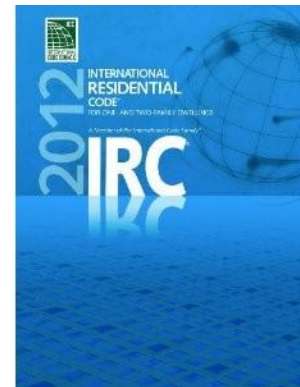




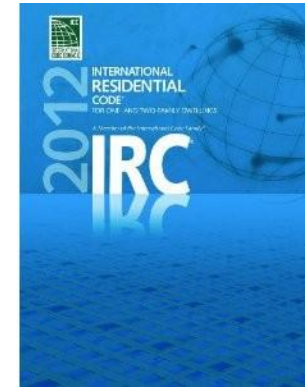
Welcome to

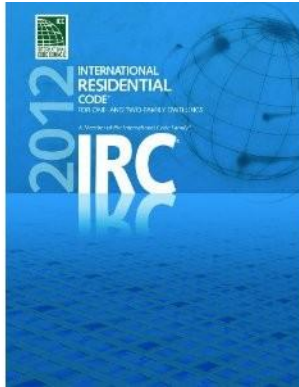
S&P USA & the 2012 International Residential and Mechanical Code for Ventilation



Presentation Objectives

- To understand sections of IRC concerning ventilation
- To understand sections of IMC concerning ventilation
- Identify S&P compliance options





Section 1

CHAPTER 15: THE CODE IN REGARDS TO VENTILATION



Sections Requiring Ventilation

- Clothes Dryer Exhaust (M1502)
- Range Hood Exhaust (M1503)
- Mechanical Ventilation (M1507)
 - Whole-house Ventilation
 - Local Exhaust

Section M1502: Clothes Dryer Exhaust



The Code Specifies:

1. The dryer exhaust **MUST** terminate to the outside
2. The **MAX.** length of the [dryer] exhaust duct is 35' from the connection to the outlet terminal

Problem Created by Code:

1. What if the dryer is **NOT** located close to the outlet terminal?
2. What if the duct is longer than 35' so elbows are necessary creating complicated duct work? (ref. table 1502.4.4.1)

FACT: When ducting from a dryer to the outlet is long and/or complicated the dryer cannot overcome the static pressure thus reducing efficiency and causing increased or poor drying time.

S&P's Solution:

A Clothes Dryer Booster Fan will help overcome the static pressure created from long and/or complicated duct runs.

PV100X with Current Sensor

- Centrifugal blade design capable of overcoming extreme resistance (high static pressure)
- Class F insulation
- “Fail-safe” activation method with Current Sensor
- Fan only runs when device senses current





The Code Specifies:

1. Makeup air is required when system is capable of exhausting 400+ CFM
 1. Rate of makeup air must be (approx.) equal to the exhaust air

Why You Need S&P:

Simple...**Makeup Air!**

S&P's Solutions:

1. **GOOD:** TD-MIXVENT (Mixed Flow Fan)
2. **BEST:** TD-SILENT (Mixed Flow Fan)

Good Solution for Makeup Air



TD MIXVENT: Mixed Flow Fan

- **TD-200 with filter box & backdraft damper**

- Meets the requirement
- Prevents cold air from infiltrating
- Filters the incoming air
- Distributes air through a small round grille
- Brings air in through an aluminum outdoor grille



The TD-200 operates at 2 sones!
That's just twice as loud
as a refrigerator.



TD SILENT: Extremely Quiet Mixed Flow Fan

- **TD-200S w/filter box & backdraft damper**

- Meets the requirement
- Prevents cold air from infiltrating
- Filters the incoming air
- Distributes air through a small round grille
- Brings air in through an aluminum outdoor grille



The TD-200S Silent operates at .5 sones!
That's ½ as quiet as a refrigerator.



