Bulletin IRHS-1
March 2016
Supersedes IRHS-1
Dated January 2015

HASTINGS HVAC
www.hastingshvac.com

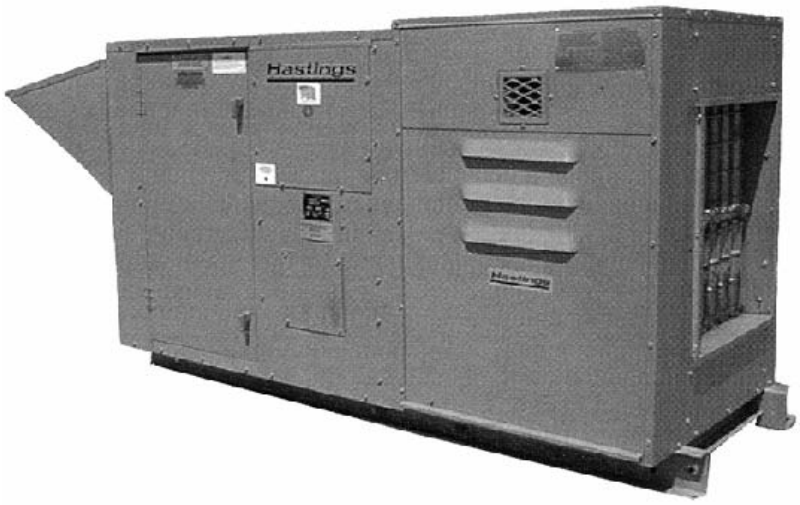
"IHR/ISHR/HR" SERIES

80% EFFICIENT

INDOOR/OUTDOOR SYSTEMS

For Natural Gas or Propane Gas

HEATING, VENTILATING MAKE-UP AIR



Power Venter Model

Models from 160 thru 1600 MBH

A MODEL FOR EVERY APPLICATION

HF

SPACE HEATING
with room thermostat control.

MU

MAKE UP AIR
with discharge air control. A modulating gas valve maintains constant leaving air temperature regardless of outdoor conditions.
Modulating Control Systems — Down to 30% of Rated Input

HV

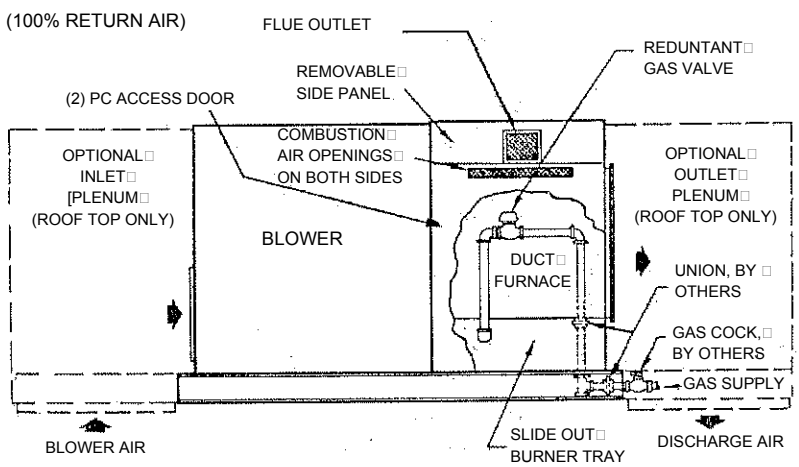
HEATING & VENTILATING
with room thermostat and discharge air control. Generally used where customer requires both outdoor and recirculated air.
Modulating Control Systems – Down to 30% of Rated Input

C ETL LISTED US
Intertek

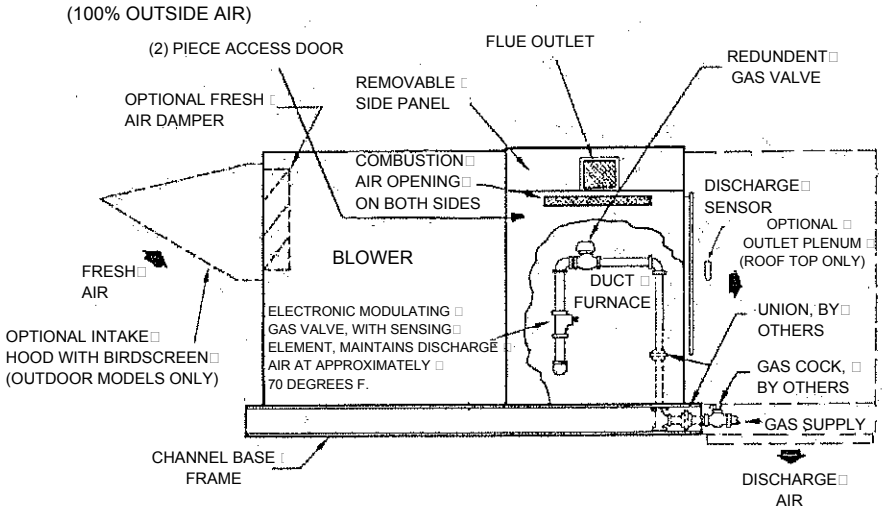
"IHR/ISHR/HR" INDOOR/OUTDOOR SYSTEMS

The "HR" series indoor/outdoor systems feature the package concept in commercial and industrial gas heating units. Hastings E. T. L. design certified type HRD gas furnaces are incorporated into factory assembled, wired and tested heating systems. Three temperature control sequences are available to meet the requirements of most heating applications.

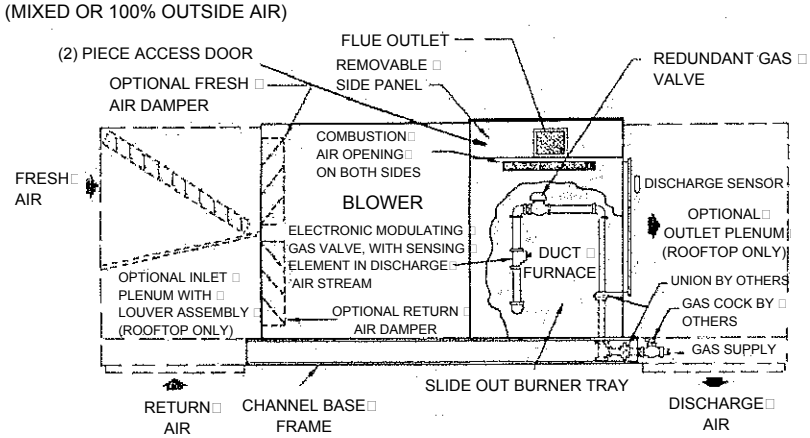
HF-SPACE HEATING



MU-MAKE UP AIR



HV-HEATING & VENTILATING



Application and Operating Sequence

The HF unit is designed for 100% return air room heating applications with the air temperature being controlled from the heated space. The HF operating sequence is not recommended for ventilating applications.

The "On" position of the "On-Off-Auto" blower switch provides continuous blower operation. The "Auto" position allows blower operation whenever the room thermostat calls for heat. The room thermostat cycles the automatic gas valve to maintain the desired space air temperature.

The MU make-up air unit is designed to replace exhausted building air with 100% outside air to prevent the many problems of "air starvation". This replacement air is heated when the outside air temperature is below the desired space air conditions.

The "On" position of the "On-Off" blower switch provides continuous blower operation. The "Winter" position of the "Summer-Off-Winter" season switch energizes the gas furnace(s). An electronic modulating gas valve with Discharge Air Sensor in the leaving air stream maintains a constant discharge air temperature. Standard discharge temperature range is 55 deg. to 90 deg. F. adjustable.

With the "Summer-Off-Winter" season switch in the "Summer" position, gas furnace(s) is de-energized and blower operates to provide summer ventlation.

The HV combines the control of both make-up air and space temperature. This sequence is equally effective for up to 100% of either outside or return air heating and ventilating applications, or 100% outside air only.

The "On" position of the "On-Off-Auto" blower switch provides continuous blower operation. The "Auto" possition allows blower operation whenever the room thermostat calls for heat. The "Winter" position of the "Summer-Off-Winter" season switch energizes the gas furnace(s). On call for heat in the space, the room thermostat opens the electronic modulating gas valve to provide full gas input. If room thermostat is satisfied, the electronic modulating gas valve maintains a constant discharge air temperature. Standard discharge temperature range is 55 deg. to 90 deg. adjustable.

With the "Summer-Off-Winter" season switch in the "Summer" position, gas furnace(s) is de-energized and blower operates to provide summer ventilation.

All Models
Standard Equipment & Optional Items

Description	Model		
	IHRHF	IHRMU	IHRHV
	HRHF	HRMU	HRHV
	ISHRHF	ISHRMU	ISHRHV
Blower section with variable drive (thru 10 H.P.)	Std.	Std.	Std.
Motor and starter (priced separately)	Std.	Std.	Std.
Insulation of blower section.	Std.	Std	Std
Natural (6" to 14") or propane (11" to 14") gas duct furnace(s) with intermittent spark ignition and 24 volt control circuit. Power venter and type 409 stainless steel heat exchanger.	Std. (see note)	Std. (see note)	Std. (see note)
(2) Piece Door (Note 10)			
Electronic gas valve. (Discharge air control only.)	NA	Std.	NA
Electronic gas valve and two position room override control.	NA	NA	Std.
Factory Assembly and wiring.	Std.	Std.	NA
Blower "on-off-auto" switch.	Std.	NA	Std.
Thermostat (on-off).	Opt.	NA	Opt.
Remote control station with operating switches and indicating lights.	Opt.	Opt.	Opt.
Fan time delay relay.	Std.	NA	NA
Filters – 2" cleanable or extended surface. (Check CFM Limitations – Page 4 & 5)	Opt.	Opt.	Opt.
Fresh air intake hood with birdscreen. (Note 5) (Note 8)	Opt.	Opt.	Opt.
Fresh air shut-off damper with 2 position motor, linkage and end switch.	Opt.	Opt.	Opt.
Mixing dampers with either two position motor or modulating motor & temp. controller.	Opt.	NA	Opt.
Vibration isolators (rubber-in-shear or spring). (Note 1)	Opt.	Opt.	Opt.
Internal (rubber-in-shear or spring) vibration isolation for fan motor and fan(s). (Note 7)	Opt.	Opt.	Opt.
Two stage gas valve(s). (Note 2)	Opt.	NA	NA
Selectra MS-1 electronic modulation make-up air package with remote temperature selector dial in place of modulating gas valve. (Temp. Range of Dial / 55° - 90° F)	NA	Std.	Opt.
Selectra MS-2 electronic modulation space heating package added to basic system. Modulating thermostat replaces on-off thermostat. (Temp. Range of Dial / 55° - 90° F)	Opt.	NA	NA
Selectra MS-3 electronic package in place of modulating valve and by-pass valve manifold. Make-up air portion same as MS-1; space heat is two position. (Temp. Range of Dial / 55° - 90° F)	NA	NA	Std.
Selectra MS-5 "Selectra" package provided with signal conditioner to interface to customer's "BMS" control sys-tem to modulate the burner input with a 20-4 MA signal conditioner or 0-10 VDC signal. Systems with multiple furnaces will have furnaces modulate in unison. All "BMS" sensors provided and installed by others. (Note 6)	Opt.	Opt.	Opt.
Low outlet temperature shut-off.	NA	Opt.	Opt.
Day-Night operation.	Opt.	Opt.	Opt.
Blocked intake switch and signal light.	Opt.	Opt.	Opt.
Step down transformer.	Std.	Std.	Std.

