

## **Capital Projects Group**

# **Air Filters and Accessories Specification**

Specification 23 41 00

Revision 0

Date: August 2018

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## Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes

## LIST OF CONTENT

<b>1. GENERAL.....</b>	<b>2</b>
1.1. SCOPE OF WORK .....	2
1.2. DESIGN REQUIREMENTS .....	2
1.3. RELATED WORKS .....	2
1.4. REFERENCE STANDARDS .....	2
1.5. WARRANTY .....	2
1.6. DELIVERY, STORAGE AND HANDLING.....	2
1.7. SUBMITTALS .....	2
1.8. QUALITY ASSURANCE.....	3
<b>2. PRODUCTS.....</b>	<b>4</b>
2.1. GENERAL.....	4
2.2. FILTERS .....	4
2.3. FILTER FRAMING AND RACKS .....	6
2.4. DIAL TYPE AIR FILTER GAUGE.....	7
<b>3. EXECUTION .....</b>	<b>7</b>
3.1. INSTALLATION OF FILTERS .....	7
3.2. INSTALLATION OF DIAL TYPE FILTER GAUGES .....	7

**1. GENERAL**

**1.1. SCOPE OF WORK**

- 1.1.1. Provide air filters and accessories as required, scheduled and specified herein.

**1.2. DESIGN REQUIREMENTS**

- 1.2.1. Design requirements are based on Part 2 specified requirements of products.

**1.3. RELATED WORKS**

- 1.3.1. Section 20 05 05 - Mechanical Work General Instructions.
- 1.3.2. Section 20 05 10 - Basic Mechanical Materials and Methods.

**1.4. REFERENCE STANDARDS**

- 1.4.1. Standards and codes to be latest editions adopted by and enforced by local governing authorities.
- 1.4.2. ASHRAE Standard 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Sizes.
- 1.4.3. ULC S111 Standard Method of Fire Tests for Air Filter Units.

**1.5. WARRANTY**

- 1.5.1. Products to be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

**1.6. DELIVERY, STORAGE AND HANDLING.**

- 1.6.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

**1.7. SUBMITTALS**

- 1.7.1. Refer to submittal requirements in Section 20 05 05.
- 1.7.2. Submit shop drawings/product data sheets as follows:
- a) to regulatory authority for review and approval prior to submitting to Consultant;
  - b) for all products specified in this Section.

1.7.3. Product Data

- a) Submit product data sheets indicating:
  - 1) technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;
  - 2) performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;
  - 3) product transportation, storage, handling, and installation requirements;
  - 4) product identification in accordance with Metrolinx requirements.

1.7.4. Shop Drawings

- a) Submit shop drawings indicating:
  - 1) types, sizes and ratings;
  - 2) mounting details to suit locations shown, indicating methods and hardware to be used.

**1.8. QUALITY ASSURANCE**

1.8.1. Manufacturers Qualifications

- a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement.
- b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.8.2. Installers Qualifications

- a) Installers for work to be performed by or work under licensed Mechanical Contractor.
- b) Installers of equipment and associated work are to be fully qualified and experienced installers of respective products and work in which they are installing.
- c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.8.3. Regulatory Requirements

- a) Products and work to comply with applicable local governing authority regulations, bylaws and directives.
- b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

**2. PRODUCTS**

**2.1. GENERAL**

- 2.1.1. Unless otherwise specified or noted, filters are to be synthetic and/or glass fibre disposable media type in accordance with drawing schedule(s).
- 2.1.2. Minimum Efficiency Reporting Values (MERV) ratings in accordance with ASHRAE Standard 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Sizes.
- 2.1.3. Unless otherwise specified or noted, filters are to be ULC Class 1 in accordance with ULC S111, Standard Method of Fire Tests for Air Filter Units.
- 2.1.4. Base filters and filter rack design on the use of 600mm x 600mm (24-inch by 24-inch) or 300mm x 600mm (12-inch by 24 inch) filters whenever possible.
- 2.1.5. If size modules noted are not possible, use industry standard filter sizes for basis of design.
- 2.1.6. Filters and filter holding frames to be by same manufacturer.
- 2.1.7. Standard of quality assurance manufacturers are:
  - a) AAF International;
  - b) Camfil Farr Inc.;
  - c) Modern Air Filter Corp;
  - d) or approved equivalent.

**2.2. FILTERS**

- 2.2.1. Pre-filters: MERV 8 Pleated Filters (30 percent)
  - a) 50mm (2-inch), medium efficiency, pleated, disposable.
  - b) Each filter consists of non-woven fabric media, support grid and enclosing frame.
  - c) UL listed as Class I or Class II.

- d) Filter media: cotton and synthetic blend.
- e) Average dust-spot efficiency of 30 percent to 35 percent and an average arrestance of 90 percent to 92 percent in accordance with ASHRAE 52-1.
- f) Minimum MERV 8 per ASHRAE 52.2 and a MERV-A rating of 8 when tested per Appendix J of ASHRAE 52.2.
- g) Effective filter media of at least 0.65m<sup>2</sup> (7.0 sq.ft. media) per 0.93m<sup>2</sup> (1.0 sq.ft.) filter face area and contain at least 33 pleats per linear meter (11 pleats per linear foot). Initial resistance at 2.5 m/s (500 fpm) face velocity not to exceed 8 Pa (0.30 " wg).
- h) Media support by welded wire grid or expanded metal with an effective open area of at least 96 percent. Bond welded wire grid to filter media to eliminate possibility of media oscillation and media pull-away. Form media support grid in a manner that it affects radial pleat design, allowing total use of filter media.
- i) Construct enclosing frame of a rigid, heavy duty, high wet strength beverage board, with diagonal support members bonded to the air entering and exiting side of each pleat to ensure pleat stability. Bond the inside periphery of enclosing frame to filter pack, thus, eliminating possibility of air bypass.