Section M1507: Mechanical Ventilation



The Code Specifies:

1. Whole-house Ventilation AND Local Exhaust is required
2. Bathroom & toilet air must be exhausted directly to the outdoors and shall not be recirculated within residence

We will start with the Whole-house Ventilation Requirements

Whole-house Ventilation Requirements

1. One or more supply or exhaust fans, plus associated ducts and controls
2. Local exhaust or supply fans contribute to the whole-house ventilation requirement
3. System must have controls that enable manual override
4. Outdoor (makeup) air must be provided at a **continuous** rate (ref. Table 1507.3.3)
 1. Exception: if you use controls that enable operation for at least 25% of each 4 hour segment you can operate **intermittently**

Section M1507 uses the ASHRAE 62.2 Standards



- Table 1507.3.3: The amount of whole house ventilation that is required to meet the standard.

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0-1	2 -3	4 -5	6-7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501-3,000	45	60	75	90	105
3,001-4,500	60	75	90	105	120
4,501-6,000	75	90	105	120	135
6,001-7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

Good Solution: Whole House Ventilation



PC-Premium CHIOCE Fan (Exhaust)

TD-MIXVENT Fan (Supply)

- The PC Fan will run continuously for exhaust
- The TD will provide outdoor air continuously
- A speed control should be used to set the TD to match the PC performance
- You meet the code but don't exceed it!



Exhaust Side of Good Solution



- Install PC fan in hallway or other area away from the living space
- Motors rated for 30,000 hours continuous on
- The extremely low sound levels ensure the PC will not be intrusive
- ENERGY STAR® qualification ensures the fan reduces energy consumption without sacrificing performance

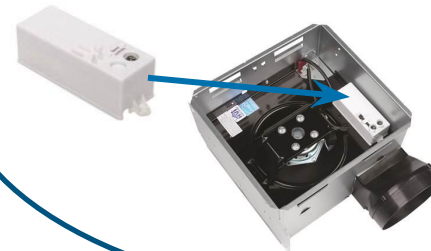


Performance

Model	CFM	Static Pressure (in W.G.)	Energy Efficiency (CFM/Watts)*	Watts	Power (V/Hz)	Sones	Amps
PC80	80/60	0.1/0.25	3.0	32	120/60	0.3	.27
PC110	110/93	0.1/0.25	3.2	36	120/60	0.6	.30
PC150	150/110	0.1/0.25	3.8	41	120/60	1.1	.34

*Energy Star qualified data based on tested air flow and power consumption.

PC Bonus Feature: Simple Plug-&-Play Speed Control

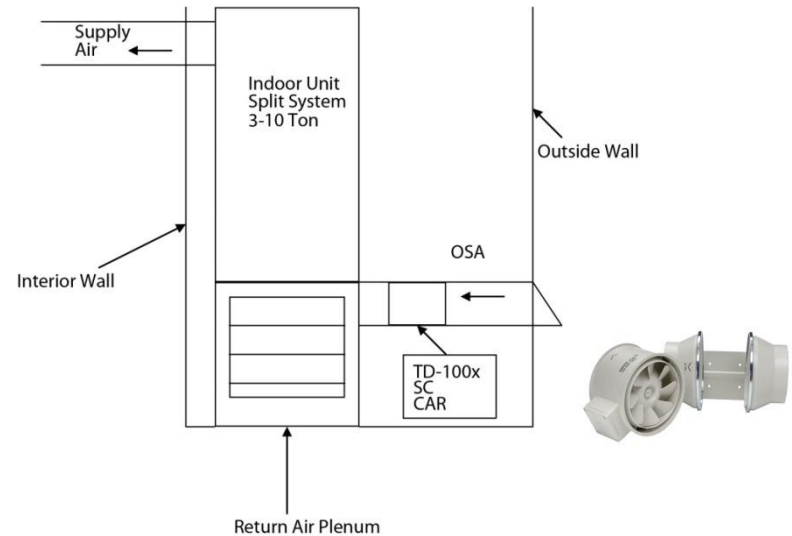


PCSC option allows you to set the continuous speed requirement. No separate wall control needed!