All Models

Standard Equipment & Optional Items

Description	Model		
	IHRHF HRHF ISHRHF	IHRMU HRMU ISHRMU	IHRHV HRHV ISHRHV
Fused disconnect switch.	Opt.	Opt.	Opt.
Two speed motor – 1800/1200 or 1800/900 RPM. (Note 3) (Note 9)	Opt.	Opt.	Opt.
Separated combustion for indoor model only (ISHR Series)	Opt.	Opt.	Opt.
High gas pressure regulator – 1/2 PSIG & over.	Opt.	Opt.	Opt.
Roof curbs and plenums – insulated. (Note 8)	Opt.	Opt.	Opt.
Air washer cooling section. (Note 4)	Opt.	Opt.	Opt.
Premium energy efficient motor.	Std.	Std.	Std.

IHR = 80% Indoor/Power Vented Model
ISHR = 80% Indoor/Separated Combustion Air/Power Vented Model
HR = 80%/Outdoor/Power Vented Model.
Std = Standard Opt. = Optional NA = Not Available
(Note) Heat exchanger warranty of first bank applies to all furnaces. Refer to heat exchanger warranty bulletin G-4A.
(Note 1) Not available for units with plenums and roof curbs.
(Note 2) Not available with propane models.
(Note 3) Depending on temperature rise. Not available on all units.
(Note 4) Transition from EC units runs to both openings at rear of MB blowers when for 100% outside air. When mixed outside and return air is required an inlet plenum is required.
(Note 5) Fresh air intake hood with birdscreen is not compatible with mixed air inlet plenum.
(Note 6) Each system utilizes a signal conditioner for interface to customer's 0-10 V.D.C. or 4-20MA signal. (Sensors provided by others)
(Note 7) Internal vibration isolation not available on MB-218.
(Note 8) Rooftop models only.
(Note 9) 100° T.R. is maximum on either speed as an "A" arrangement.
(Note 10) 2-Piece Burner Access Panel on both indoor and outdoor models.

Blower Table–IHR/ISHR/HRHFA, IHR/ISHR/HRMUA & IHR/ISHR/HRHVA Models with Single Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					40˚			50˚			60˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
160	128,000	643	114A	1)160	2,963	.85 1.26	3/4 2	2,370	.72 1.15	1/2 3/4	1,975	.90 1.33	1/2 3/4
210	168,000	693	114A	1)210	3,889	.52 1.14	1 1½	3,111	.77 1.14	3/4 1	2,593	1.05 1.54	3/4 1
250	200,000	822	114B	1)250	4,630	.90 1.43	1½ 2	3,704	.91 1.48	1 1½	3,086	.84 1.15	3/4 1
300	240,000	872	114B	1)300	5,556	.77 1.59	2 3	4,444	1.03 1.54	1½ 2	3,704	.91 1.48	1 1½
400	320,000	1221	214	1)400	7,407	.49 1.14	2 3	5,926	1.04 1.72	2 3	4,938	1.01 1.42	1½ 2
600	480,000	2079	218	2)300	11,111	.73 1.33	3 5	8,889	1.03 1.66	3 5	7,407	.81 1.24	2 3
800	640,000	2517	218	2)400	14,815	.76 1.37	5 7½	11,852	.63 1.22	3 5	9,877	.90 1.51	3 5

Blower Table–IHR/ISHR/HRHFA, IHR/ISHR/HRMUA & IHR/ISHR/HRHVA Models with Single Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					70˚			80˚			90˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
160	128,000	643	114A	1)160	1,693	.75 1.02	1/3 1/2	1,481	.83 1.10	1/3 1/2	1,317	.89 1.16	1/3 1/2
210	168,000	693	114A	1)210	2,222	.79 1.22	1/2 3/4	1,944	.91 1.35	1/2 3/4	1,728	1.0 1.43	1/2 3/4
250	200,000	822	114B	1)250	2,645	.981.3 0	3/4 1	2,315	1.08 1.42	3/4 1	2,058	1.14 1.5	3/4 1
300	240,000	872	114B	1)300	3,175	1.12 1.75	1 1½	2,778	.94 1.26	3/4 1	2,469	1.03 1.36	3/4 1
400	320,000	1221	214	1)400	4,233	1.24 1.66	1½ 2	3,704	.97 1.39	1 1½	3,292	1.09 1.52	1 1½
600	480,000	2079	218	2)300	6,350	.92 1.39	2 3	5,556	.79 1.01	1½ 2	4,938	.85 1.09	1½ 2
800	640,000	2517	218	2)400	8,466	.70 1.08	2 3	7,407	.81 1.24	2 3	6,584	.9 1.36	2 3

NOTE: Total Static Pressure shown in inches of water. Shaded areas require cleanable filters.
**Special fan required – C.H.O.
***Maximum CFM for one damper (100% outside air only)
MB114A 3,400 CFM MB114B 3,400 CFM MB214 5,560 CFM MB218 14,000 CFM

Blower Table–IHR/ISHR/HRHFB, IHR/ISHR/HRMUB & IHR/ISHR/HRHVB Models with Double Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					70˚			80˚			90˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
320	256,000	1031	114A	2)160	3,386	.94 1.62	1 1½	2,963	.85 1.26	3/4 1	2,634	1.03 1.51	3/4 1
420	336,000	1131	114A	2)210	4,444	.56 1.24	1½ 2	3,889	.52 1.14	1 1½	3,457	.79 1.46	1 1½
500	400,000	1319	114B	2)250	5,291	.37 .96	1½ 2	4,630	.90 1.43	1½ 2	4,115	.72 1.23	1 1½
600	480,000	1419	114B	2)300	6,349	.1 .98	2 3	5,556	.77 1.39	2 3	4,938	.66 1.23	1½ 2
800	640,000	1967	214	2)400	8,466	.92 1.70	3 5	7,407	.49 1.14	2 3	6,584	.80 1.48	2 3
1000	800,000	3293	218	4)250	10,582	.81 1.41	3 5	9,259	.98 1.61	3 5	8,230	.73 1.12	2 3
1200	960,000	3433	218	4)300	12,698	1.09 1.73	5 7½	11,111	.73 1.33	3 5	9,877	.90 1.51	3 5
1600	1,280,000	3844	218	4)400	16,931	1.0 1.51	7½ 10	14,815	.76 1.37	5 71/2	13,169	1.02 1.65	5 71/2

NOTE: Total Static Pressure shown in inches of water. Shaded areas require cleanable filters.
***Maximum CFM for one damper (100% outside air only)
MB114A 3,400 CFM MB114B 3,400 CFM MB214 5,560 CFM MB218 14,000 CFM

Blower Table–IHR/ISHR/HRHFB, IHR/ISHR/HRMUB & IHR/ISHR/HRHVB Models with Double Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					100˚			110˚			120˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
320	256,000	1031	114A	2)160	2,370	.72 1.15	1/2 3/4	2155	.83 1.27	1/2 3/4	1975	.90 1.33	1/2 ¾
420	336,000	1131	114A	2)210	3,111	.771.1 4	3/4 1	2828	.92 1.36	3/4 1	2593	1.05 1.54	3/4 1
500	400,000	1319	114B	2)250	3,704	.91 1.48	1 1½	3367	1.04 1.65	1 1 1/2	3086	.84 1.15	3/4 1
600	480,000	1419	114B	2)300	4,444	1.03 1.54	1½ 2	4040	.75 1.27	1 1 1/2	3704	.91 1.48	1 1 1/2
800	640,000	1967	214	2)400	5,926	1.04 1.72	2 3	5387	.88 1.26	1 1/2 2	4938	1.01 1.42	1 1/2 2

Blower Table–IHR/ISHR/HRHFB, IHR/ISHR/HRMUB & IHR/ISHR/HRHVB Models with Double Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					100˚			110˚			120˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
1000	800,000	3293	218	4)250	7,407	.81 1.24	2/3	6734	.89 1.33	2 3	6173	.95 1.42	2 3
1200	960,000	3433	218	4)300	8,889	1.03 1.66	3 5	8081	.74 1.15	2 3	7407	.81 1.24	2 3
1600	1,280,000	3844	218	4)400	11,852	.63 1.22	3 5	10,774	.78 1.38	3 5	9877	.90 1.51	3 5

NOTE: Total Static Pressure shown in inches of water. Shaded areas require cleanable filters.
***Maximum CFM for one damper (100% outside air only)
MB114A 3,400 CFM MB114B 3,400 CFM MB214 5,560 CFM MB218 14,000 CFM

Blower Table–IHR/ISHR/HRHFA, IHR/ISHR/HRMUA & IHR/ISHR/HRHVA Models with Single Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					20˚			25˚			30˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
600	480,000	2079	218	2)300	22,222	.55 1.35	10 15	17,778	.85 1.36	7 1/2 10	14,815	.76 1.37	5 7 1/2
800	640,000	2517	218	2)400	29,630	.80 .90	25 25	23,704	.27 1.14	10 15	19,753	.51 1.0	7 1/2 10

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					35˚			40˚			45˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
600	480,000	2079	218	2)300	12,698	1.09 1.73	5 7 1/2	11,111	.73 1.33	3 5	9,877	.90 1.51	3 5
800	640,000	2517	218	2)400	16,931	1.0 1.51	7 1/2 10	14,815	.76 1.37	5 7 1/2	13,139	1.02 1.65	5 7 1/2

Blower Table–IHR/ISHR/HRHFB, IHR/ISHR/HRMUB & IHR/ISHR/HRHVB Models with Double Bank Furnaces

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					40˚			50˚			60˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
1000	800,000	3218	218	4)250	18,513	.73 1.21	7 1/2 10	14,815	.76 1.37	5 7 1/2	12,346	.53 1.14	3 5
1200	960,000	3358	218	4)300	22,222	.55 1.35	10 15	17,778	.85 1.36	7 1/2 10	14,815	.75 1.37	5 7 1/2
1600	1,280,000	3744	218	4)300	29,630	.80 .80	25 25	23,704	.27 1.04	10 15	19.753	.51 1.1	7 1/2 10

Model No. & MBH Input	Btuh Output	Ship Wt. Lbs.	Blower Used	Duct Furn. Used	Air Temperature Rise								
					70˚			80˚			90˚		
					CFM	Total S.P.	HP	CFM	Total S.P.	HP	CFM	Total S.P.	HP
1000	800,000	3218	218	4)250	10,582	.81 1.41	3 5	9259	.98 1.61	3 5	8,230	.73 1.12	2 3
1200	960,000	3358	218	4)300	12,398	1.09 1.73	5 7 1/2	11,111	.73 1.33	3 5	9,877	.90 1.51	3 5
1600	1,280,000	3744	218	4)300	16,931	1.0 1.51	7 1/2 10	14,815	.76 1.37	5 7 1/2	13,169	1.02 1.65	5 7 1/2

NOTE: Total Static Pressure shown in inches of water. Shaded areas require cleanable filters. .
***Maximum CFM for one damper (100% outside air only)
MB114A 3,400 CFM MB114B 3,400 CFM MB214 5,560 CFM MB218 14,000 CFM

Equipment Selection

IHR/ISHR/HRHF – SPACE HEATING

1. Select model size according to Btuh requirements
2. Specify desired air delivery or temperature rise. For normal applications, an air delivery resulting in a 70˚ F temperature rise is recommended.
3. Specify motor size to deliver the selected SCFM against required TSP (total static pressure).

