acknowledgement. Default latching status:

1. Level 1 alarms: latching
2. Level 2 alarms: latching
3. Level 3 alarms: non-latching
4. Level 4 alarms: non-latching

Revise Section 5.1.12.6 as follows:

5.1.12.6 Post-Exit Suppression period – To limit alarms, any alarm may have an adjustable suppression period such that ~~if~~once the alarm is ~~triggered~~exited, its ~~post-exit~~ suppression timer is triggered and the alarm may not trigger again until the post-exit suppression timer has expired. Default suppression periods:

1. Level 1 alarms: 0 minutes
2. Level 2 alarms: 5 minutes
3. Level 3 alarms: 24 hours
4. Level 4 alarms: 7 days

Delete Section 5.1.12.7:

~~5.1.12.7 For both latching and non-latching alarms, the operators may acknowledge the alarm. Acknowledging an alarm clears the alarm, the exit deadband, and suppression period. A device can go right back into alarm as soon as the entry delay elapses.~~

Revise Section 5.3.6.1 as follows:

5.3.6.1 Zone temperature alarms

1. High temperature alarm

- a. If the zone is 2°C (3°F) above cooling setpoint for 10 minutes, generate a Level 3 alarm.
- b. If the zone is 3°C (5°F) above cooling setpoint for 10 minutes, generate a Level 2 alarm.

2. Low temperature alarm

- a. If the zone is 2°C (3°F) below heating setpoint for 10 minutes, generate a Level 3 alarm.
- b. If the zone is 3°C (5°F) below heating setpoint for 10 minutes, generate a Level 2 alarm.

Revise Section 5.5.7 as follows:

5.5.7 Alarms

5.5.7.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level 3 alarm.
2. If the measured airflow is less than 50% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level 2 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.5.7.2 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.5.7.3 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.6.6 as follows:

5.6.6 Alarms

5.6.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.
2. If the measured airflow is less than 50% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.6.6.2 Low discharge air temperature

1. If heating hot water plant is proven on and the discharge air temperature is 8.3°C (15°F) less than setpoint for 10 minutes, generate a Level 34 alarm.
2. If heating hot water plant is proven on and the discharge air temperature is 17°C (30°F) less than setpoint for 10 minutes, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its Hot Water reset Trim & Respond control loop, low discharge air temperature alarms shall be suppressed for that zone.

5.6.6.3 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.6.6.4 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

5.6.6.5 Leaking valve. If the valve position is 0% for 15 minutes, discharge air temperature is above AHU SAT by 3°C (5°F), and the fan serving the zone is proven on, generate a Level 4 alarm.

Revise Section 5.7.6 as follows:

5.7.6 Alarms

5.7.6.1 Low Primary Airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.

2. If the measured airflow is less than 50% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.7.6.2 Low Discharge Air Temperature

1. If heating hot water plant is proven on and the discharge air temperature is 8.3°C (15°F) less than setpoint for 10 minutes, generate a Level 34 alarm.
2. If heating hot water plant is proven on and the discharge air temperature is 17°C (30°F) less than setpoint for 10 minutes, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its Hot Water reset Trim & Respond control loop, low discharge air temperature alarms shall be suppressed for that zone.

5.7.6.3 Fan alarm is indicated by the status input being different from the output command after a period of 15 seconds after a change in output status.

1. Commanded on, status off: Level 2
2. Commanded off, status on: Level 4

5.7.6.4 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.7.6.5 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

5.7.6.6 Leaking valve. If the valve position is 0% for 15 minutes, discharge air temperature is above AHU SAT by 3°C (5°F), and the fan serving the zone is proven on, generate a Level 4 alarm.

Revise Section 5.8.6 as follows:

5.8.6 Alarms

5.8.6.1 Low Primary Airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.

2. If the measured airflow is less than 50% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.8.6.2 Low Discharge Air Temperature

1. If heating hot water plant is proven on and the discharge air temperature is 8.3°C (15°F) less than setpoint for 10 minutes, generate a Level 34 alarm.
2. If heating hot water plant is proven on and the discharge air temperature is 17°C (30°F) less than setpoint for 10 minutes, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its Hot Water reset Trim & Respond control loop, low discharge air temperature alarms shall be suppressed for that zone.