**2.2.2. Final Filters: MERV 11 Bag Filters (65 percent)**

- a) 550 mm (22 ") deep, high performance, totally disposable, bag type.
- b) Filter UL listed as Class I or Class II.
- c) Filter media: High-density, microfine glass fibers.
- d) Average dust-spot efficiency of 60 percent to 65 percent and an average arrestance greater than 95 percent per ASHRAE 52-2.
- e) Minimum MERV 11 rating per ASHRAE 52.2 and a MERV-A rating of 11 when tested per Appendix J of ASHRAE 52.2.
- f) Filter with minimum of 400 support points per m<sup>2</sup> (40 support points per sq.ft).
- g) Filter with 10 pockets. Initial resistance at 2.5 m/s (500 fpm) face velocity to not exceed 6 Pa (0.25 inch wg).
- h) Form filter pockets by linear sewing process to maintain pocket configuration when in use. Seal stitching points completely with a positive leak-free sealant. Chemically adhere pockets around periphery of galvanized steel retainers. Retainers to have rolled edges for enhanced pocket support.



- i) Construct filter headers of deep grooved "J" retainer channel of galvanized steel. Rivet closure corner with mitered joints sealed against air leakage. Filters to have minimum 22 mm (7/8 ") headers.

**2.2.3. Final Filters: MERV 14 Bag Filters (95 percent)**

- a) 750 mm (30 ") deep, high performance, totally disposable, bag type.
- b) Filter UL listed as Class I or Class II.
- c) Filter media: High-density, microfine glass fibers.
- d) Average dust-spot efficiency of 90 percent to 95 percent and an average arrestance greater than 98 percent per ASHRAE 52-2.
- e) Minimum MERV 14 rating per ASHRAE 52.2 and a MERV-A rating of 14 when tested per Appendix J of ASHRAE 52.2.
- f) Filter with minimum of 400 support points per m<sup>2</sup> (40 support points per sq.ft).
- g) Filter with 10 pockets and initial resistance at 2.5 m/s (500 fpm) face velocity to not exceed 12.5 Pa (0.5 inch wg).
- h) Form filter pockets by linear sewing process to maintain pocket configuration when in use. Seal stitching points completely with a positive leak-free sealant. Chemically adhere pockets around periphery of galvanized steel retainers. Retainers to have rolled edges for enhanced pocket support.
- i) Construct filter headers of deep grooved "J" retainer channel of galvanized steel. Rivet closure corner with mitered joints sealed against air leakage. Filters to have minimum 22 mm (7/8 inch) headers.

**2.3. FILTER FRAMING AND RACKS**

- 2.3.1. No. 16 gauge galvanized steel filter framing/racks, sized and arranged to suit filters and filter bank, easily accessible for filter service and replacement, and complete with slide-in tracks or lay-in flanges as required for filter placement, and all required gasketing and facilities to prevent air by-pass.
- 2.3.2. Filters equipped with gaskets and 4 spring type positive sealing fasteners. Fasteners capable of being attached or removed without deforming gaskets and without use of tools. Frames capable of supporting filters of different efficiencies and depths by change of fasteners.
- 2.3.3. Provide grid type (face loading) frame in air handling units.
- 2.3.4. Design frames so that housing can be stacked on top of other without deformation.
- 2.3.5. Frames to at minimum withstand double scheduled dirty filter pressure drop without deformation or air bypass.

- 2.3.6. Filters inserted and seal from upstream side of frame.
- 2.3.7. Filter frame maximum allowable leakage rate 0.5 percent at 150 Pa (6 inches wc).

## **2.4. DIAL TYPE AIR FILTER GAUGE**

- 2.4.1. Dwyer Instruments Inc. Series 2000 "Magnehelic" or approved equivalent, differential dial type filter gauge as follows:
  - a) accurate to within  $\pm 2\%$  of full scale;
  - b) die-cast aluminum housing and bezel and acrylic cover;
  - c) over-pressure relief plug;
  - d) pair of 3.2 mm (1/8") dia. female NPT pressure taps at both side and back of gauge;
  - e) 2 pressure tap plugs, aluminum or copper tubing;
  - f) scale overlay or marker to indicate dirty filters;
  - g) required mounting and connection accessories.
- 2.4.2. Select scale so it allows for 25 Pa (1 " wc) greater than final filter resistance.
- 2.4.3. Each filter gauge is to be complete with contacts suitable for connection into building automation system.

## **3. EXECUTION**

### **3.1. INSTALLATION OF FILTERS**

- 3.1.1. Provide required filter media when fan equipment is ready for start-up and performance testing. Provide any required filter framing/racks.
- 3.1.2. Provide filter(s) across entire filter bank of each supply air handling unit, either at factory where fan is produced or at site as soon as fan is installed. Secure media in place so it will not be dislodged by fan operation. Replace media periodically if it becomes loaded and clogged.
- 3.1.3. For exhaust systems, secure filter media across exhaust air openings and ductwork to prevent construction dirt and dust from fouling the fan.
- 3.1.4. Leave media in place until fan start-up, at which time remove and dispose of construction media.

### **3.2. INSTALLATION OF DIAL TYPE FILTER GAUGES**

- 3.2.1. Provide one dial type filter gauge for each air handling system filter banks.

- 3.2.2. Secure gauge to filter section casing and install differential pressure tubing and accessories. Set gauges to suit fresh clean filter media and mark scales at point where filter media requires replacement.

**END OF SECTION**