IHR/ISHR/HRU – MAKE-UP AIR

1. Check the exhaust specification or equipment to determine the total SCFM of fresh air required.
2. Increase the total SCFM by approximately 10% if building needs to be slightly pressurized.
3. Determine air temperature rise, usually 70˚ F minus winter outside design temperature.
4. Select model and motor size to deliver desired air temperature rise and SCFM against required TSP.

IHR/ISHR/HRHV – HEATING & VENTILATING

1. Calculate the total SCFM of outside air needed to satisfy exhaust air requirements and meet ventilation specifications.
2. Find the Btuh output needed to heat the total SCFM of outside air by multiplying SCFM x TD (room temperature minus winter outside design temperature) x 1.08.
3. Find total Btuh output by adding the space heat loss to the Btuh ventilation requirement from step 2.
4. Select model and motor size to deliver total Btuh output and SCFM against required TSP. The SCFM chosen must equal or exceed the volume required for ventilation.

NOTE: Total static pressure as found in the blower tables must overcome total system resistance. Duct furnace and accessory equipment air pressure losses are found on page 7 thru 10 of this bulletin. Total system resistance is the total of these pressure drops added to the pressure loss of all system duct work and registers

(80% Eff.)
MODEL DESIGNATION

(IHR) (ISHR) HRHF (X), **(IHR) (ISHR) HRMUA** (X) **OR (IHR (ISHR) HRHV** (X) – XXX-X

A – Single Bank Furnaces
B – Double Bank Furnaces

MBH Input
From Performance Table

V – Power Vented

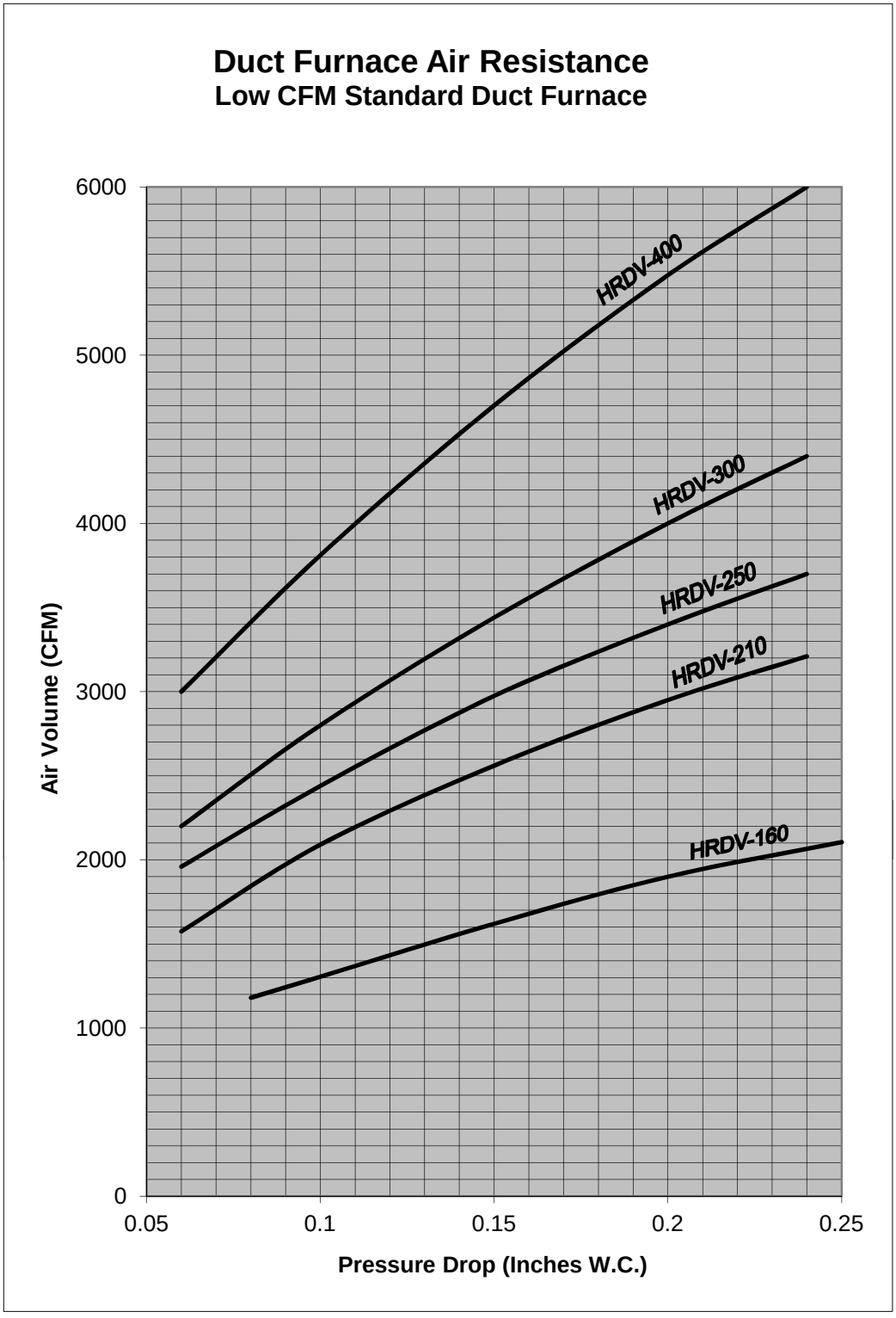
GAS CONNECTION SIZE (*)

MBH Input	Type of Control			
160	1/2	1/2	1/2	1/2
215	1/2	1/2	1/2	3/4
255	3/4	3/4	3/4	3/4
300	3/4	3/4	3/4	3/4
400	3/4	3/1	3/4	3/4

(*) Table based on natural gas at 6”pressure. Standard sizes subject to variation on some furnaces depending on type of modulation required.

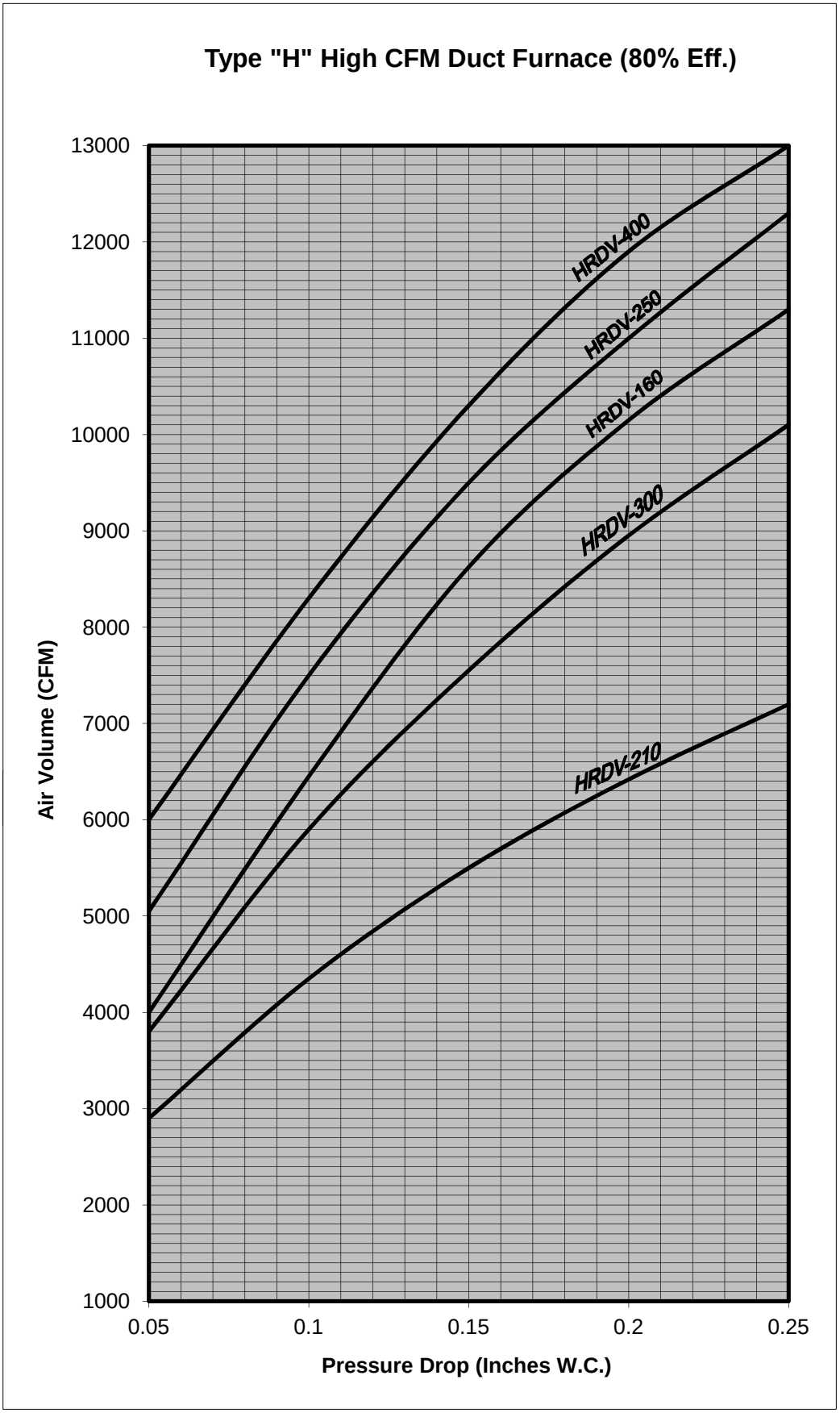
NOTE: Individual gas connections required on multiple furnace models.

