

PART 1 GENERAL

1.01 SECTION INCLUDES

Air mixers with integrated dampers for air handler mixing plenums.

1.02 SYSTEM DESCRIPTION

Air mixing devices shall be installed where shown on plans to enhance the mixing of outside air with return air to a temperature that will not trip a freeze stat at the cooling coil or cause freezing of the cooling coil. Devices should provide even airflow across filters, coils, and control sensors. The performance requirements for each system should be as listed in the schedule of equipment as shown on the plans.

1.03 SUBMITTALS

Product drawings shall include all dimensional data required to ensure a correct fit within the system and include notations which indicate the material, model number, location, and any space requirements for maintenance, access, or proper performance.

Performance reports shall be supplied for each different air mixer supplied. Data shall be listed as follows:

The product shall be designed to provide freeze protection under the following conditions:

Minimum Design Ambient =

Design Return Air Temperature =

Design Supply Air Temperature =

Maximum Supply Air CFM =

Minimum Supply Air CFM =

Min OA CFM =

Internal Plenum Height =

Internal Plenum Width =

Freeze protection performance will be validated at these conditions in a report using computational fluid dynamics (CFD).

CFD results must include ΔP for 100% of nominal CFM air flow through the unit to be channeled through the OA dampers only with the dampers positioned full open. Additionally, ΔP and mixing performance for 100% of nominal CFM air flow through the unit with an OA% consistent with the required min OA flow rate and the OA at the required min OA temperature with the dampers in a control position.

1.04 COMMISSIONING

During commissioning tests of air mixers, the system must be in a steady-state condition.

Temperature readings shall be made at the cold air and hot air inlets to the mixing plenum to determine the upstream temperature differential. Temperature differentials between Cold and Hot air streams should be at least 40 deg F. A temperature traverse shall be made at the specified distance downstream of the mixer in order to determine the downstream temperature spread and the associated mixing system effectiveness. The measurements shall be made in accordance with the recommendations set forth in Chapter 37, "2017 ASHRAE Handbook- Fundamentals".

Static pressure readings shall be taken on both sides of the mixer installation in order to determine the approximate pressure drop across the mixer.

If temperatures are not equal to those provided by the CFD results an equivalent Freeze Protection Effectiveness (FPE) can be used to determine compliance. FPE is defined as

$$FPE = 1 - \frac{T_{ave} - T_{min}}{T_{ave} - T_{OA}}$$

Where T_{ave} is the average mixed air temperature, T_{min} is the minimum temperature predicted at the upstream filter face, and T_{OA} is the Outdoor Air temperature.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Blender Products, Inc. - the CHANNEL BLENDER® mixer

2.02 PRODUCT DESCRIPTION

An air mixing component for the mixing box that integrates OA and RA control dampers for economizing and air flow control into a device that will divide OA and RA into alternating adjacent channels with a control damper located at the end of each channel. These alternating OA and RA dampers will be oriented such that the air leaving an OA damper blade discharges into the air leaving an adjacent RA damper blade for the purpose of mixing OA and RA to eliminate freeze stat trips and to protect coils from freezing in a shorter distance than required by static mixing devices.

The performance requirements for each air mixer should be as listed in the schedule of equipment as shown on the plans.

2.03 CONSTRUCTION

A. Material:

- Damper frame shall be .080" Aluminum secured to the Channel Blender structure to prevent racking.
- Dampers shall be Class 1A low leakage dampers with 3 cfm/ft² of allowable leakage at 1" w.c. ΔP.
- Dampers are to be extruded aluminum with EPDM OR Santoprene seals mechanically secured into the damper blade.
- Damper shaft and bearing group shall be either
 - 300 series stainless steel with a precision machined surface for mating/bearing to an aluminum precision drawn hole.

OR

- A hex shaft of 12L14 or 1215 steel with Zinc coating class Fe/Zn5 with a minimum thickness of 0.0002" and a Type II yellow chromate treatment mating with a pair of Lexan/acetal copolymer thrust bearings.
- Channel walls separating OA and RA sections must be insulated to prevent condensation with RA conditions of 70°F and 60% RH at an OA temperature of -20°F or RA conditions of 70°F and 70% RH at an OA temperature of 5°F.

B. Construction: Air mixers shall be mechanically fastened construction. Damper construction should be capable of >60,000 actuations

C. Finish: Air mixers shall have bare finish.

D: Damper Actuators (Optional): The Air Mixer can be ordered with or without damper actuators mounted at the factory. Factory supplied actuator: Belimo (AFX24-SR).

2.04 PERFORMANCE TESTING/RATING

A. CFD analysis will be used to ensure mixer performance is adequate and to provide an estimated pressure drop. At a minimum, results should be provided for the following cases

- Pressure drop at 100% OA,
- Pressure drop and minimum expected temperature at the upstream face of the cooling coil at full flow with dampers in a control position, min OA%, and min OA design temperature. If the Mixed Air (MA) temperature under these conditions is less than the Supply Air (SA) temperature, the minimum temperature after the heating coil is determined by adding the difference between the Mixed Air (MA) temperature and the Supply Air (SA) temperature to the minimum temperature at the filter face.

CFD analysis must be demonstrated to be valid for analysis of similar applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with the manufacturer’s written installation instructions and SMACNA plenum construction guidelines. If necessary, provide reinforcing in AHU walls where the mixing device is installed to eliminate excess vibration or deflection of blankoff plenum.

3.02 EQUIPMENT SCHEDULES *(May be shown on plans)*

Air Mixer Schedule

Air Mixer Mark	AHU Mark	Plenum Dimensions		Design Flow Rates			Design Temperatures				Performance		Air Mixer			Distances		
																	W _p	H _p
AM-1																		