Supply Side of the Good Solution



- Insert TD Fan into the outside air duct
- Set the performance for the whole house requirement and the exhaust requirement totaling the makeup air



Model	Nom. RPM	Volts	Max. Watts	Speed	CFM v Static Pressure (SP) Ins. WG							Max. SP	Max operating temp. (°F)	Wgt. (lbs)	Duct Dia. Ins.	Sones
					0"	0.125"	0.25"	0.375"	0.5"	0.75"	1.0"					
TD-100	2431	120	23	LS	97	81	51	-	-	-	-	.4	104	2	4"	1.1
	2516	120	26	HS	101	85	57	-	-	-	-	.4	104		4"	
TD-100x	1556	120	20	LS	100	77	48	-	-	-	-	.375	104	4.4	4"	1.7
	2096	120	33	HS	135	113	90	53	-	-	-	.55	104		4"	
TD-125	1633	120	24	LS	149	110	73	-	-	-	-	.35	104		5"	2.1
	2146	120	38	HS	197	168	133	86	22	-	-	.55	104		5"	
TD-150	1709	120	54	LS	218	193	163	128	105	24	-	.8	140	6"	2.8	
	2289	120	65	HS	293	273	250	227	206	131	35	1.15	140			
TD-200	2322	120	139	LS	476	422	373	317	260	40	-	1.38	140	8.8	8"	4
	2781	120	184	HS	538	495	458	418	367	190	10	1.625	140		8"	
TD-250	2400	115	162	LS	541	475	418	355	295	218	170	2.03	140	19.8	10"	5
	3200	115	241	HS	754	715	680	640	606	520	405	2.53	140		10"	
TD-315	2000	115	208	LS	751	670	545	420	285	190	130	1.62	140	30.9	12.4"	6.8
	2500	115	335	HS	1050	990	932	850	770	600	420	2.95	140		12.4"	



TD-SILENT: REQUIRES 2 FANS

- Exhaust Fan set at the required airflow for installed in hallway
- Supply Fan in the outside air duct set at the requirement for Kitchen Ventilation, Bathroom Ventilation, & Whole House ventilation.



Model	Nom. RPM	Volts	Max. Watts	Speed	CFM v Static Pressure (SP) Ins. WG						Max. SP	Max operating temp. (°F)	Wgt. (lbs)	Duct Dia. Ins.	Sones	
					0"	0.125"	0.25"	0.375"	0.5"	0.75"						1.0"
TD-100XS	2000	120	21	LS	108	82	48	-	-	-	-	0.4	104	11.9	4"	0.6
	2500	120	35	HS	143	121	91	59	23	-	-	0.6	104		4"	
	2000	120	21	LS	147	110	63	-	-	-	-	0.4	104		5"	
	2500	120	36	HS	203	175	138	84	33	-	-	0.6	104		5"	
TD-150S	2200	120	55	LS	239	209	181	154	120	62	-	0.95	140	13.2	6"	0.5
	2700	120	65	HS	333	315	286	271	257	178	77	1.2	140		6"	
TD-200S	2000	120	115	LS	409	367	333	306	271	183	46	1.2	140	19.2	8"	0.5
	2200	120	122	HS	530	503	472	443	415	349	204	1.2	140		8"	