"IHR/ISHR/HR" DUCT FURNACE AIR RSISTANCE (80% EFF.)



Note: Standard Low CFM furnaces used with single bank "A" units having higher than 40° temperature rise. Resistance Chart applies to all 80% Efficient models.

"IHR/ISHR/HR" DUCT FURNACE AIR RESISTANCE (80% EFF.)

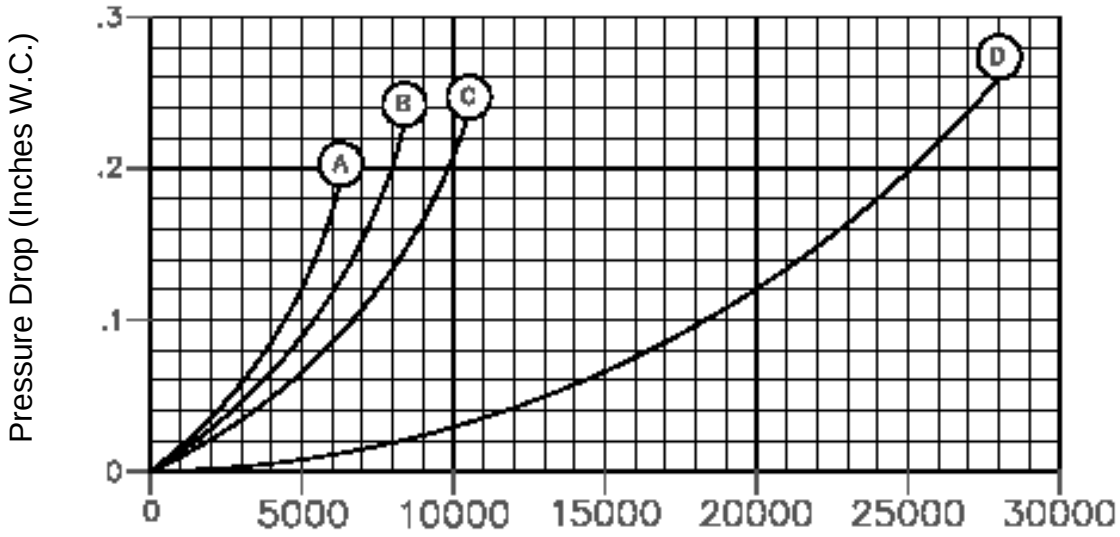


Note: High CFM Type "H" furnaces used with double bank "B" units and single bank "A" units having 60° or less air temperature rise. Resistance Chart applies to all 80% Efficient models.

ACCESSORY EQUIPMENT AIR PRESSURE

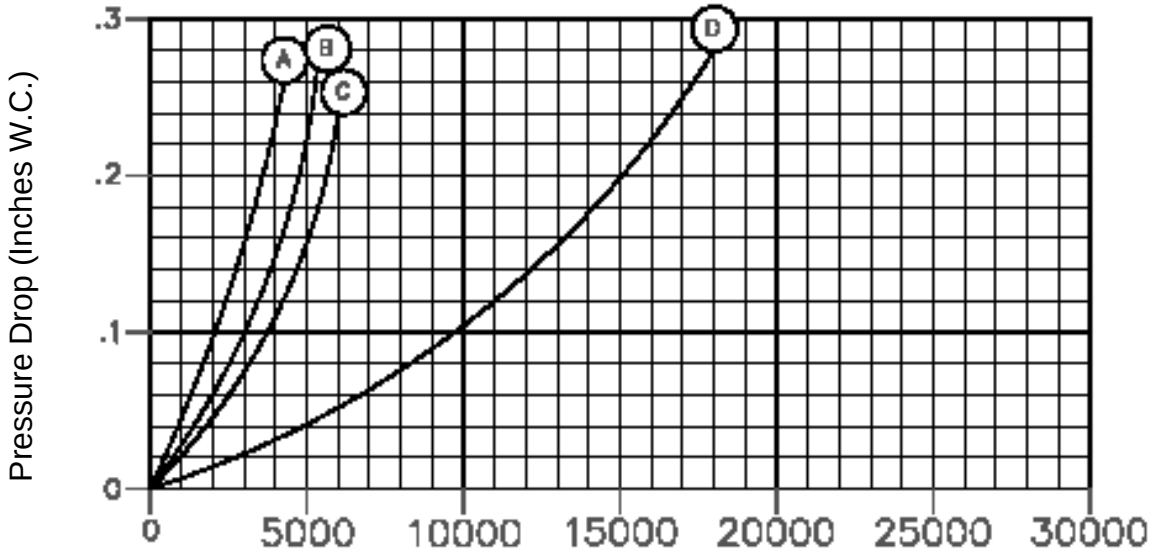
Plenums – Allow 10 in. WC – Each

Cleanable Filters



Air Volume ((CFM)

Extended Surface Filters



Air Volume ((CFM)

Ⓐ **MB-114A** Filters Used (4) 20 x 20 x 2 *(11 FT²)

Ⓑ **MB-114B** Filters Used (4) 20 x 25 x 2 *(13.5 FT²)

Ⓒ **MB-214** Filters Used (8) 16 x 20 x 2 *(17.5 FT²)

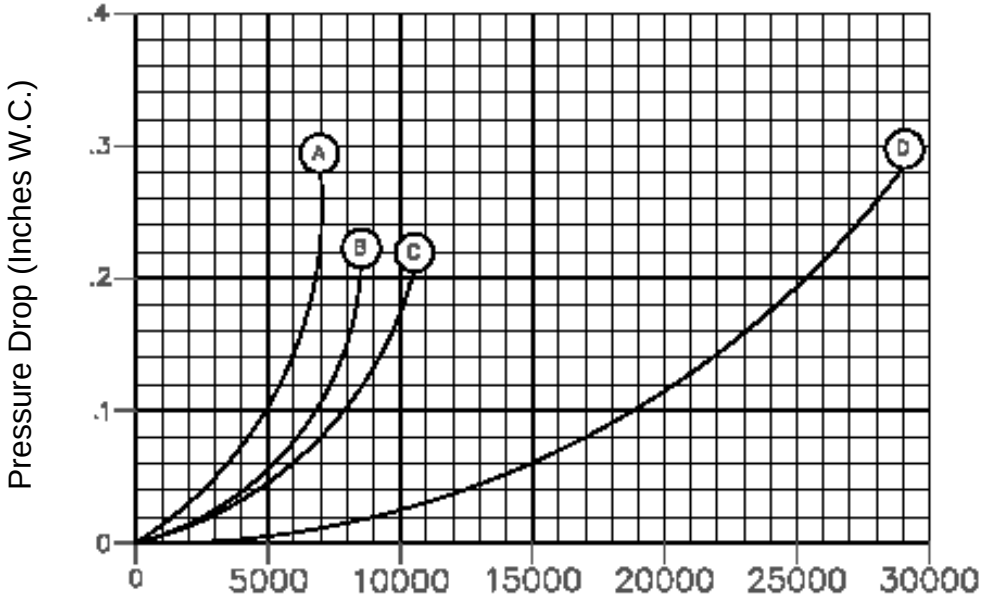
Ⓓ **MB-218** Filters Used (10) 16 x 25 x 2 (5) 20 x 25 x 2 *(45 FT²)

*Approximate total filter area (FT²)

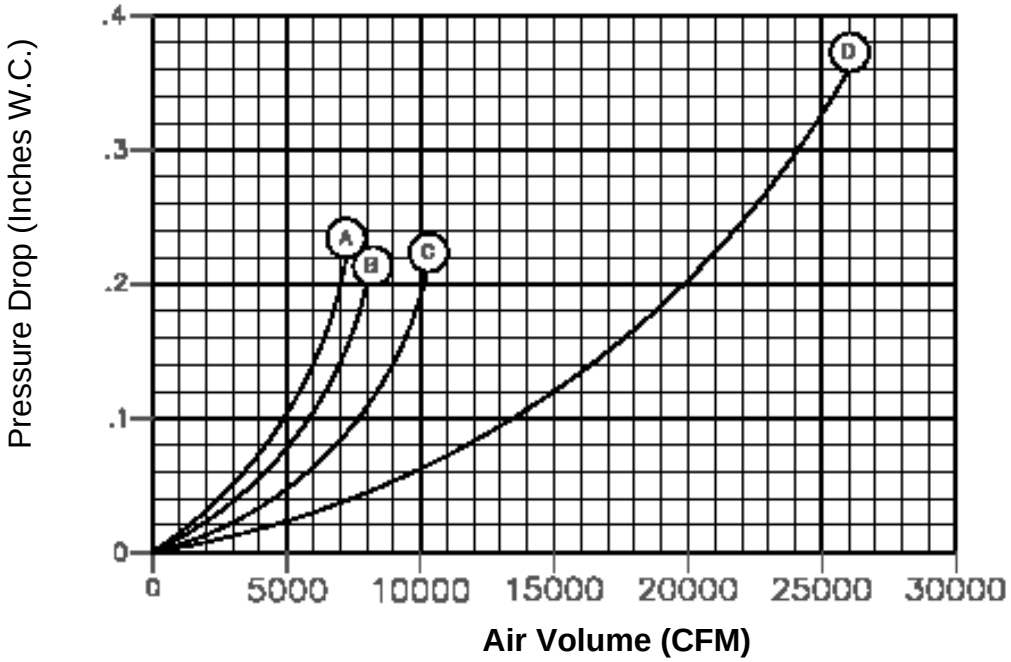
ACCESSORY EQUIPMENT AIR PRESSURE

Plenums – Allow 10 in. WC – Each

Intake Hood with Birdscreen



Fresh Air Shut-Off or Mixing



Ⓐ **MB-114A** Filters Used (4) 20 x 20 x 2 *(11 FT²)

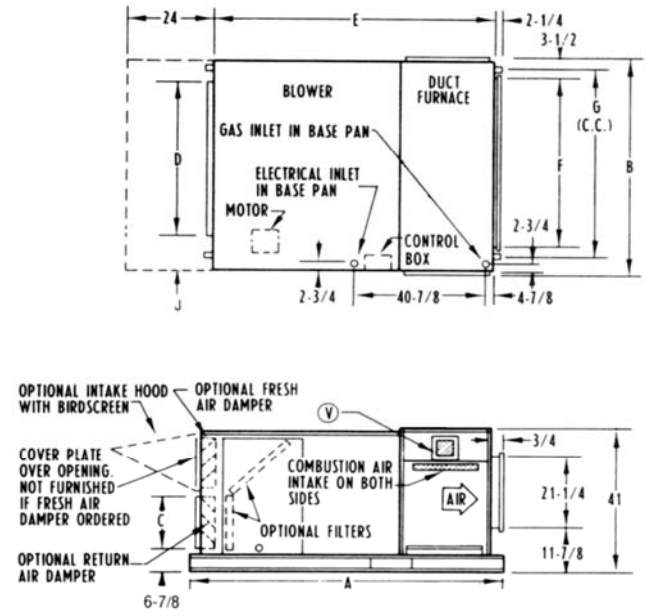
Ⓑ **MB-114B** Filters Used (4) 20 x 25 x 2 *(13.5 FT²)