5.8.6.3 Fan alarm is indicated by the status input being different from the output command after a period of 15 seconds after a change in output status.

1. Commanded on, status off: Level 2
2. Commanded off, status on: Level 4

5.8.6.4 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.8.6.5 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

5.8.6.6 Leaking valve. If the valve position is 0% for 15 minutes, discharge air temperature is above AHU SAT by 3°C (5°F), and the fan serving the zone is proven on, generate a Level 4 alarm.

Revise Section 5.9.6 as follows:

5.9.6 Alarms

5.9.6.1 Low Primary Airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.

2. If the measured airflow is less than 50% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.9.6.2 Low Discharge Air Temperature

1. If heating hot water plant is proven on and the discharge air temperature is 8.3°C (15°F) less than setpoint for 10 minutes, generate a Level 34 alarm.
2. If heating hot water plant is proven on and the discharge air temperature is 17°C (30°F) less than setpoint for 10 minutes, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its Hot Water reset Trim & Respond control loop, low discharge air temperature alarms shall be suppressed for that zone.

5.9.6.3 Fan alarm is indicated by the status input being different from the output command after a period of 15 seconds after a change in output status.

1. Commanded on, status off: Level 2
2. Commanded off, status on: Level 4

5.9.6.4 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.9.6.5 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

5.9.6.6 Leaking valve. If the valve position is 0% for 15 minutes, discharge air temperature is above AHU SAT by 3°C (5°F), and the fan serving the zone is proven on, generate a Level 4 alarm.

Revise Section 5.10.6 as follows:

5.10.6 Alarms

5.10.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.

2. If the measured airflow is less than 50% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.10.6.2 Low Discharge Air Temperature

1. If heating hot water plant is proven on and the discharge air temperature is 8.3°C (15°F) less than setpoint for 10 minutes, generate a Level 34 alarm.
2. If heating hot water plant is proven on and the discharge air temperature is 17°C (30°F) less than setpoint for 10 minutes, generate a Level 23 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its Hot Water reset Trim & Respond control loop, low discharge air temperature alarms shall be suppressed for that zone.

5.10.6.3 Fan alarm is indicated by the status input being different from the output command after a period of 15 seconds after a change in output status.

1. Commanded on, status off: Level 2
2. Commanded off, status on: Level 4

5.10.6.4 Airflow sensor calibration. If the fan serving the zone ~~has been~~ is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.10.6.5 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

5.10.6.6 Leaking valve. If the valve position is 0% for 15 minutes, discharge air temperature is above AHU SAT by 3°C (5°F), and the fan serving the zone is proven on, generate a Level 4 alarm.

Revise Section 5.11.6 as follows:

5.11.6 Alarms

5.11.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 510 minutes while setpoint is greater than zero, generate a Level 34 alarm.

2. If the measured airflow is less than 50% of setpoint for ~~5~~10 minutes while setpoint is greater than zero, generate a Level ~~2~~3 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.11.6.2 Airflow sensor calibration. If the fan serving the zone ~~has been~~is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.11.6.3 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.12.6 as follows:

5.12.6 Alarms

5.12.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level ~~3~~4 alarm.
2. If the measured airflow is less than 50% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level ~~2~~3 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.12.6.2 Airflow sensor calibration. If the fan serving the zone ~~has been~~is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.12.6.3 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.13.6 as follows:

5.13.6 Alarms

5.13.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level ~~3~~4 alarm.
2. If the measured airflow is less than 50% of setpoint for 5 minutes while setpoint is greater than zero, generate a Level ~~2~~3 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.13.6.2 Airflow sensor calibration. If the fan serving the zone ~~has been~~is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.13.6.3 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.14.6 as follows:

5.14.6 Alarms

5.14.6.1 Low airflow

1. If the measured airflow is less than 70% of setpoint for ~~5~~10 minutes while setpoint is greater than zero, generate a Level ~~3~~4 alarm.
2. If the measured airflow is less than 50% of setpoint for ~~5~~10 minutes while setpoint is greater than zero, generate a Level ~~2~~3 alarm.
3. If a zone has an Importance-Multiplier of 0 [see 5.1.14.12.1.a] for its static pressure reset Trim & Respond control loop, low airflow alarms shall be suppressed for that zone.