Best Solution for Whole House Ventilation



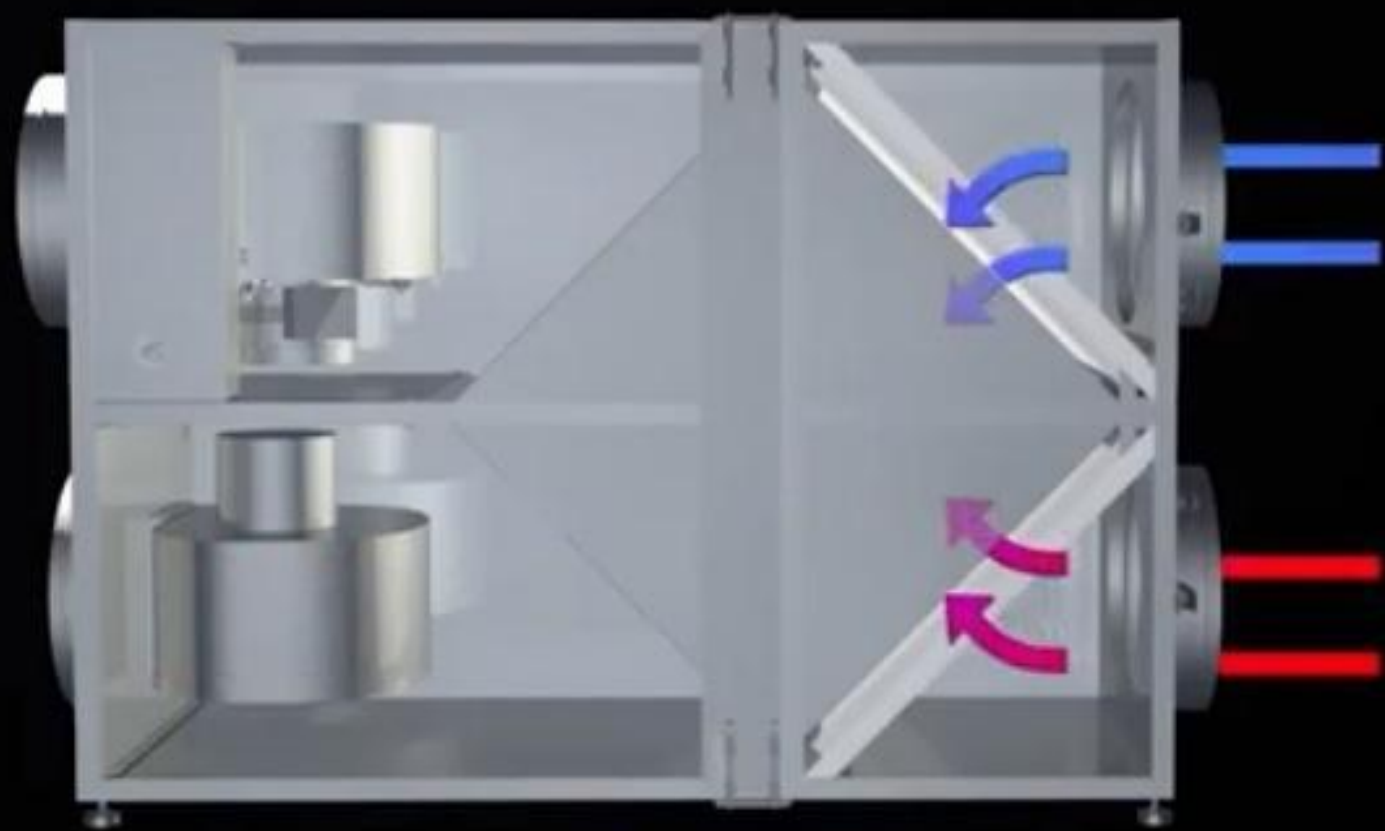
TR: Energy Recovery Ventilator OR
HR: Heat Recovery Ventilator