Ⓒ **MB-214** Filters Used (8) 16 x 20 x 2 *(17.5 FT²)

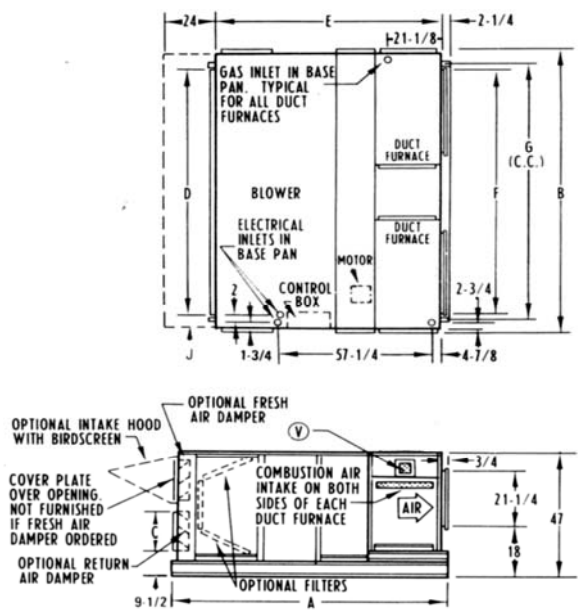
Ⓓ **MB-218** Filters Used (10) 16 x 25 x 2 (5) 20 x 25 x 2 *(45 FT²)

*Approximate total filter area (FT²)

"A" Arrangement – 160 thru 400



"A" Arrangement – 600 thru 800



Ⓥ Flue opening – Power Vent Model only

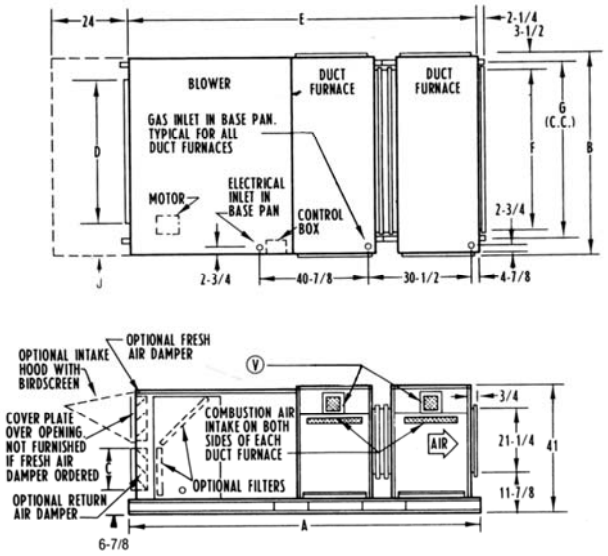
	"A" Arrangement				
	160 210	**250 300**	**400**	**600**	**800**
A	80	80	83	90	90
B	41-3/8	52-1/8	65-1/2	131	131
C	13-3/4	13-3/4	13-3/4	15-1/2	15-1/2
D	30-1/4	r1	47-3/8	113-3/8	113-3/8
E	75-1/2	75-1/2	78-1/2	k85-5/8	85-5/9
F	28-5/8	39-3/8	52-3/4	114-1/2	114-1/2
G	32k-5/8	43-3/8	56-3/8	118-5/8	118-5/8
H	16	19-3/8	19-7/8	19-3/8	19-3/8
J	6-1/2	6-1/2	10	11-3/4	11-3/4

NOTES:

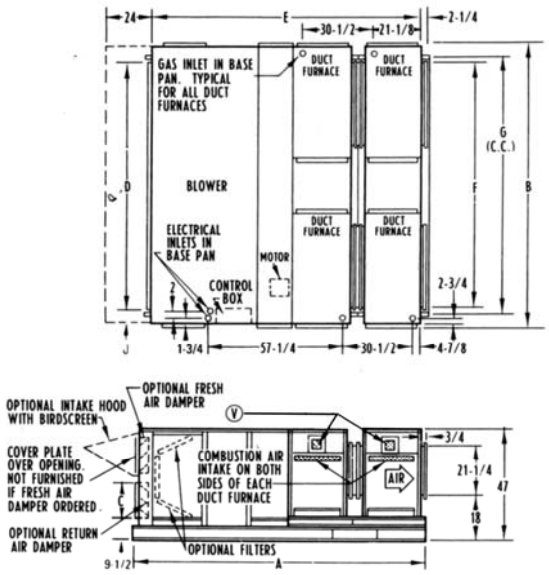
1. Duct dimensions are approximate. Certified prints furnished on request.
2. 2-piece door on indoor and outdoor models.

SHIPPING INFORMATION – C.H.O.

"B" Arrangement – 320 thru 800



"B" Arrangement – 1000 thru 1600



Ⓥ Flue opening – Power Vent

	"B" Arrangement				
	320 420	**500 600**	**800**	**1000 1200**	**1600**
A	110-1/2	110-1/2	113-1/2	120-1/2	120-1/2
B	41-3/8	52-1/8	65-1/2	131	131
C	13-3/4	13-3/4	13-3/4	15-1/2	15-1/2
D	30-1/4	41	47-3/8	113-3/8	113-3/8
E	105-7/8	105-7/8	108-7/8	116-1/4	116-1/4
F	28-5/8	39-3/8	52-3/4	114-1/2	114-1/2
G	32-5/8	43-3/8	56-3/8	118-5/8	118-5/8
H	16	19-3/8	19-7/8	19-3/8	19-7/8
J	6-1/2	6-1/2	10	11-3/4	11-3/4

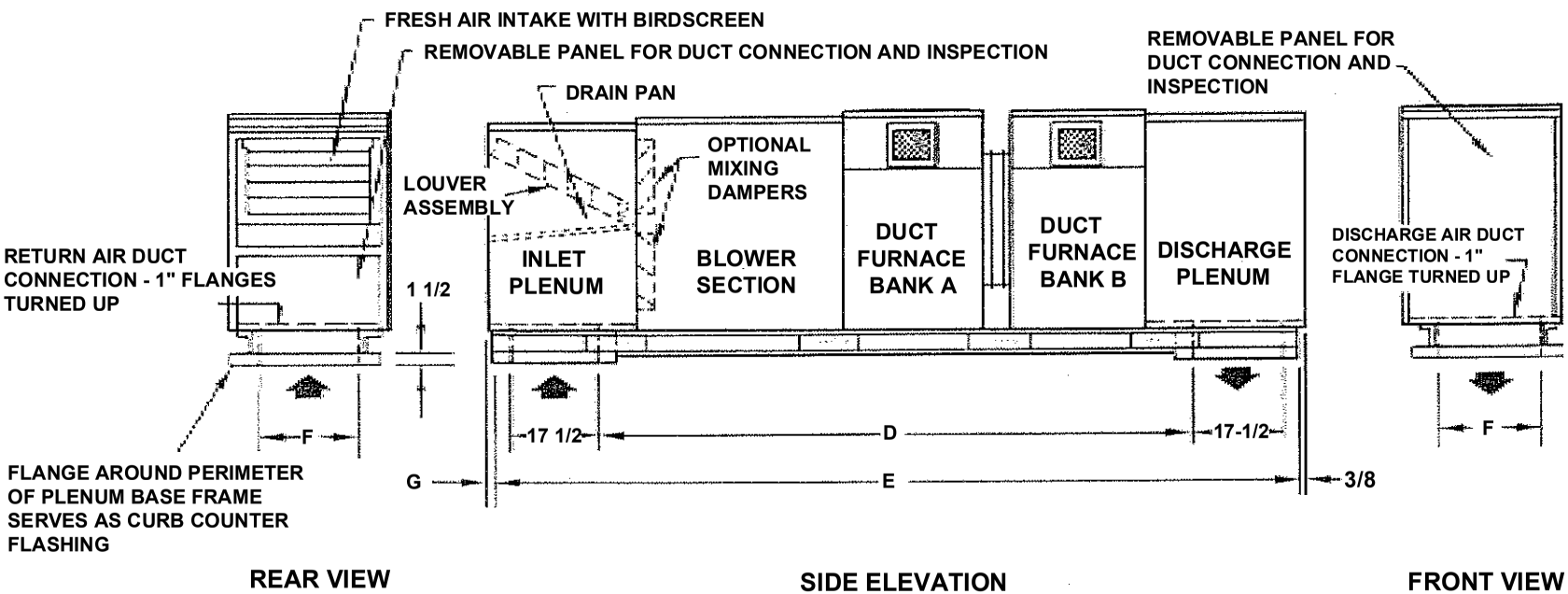
NOTES:

1. Duct dimensions are approximate. Certified prints furnished on request.
2. 2-piece door on indoor and outdoor models.

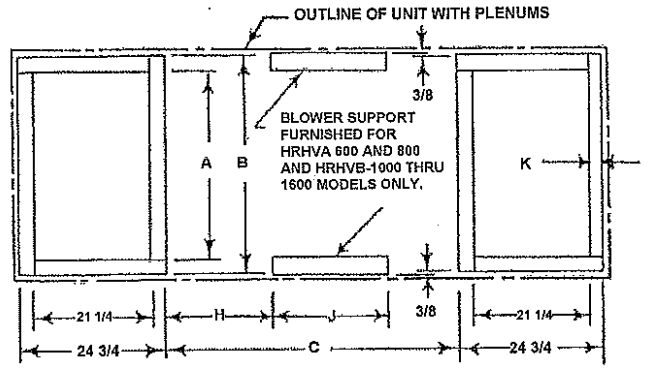
SHIPPING INFORMATION – C.H.O.

"HR" SERIES OUTDOOR SYSTEMS

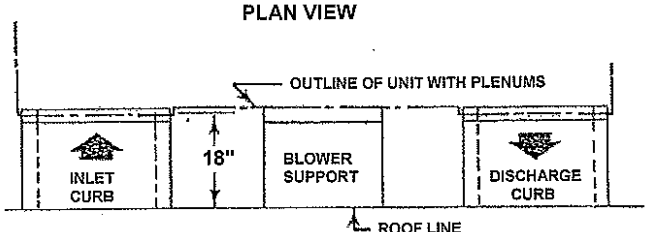
Dimensions - HRHF & HRHV Models wth Intake and Discharge Plenums.