5.14.6.2 Airflow sensor calibration. If the fan serving the zone ~~has been~~is off for ~~10 minutes~~ and airflow sensor reading is above the larger of 10% of the maximum airflow setpoint or 50 cfm for 30 minutes, generate a Level 3 alarm.

5.14.6.3 Leaking damper. If the damper position is 0% and airflow sensor reading is above the larger of 10% of the cooling maximum airflow setpoint or 50 cfm for 10 minutes while the fan serving the damper is proven on, generate a Level 4 alarm.

The constant value thresholds for the airflow sensor calibration and leaking damper alarms are a function of the transducer and A/D converter used to measure airflow. The value used should be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.16.13.3 as follows:

5.16.13.3 Filter pressure drop exceeds the larger of the alarm limit or 12.5 Pa (0.05") for 10 minutes when airflow (expressed as a percentage of design airflow or design speed if total airflow is not known) exceeds 20%: Level 4. The alarm limit shall vary with total airflow (if available; use fan speed if total airflow is not known) as follows:

$$DP_x = DP_{100} (x)^{1.4}$$

where DP100 is the high limit pressure drop at design airflow (determine limit from filter manufacturer) and DPx is the high limit at the current airflow rate x (expressed as a fraction). For instance, the setpoint at 50% of design airflow would be $(0.5)^{1.4}$ or 38% of the design high limit pressure drop. See 3.1.4.4 for DP100.

The constant value threshold for the filter pressure drop alarm is a function of the transducer and A/D converter used to measure filter differential pressure. The value used shall be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.17.3.3 as follows:

5.17.3.3 Filter pressure drop exceeds the larger of the alarm limit or 12.5 Pa (0.05") for 10 minutes when airflow (expressed as a percentage of design airflow or design speed if total airflow is not known) exceeds 20%: Level 4. The alarm limit shall vary with total airflow (if available; use fan speed if total airflow is not known) as follows:

$$DP_x = DP_{100} (x)^{1.4}$$

where DP100 is the high limit pressure drop at design airflow (determine limit from filter manufacturer) and DPx is the high limit at the current airflow rate x (expressed as a fraction). For instance, the setpoint at 50% of design airflow would be $(0.5)^{1.4}$ or 38% of the design high limit pressure drop. See 3.1.5.2 for DP100.

The constant value threshold for the filter pressure drop alarm is a function of the transducer and A/D converter used to measure filter differential pressure. The value used shall be determined as the minimum accuracy of the transducer and A/D converter combination.

Revise Section 5.17.3.4 as follows:

5.17.3.4 High building pressure [more than 25 Pa (0.10”)] for 5 minutes: Level 3

Revise Section 5.17.3.5 as follows:

5.17.3.5 Low building pressure [~~less than 25 Pa (0.10”)~~, i.e., negative] for 5 minutes: Level 3

Revise Section 5.18.12 as follows:

5.18.12 ~~Standard~~ Alarms

Add Section 5.18.12.3 as follows:

5.18.12.3 Filter pressure drop exceeds the larger of the alarm limit or 12.5 Pa (0.05”) for 10 minutes when fan speed exceeds 20% of MaxCoolSpeed: Level 4. The alarm limit shall vary with fan speed as follows:

$$\underline{DP_x = DP_{100} (x)^{1.4}}$$

where DP100 is the high limit pressure drop at design airflow (determine limit from filter manufacturer) and DPx is the high limit at the current fan speed x (expressed as a fraction). For instance, the setpoint at 50% of design speed would be (0.5)^{1.4} or 38% of the design high limit pressure drop. See 3.2.2.1 for MaxCoolSpeed and 3.1.6.3 for DP100.

The constant value threshold for the filter pressure drop alarm is a function of the transducer and A/D converter used to measure filter differential pressure. The value used shall be determined as the minimum accuracy of the transducer and A/D converter combination.