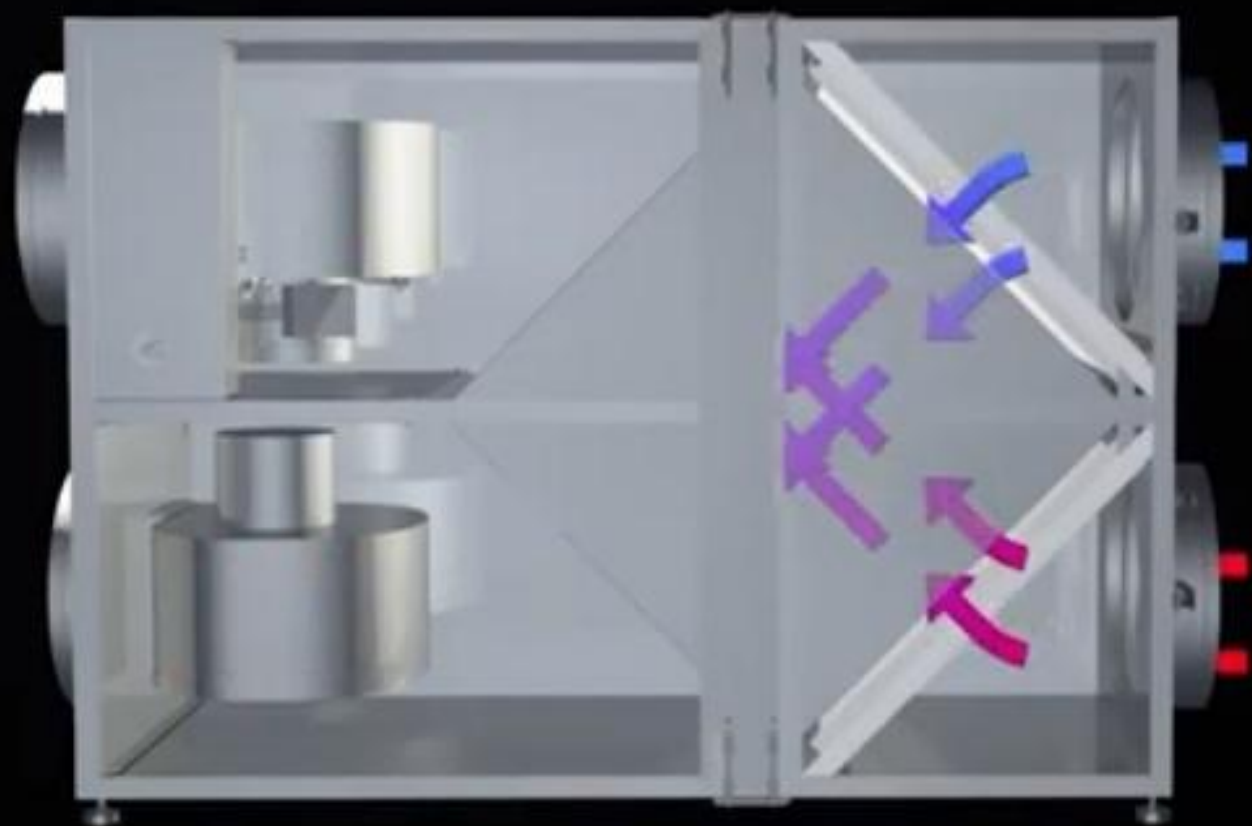


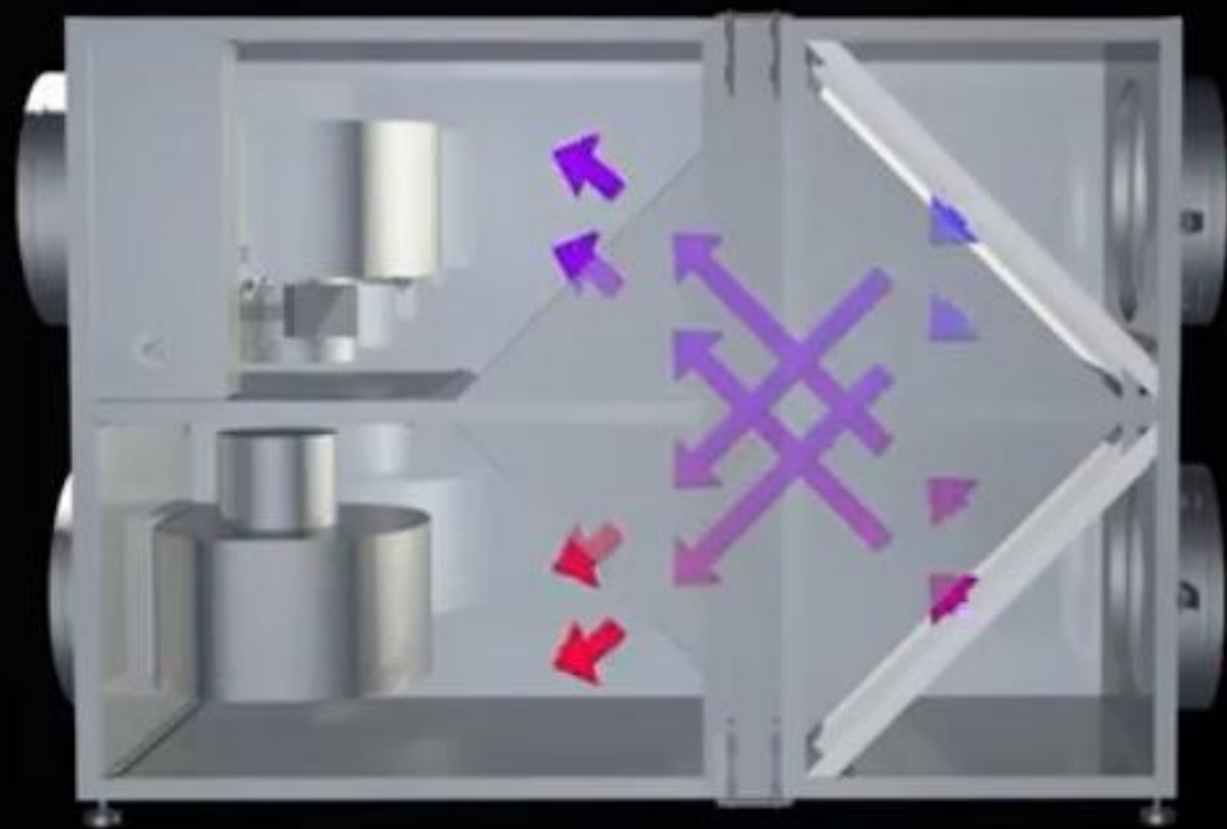
- Use ERV or HRV to bring in the outside air AND exhaust the air to meet the requirement
- With S&P TR or HR the exhaust and supply air do not mix in the core
- No need to worry about bathroom air cross contamination so it meets the code (see following sides for airflow animation)