Dimensions – Roof Curbs for Intake and Discharge Plenums



PLAN VIEW



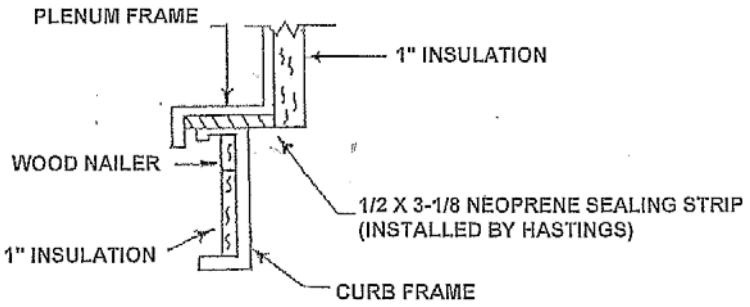
ELEVATION

*DECKED CURBS – C.H.O. FOR CURB DIMENSIONS.

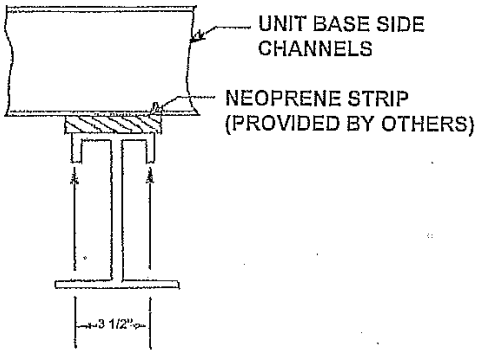
NOTES:

1. Inlet plenum is shown for units with mixing dampers. This includes louver assembly drain pan and fresh air intake with birdscreen. For 100% return air applications. Inlet plenum furnished with louver assembly and drain pan. Birdscreen is replaced with cover plate.
2. Duct Furnace Base B furnished with HRHFB-HRHVB models only.
3. Standard flashing and mopping procedures are recommended for curb openings and gas and electrical roof penetrations
4. Deck curb available to provide covered island under complete unit with openings for supply and return air.

Plenum Curb Relationship



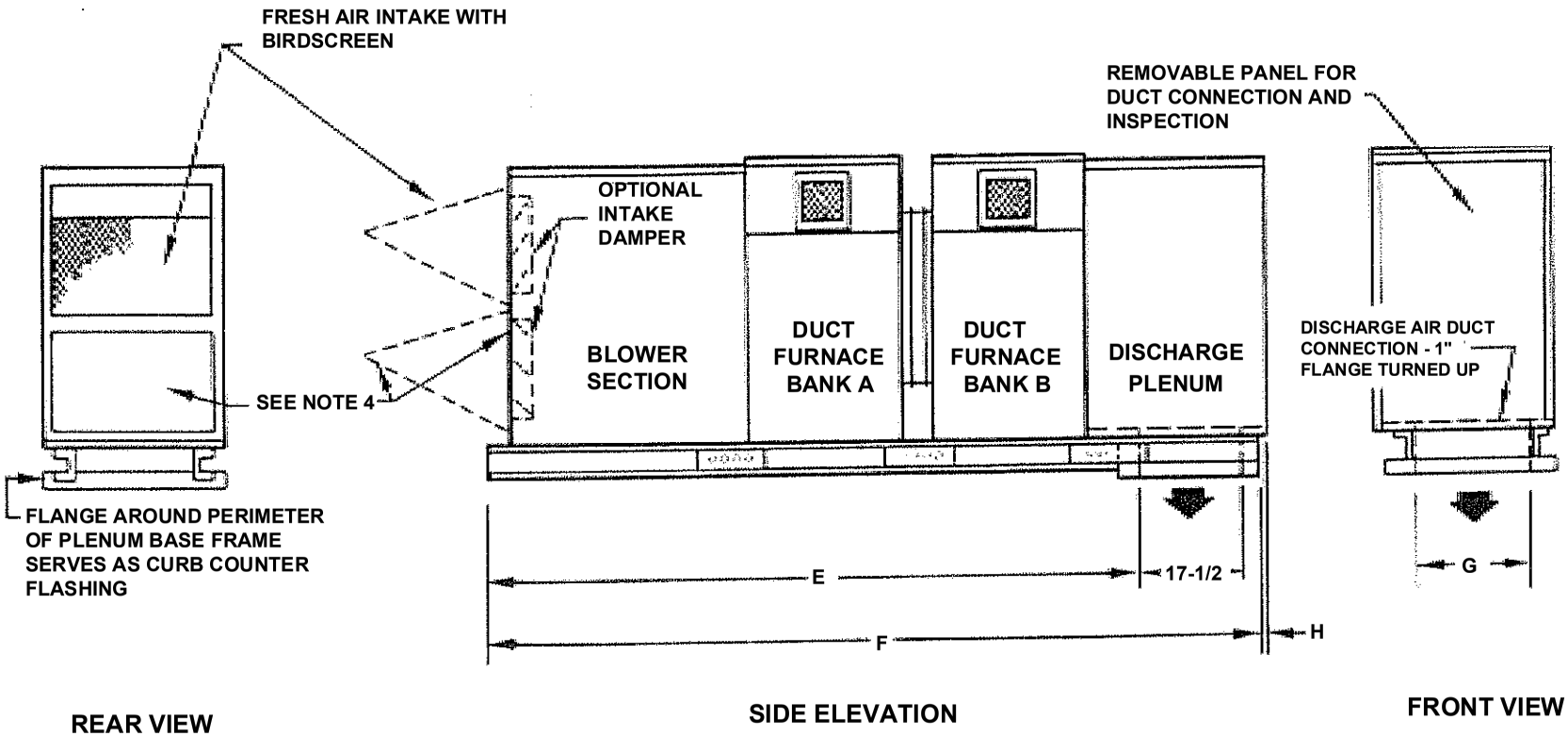
Rear Support - Curb Relationship



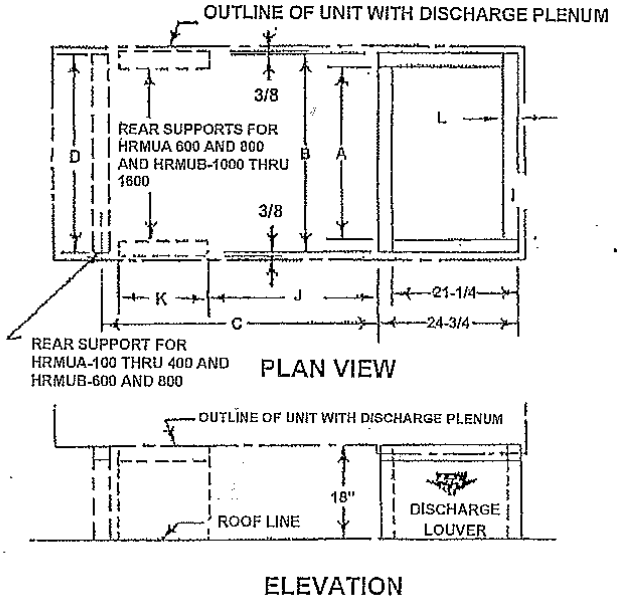
	"A" ARRANGEMENT				"B" ARRANGEMENT			
	160 & 210	250 & 300	400	680 & 800	320 & 420	500 & 600	800	1000 & UP
A	31-11/16	42-7/16	55-7/8	117-1/2	31-11/16	42-7/16	55-7/8	117-1/2
B	35-3/16	45-15/16	59-3/8	121	35-3/16	45-15/16	59-3/8	121
C	81-3/4	81-3/4	84-3/4	92-1/16	112-3/16	112-3/16	115-3/16	122-1/2
D	89	89	92	99-3/16	119-7/16	119-7/16	122-7/16	129-8/8
E	133	133	136	142-3/16	163-7/16	163-7/16	116-7/16	173-5/8
F	27-15/16	38-11/16	52-3/16	113-15/16	27-15/16	38-11/16	52-3/16	113-15/16
G	3/8	3/8	3/8	1/4	3/8	3/8	3/8	1/4
H	-	-	-	23	-	-	-	23
J	-	-	-	48	-	-	-	60
K	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4

"HR" SERIES OUTDOOR SYSTEMS

Dimensions - HRMU & HRHV Models with Discharge Plenums Only



Dimensions – Roof Curbs for Discharge Plenums Only

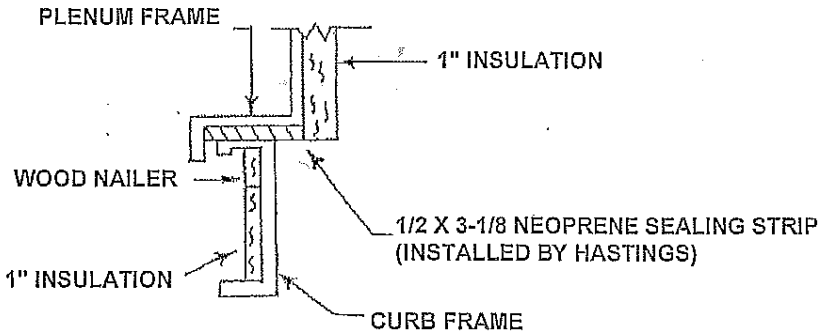


* Decked Curbs - C.H.O. for curb dimensions.

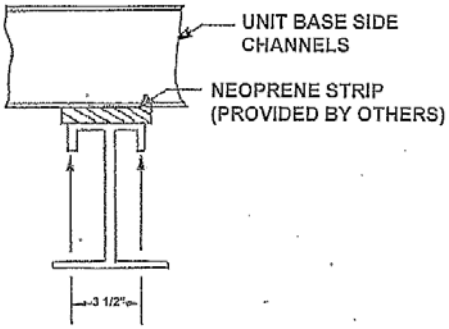
NOTES:

1. Duct Furnace Bank B furnished with HRMUB-HRHVB models only.
2. Standard flashing and mopping procedures are recommended for curb opening, rear support and gas and electrical roof penetrations.
3. Deck curb available to provide covered island under complete unit with opening for supply air.
4. High air delivery may necessitate a second Fresh Air Damper and/or Intake Hood with Birdscreen. Check Pressure drop chart on page 6 and 7 and Blower Motor Capacity on page 3 and 4.

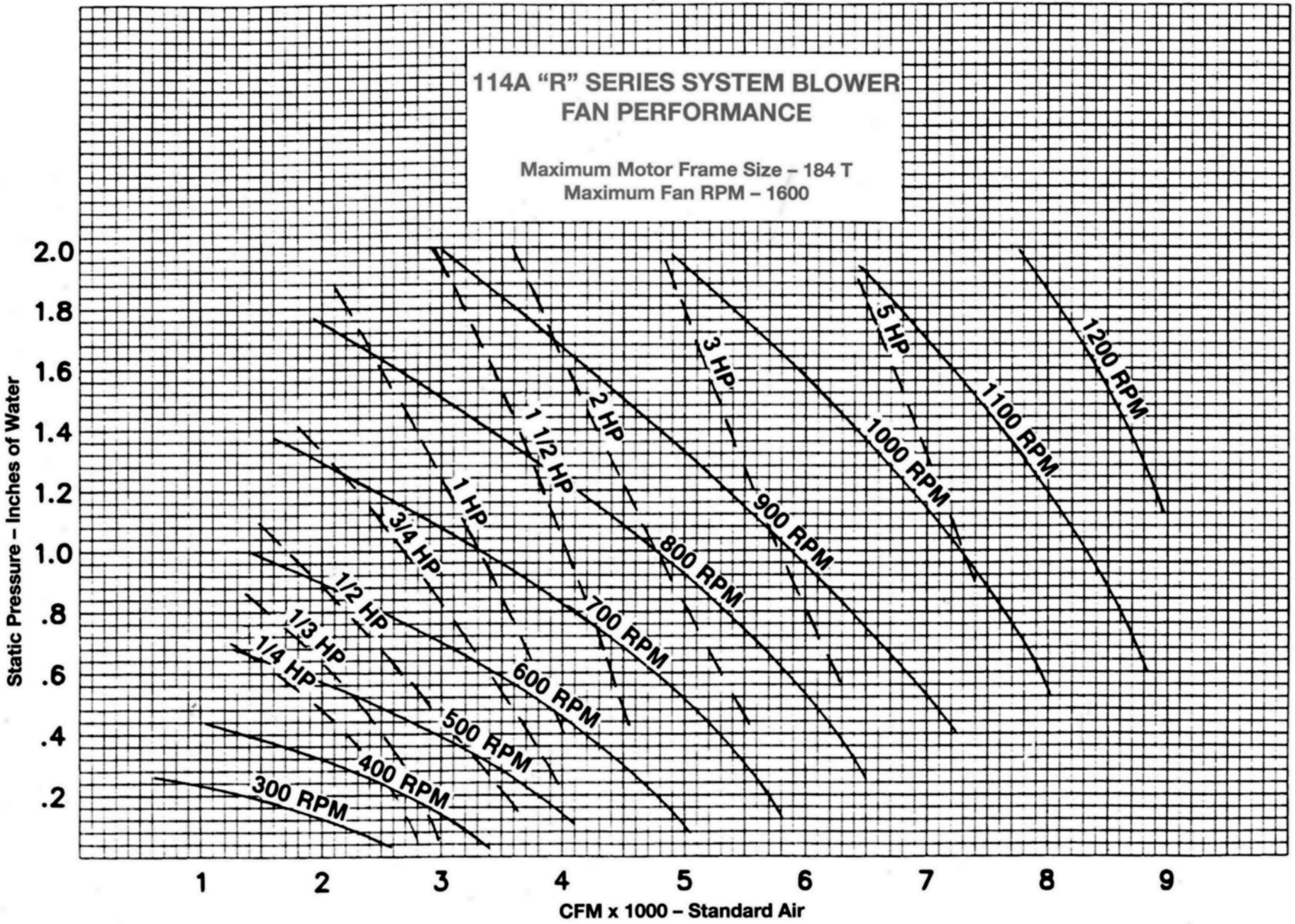
Plenum Curb Relationship

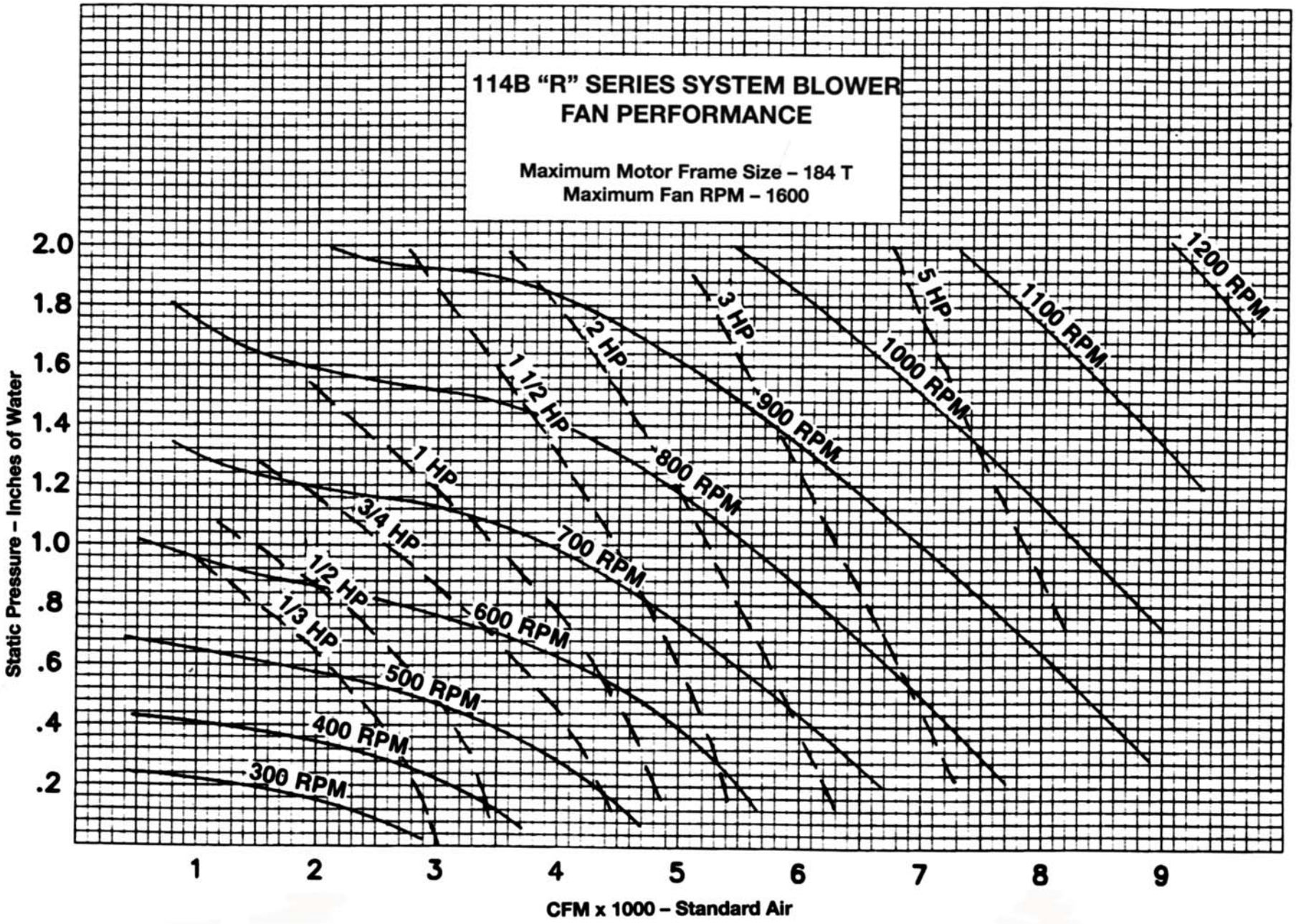


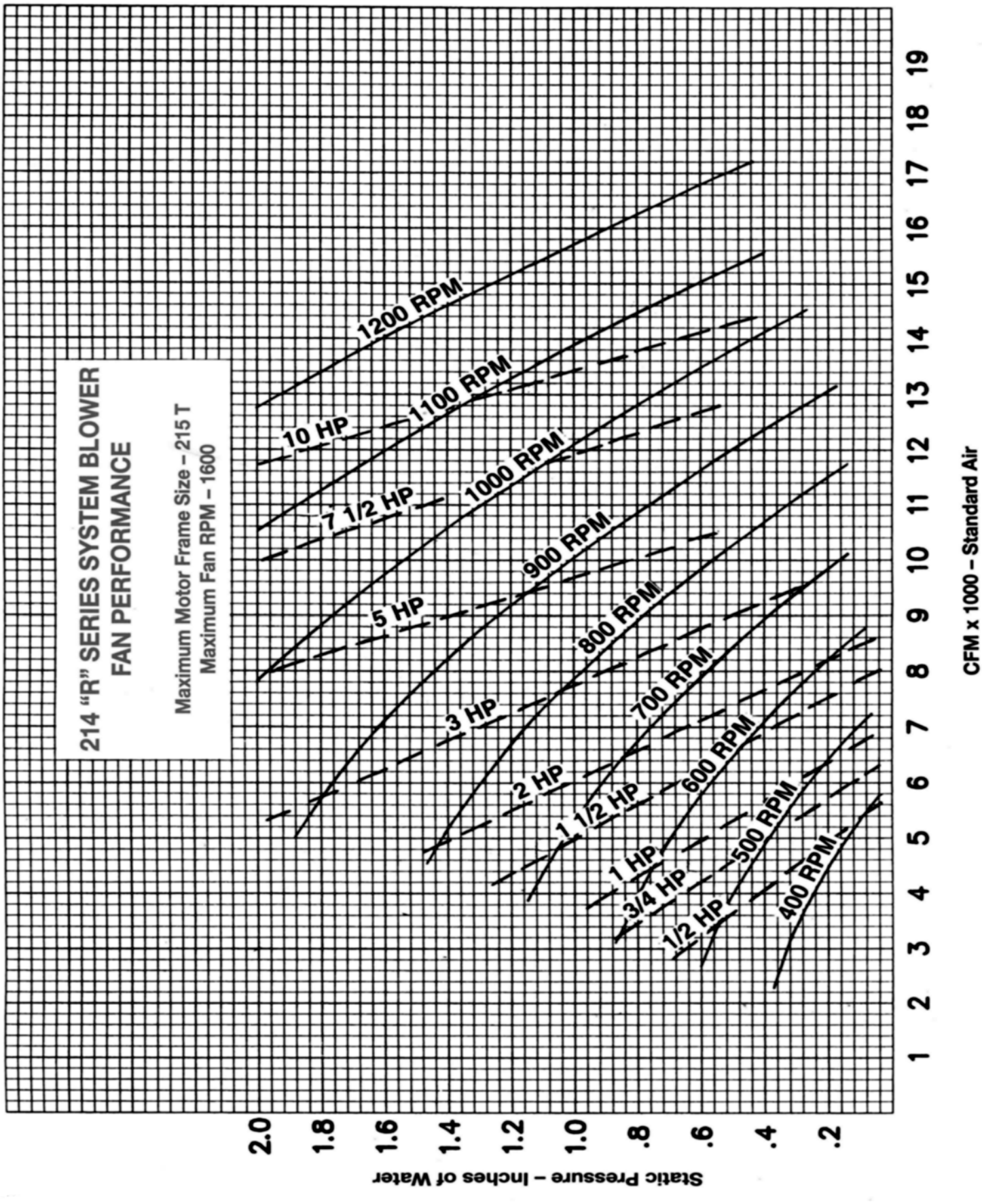
Rear Support - Curb Relationship

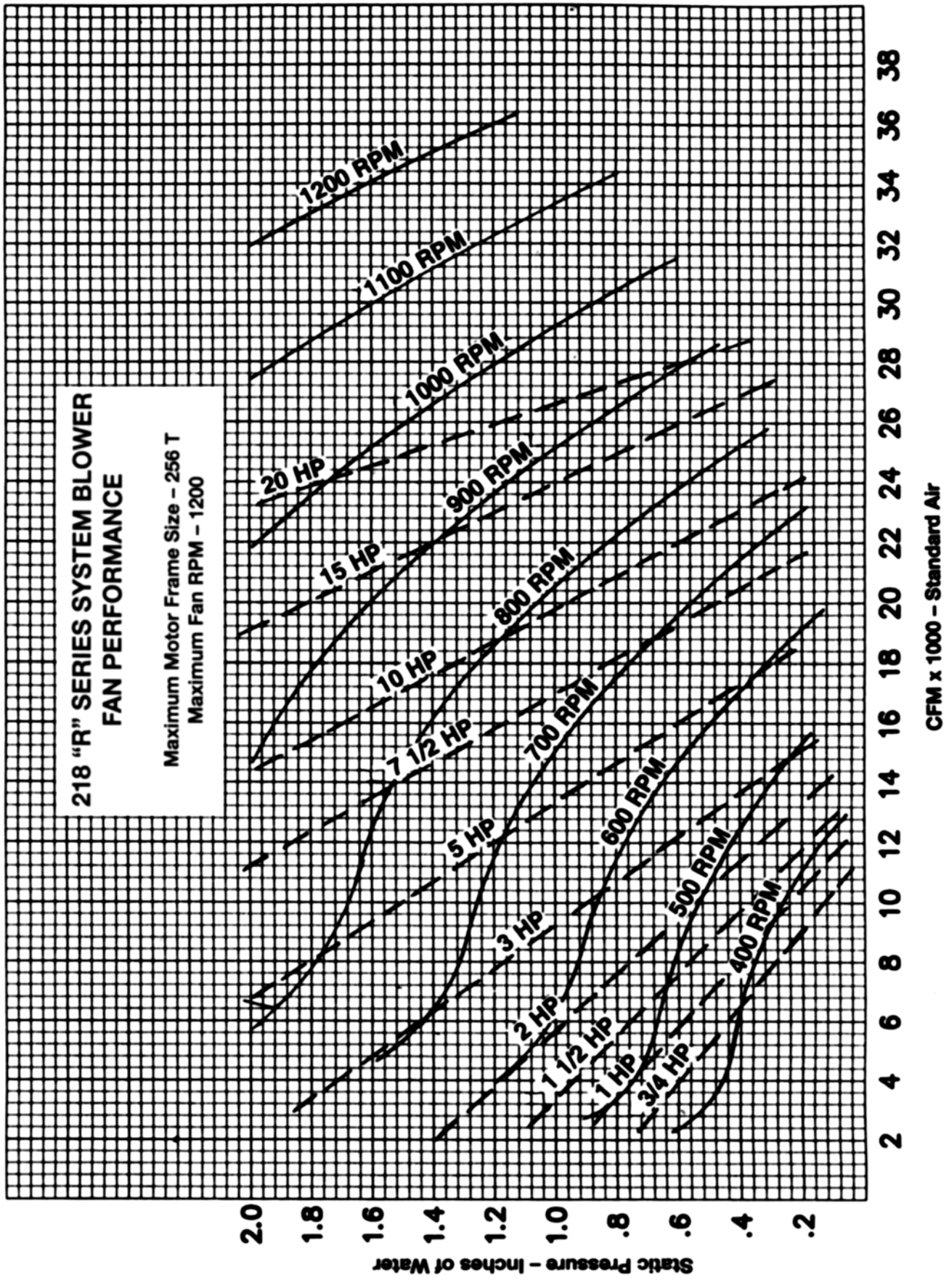


	"A" ARRANGEMENT				"B" ARRANGEMENT		
	160 & 210	**250 & 300**	**400**	**600 & 800**	**500 & 600**	**800**	**1000 & UP**
A	31-11/16	42-7/16	55-7/8	117-1/2	42-7/16	55-7/8	117-1/2
B	35-3/16	45-15/16	59-3/8	121	45-15/16	59-3/8	121
C	67	67	70	-	97-7/16	100-7/16	-
D	33-15/16	44-11/16	58-1/8	-	44-11/16	58-1/8	-
E	84-1/2	84-1/2	87-1/2	94-19/32	114-15/16	117-15/16	125-1/32
F	106-1/2	106-1/2	109-1/2	116-19/32	138-15/16	139-15/16	147-1/2
G	3/8	3/8	3/8	1/4	3/8	3/8	1/4
H	-	-	-	33-1/16	-	-	63-1/2
J	-	-	-	36	-	-	36
K	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4


114A "R" SERIES SYSTEM BLOWER
FAN PERFORMANCE
Maximum Motor Frame Size – 184 T
Maximum Fan RPM – 1600
Static Pressure – Inches of Water
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
1
2
3
4
5
6
7
8
9
CFM x 1000 – Standard Air
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
1/2 HP
1/3 HP
1/4 HP
1200 RPM
1100 RPM
1000 RPM
900 RPM
800 RPM
700 RPM
600 RPM
500 RPM
400 RPM
300 RPM


114B "R" SERIES SYSTEM BLOWER
FAN PERFORMANCE
Maximum Motor Frame Size – 184 T
Maximum Fan RPM – 1600
Static Pressure – Inches of Water
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
1
2
3
4
5
6
7
8
9
CFM x 1000 – Standard Air
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
1/2 HP
1/3 HP
1200 RPM
1100 RPM
1000 RPM
900 RPM
800 RPM
700 RPM
600 RPM
500 RPM
400 RPM
300 RPM


214 "R" SERIES SYSTEM BLOWER
FAN PERFORMANCE
Maximum Motor Frame Size – 215 T
Maximum Fan RPM – 1600
1200 RPM
1100 RPM
1000 RPM
900 RPM
800 RPM
700 RPM
600 RPM
500 RPM
400 RPM
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
1/2 HP
Static Pressure – Inches of Water
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
CFM x 1000 – Standard Air


218 "R" SERIES SYSTEM BLOWER
FAN PERFORMANCE
Maximum Motor Frame Size – 256 T
Maximum Fan RPM – 1200
1200 RPM
1100 RPM
1000 RPM
900 RPM
800 RPM
700 RPM
600 RPM
500 RPM
400 RPM
20 HP
15 HP
10 HP
7 1/2 HP
5 HP
3 HP
2 HP
1 1/2 HP
1 HP
3/4 HP
Static Pressure – Inches of Water
2.0
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38
CFM x 1000 – Standard Air

Engineers Specifications

Furnish and install the following Hastings (Natural) (Propane) gas fired equipment.

Item No.	Model No.	Btuh Input	SCFM	Ext. S.P.	Motor HP	Motor Volts & Ph.

Equipment Casing and Base:

A. Casing shall be constructed of high quality aluminized steel to insure long rust-free life.
B. Access panels shall be provided to allow easy access to motors, filters (if ordered) and electrical controls.
C. Casing shall have a rinse primer and an enamel finish.
D. Base frame channels shall be constructed of 12 gauge aluminized steel for all models through the 214 blower units. 218 units shall have a 1/4" hot rolled steel base.

Blower Section:

A. Blower wheels shall be statically and dynamically balanced forwardly curved double width double inlet class 1.
B. Blower wheels shall be mounted on a solid turned ground shaft with keyway for driven sheave.
C. Bearings shall be ball bearing self-aligning. Greasable 200,000 hours average life.
D. Blower scrolls, bearings, and adjustable motor base shall be mounted and properly reinforced to insure rigidity and quiet operation.
E. Cabinet shall be of 16 gauge aluminized steel with primed and enamel finish.
F. The driver and driven sheaves shall be of the keyed hub type. The driven sheave shall be of a fixed pitch diameter and the driver shall be a variable pitch diameter sheave standard through 10 HP. V-belt drives shall be sized for 135% of motor horsepower.

Furnace Section

A. Heater exchanger tubes shall be –
   1. Standard type 409 (chrome) stainless steel. .044" tubes and .050" header plates. Internal baffles are .032" type 409 stainless steel with stainless steel tips.
   2. Type 409 (chrome) stainless steel secondary tubes.

B. Burners shall be made of 18 gauge stainless steel with type 430 stainless steel ribbon inserts.
C. Burner tray shall be so constructed as to slide out from compartment for easy service and maintenance.
D. Gas and electrical components shall consist of not less than the following: Combination Redundant Gas Valve with high limit control, 24 volt control transformer, electronic spark ignition system, and non-100% shut-off intermittent pilot.
E. E.T.L. Certified
F. Temperature controls consist of:

1. HF Models

(a) Basic "on-off-auto" blower switch, fan time delay relay and on-off room thermostat.
(b) Optional two stage gas valve and two stage room thermostat added to basic system controls.
(c) Optional MS-2 "Selectra" space heating package added to basic system. Solid state electronic modulation, down to 30% of rated input, provides continuous blower operation and extremely close control of space temperature.

2. MU Models

(a) MS-1 "Selectra" make-up air package provides solid state electronic modulation, down to 30% of rated input, provides constant leaving air temperature. A temperature selector mounted in the control cabinet or remote from unit permits adjustment of leaving air temperature from a convenient location.
(b) MS-5 "Selectra" package provided with signal conditioner to interface to customer's "BMS" control system to modulate the burner input with a 20-4 MA signal conditioner or 0-10 VDC signal. Systems with multiple furnaces will have furnaces modulate in unison.
All "BMS" sensors provided and installed by others.

3. HV Models

(a) MS-3 “Selectra” make-up air and space heating package provides solid state electronic modulation with turn-down to 30% or rated input, provides constant leaving air temperature. A temperature selector mounted in the control cabinet or remote from unit permits adjustment of leaving air temperature from a convenient location. Over-ride is controlled by an on-off thermostat

G. Cabinet shall be weatherproof of 20 gauge aluminized steel construction with an enamel finish.

H. “V” model units are equipped with power venter on each heater.

Motor:

A Premium Efficient T-frame, ODP, 1800 RPM pre-lubricated ball bearing type motor shall be furnished for voltage and scheduled.

Assembly:

The system shall be factory assembled and wired with the exception of controls that are remote to the unit.

Options and Accessories:

The following items are to be furnished **(select from page 3 of this bulletin)**.

In order to maintain our policy of continuous product improvement, we reserve the right to change prices, specification, ratings or dimensions without notice obligation.

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