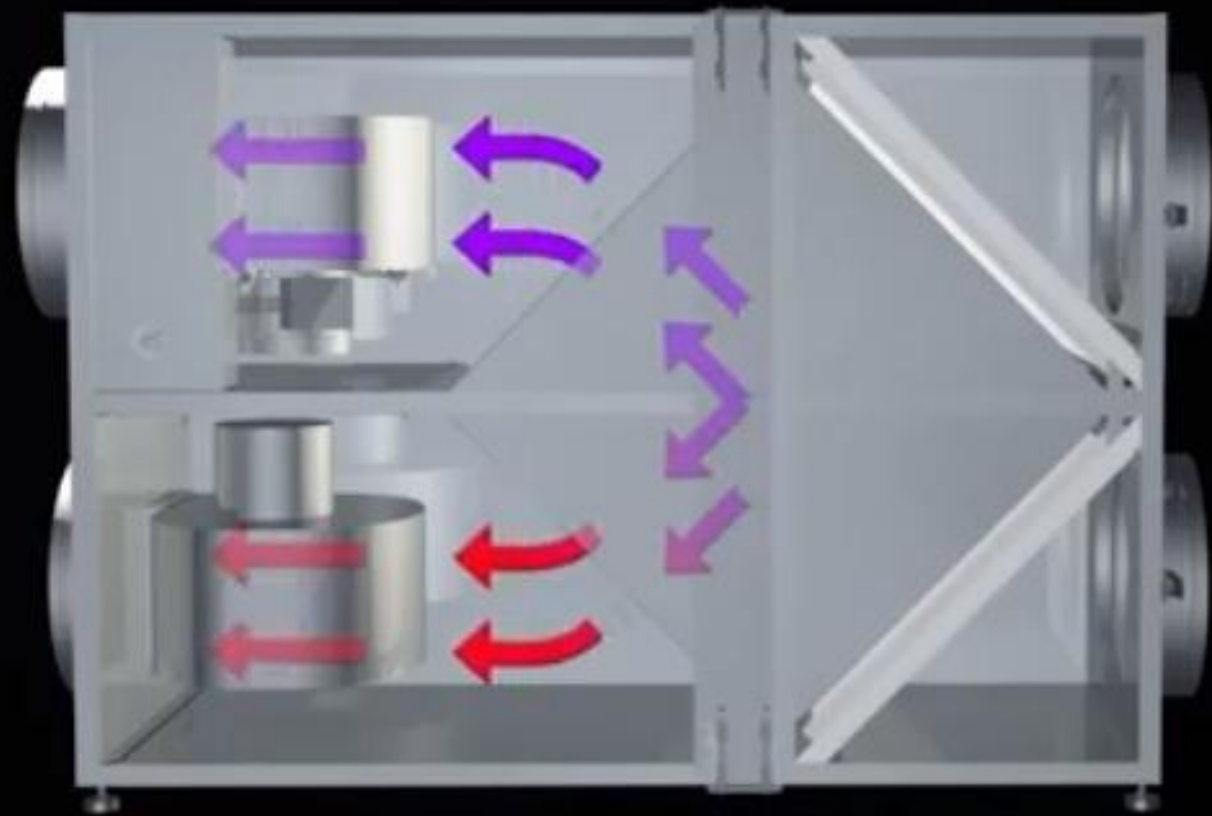
Model	ESP (Inches H ₂ O)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	Specifications
TR90/TR90G	Airflow (CFM)	113	98	85	73	58	40	-	-	-	-	Electrical: 120 V, 60 Hz, Single Phase, contains two 0.03hp, 0.16 FLA motors Dimensions: unit case=18"W x 23-1/8"H x 11-5/8"D carton=21-1/2"W x 28-1/2"L x 14-3/4"H Weight: unit=36 lbs, in carton=41 lbs
	Watts	41	43	41	44	40	37	-	-	-	-	
	Temp Eff %	61	64	67	69	72	76	-	-	-	-	
	Total Winter %	55	58	61	63	66	70	-	-	-	-	
	Total Summer %	42	46	49	53	57	61	-	-	-	-	
TR130	Airflow (CFM)	148	141	132	113	94	69	52	-	-	-	Electrical: 120 V, 60 Hz, Single Phase, 1.3 FLA, contains one 0.1 hp motor Dimensions: unit case=28-3/4"W x 20-1/8"H x 13"D, carton=21"W x 32"L x 17-1/2"H Weight: unit=58 lbs, in carton=65 lbs
	Watts	138	132	125	118	110	98	92	-	-	-	
	Temp Eff %	67	68	70	73	76	80	83	-	-	-	
	Total Winter %	57	59	60	64	67	72	75	-	-	-	
	Total Summer %	41	43	44	48	52	57	60	-	-	-	
TR200	Airflow (CFM)	207	192	186	176	168	149	122	-	-	-	Electrical: 120 V, 60 Hz, Single Phase, 1.5 FLA, contains one 0.1 hp motor Dimensions: unit case=28-3/4"W x 20-1/8"H x 23-7/8"D carton=21-1/2"W x 32"L x 29"H Weight: unit=80 lbs, in carton=88 lbs
	Watts	185	169	165	154	148	138	128	-	-	-	
	Temp Eff %	76	77	77	78	79	80	82	-	-	-	
	Total Winter %	67	68	68	69	70	72	74	-	-	-	
	Total Summer %	52	52	53	56	55	56	59	-	-	-	
TR300	Airflow (CFM)	-	-	-	310	300	289	268	249	199	155	Electrical: 120 V, 60 Hz, Single Phase, 3.3 FLA, contains one 0.2 hp motor Dimensions: unit case=28-3/4"W x 20-1/8"H x 23-7/8"D carton=21-1/2"W x 32"L x 29"H Weight: unit=72 lbs, in carton=85 lbs
	Watts	-	-	-	310	300	287	266	247	224	206	
	Temp Eff %	-	-	-	67	68	69	71	72	76	80	
	Total Winter %	-	-	-	56	57	58	61	62	67	70	
	Total Summer %	-	-	-	37	38	39	42	44	48	51	

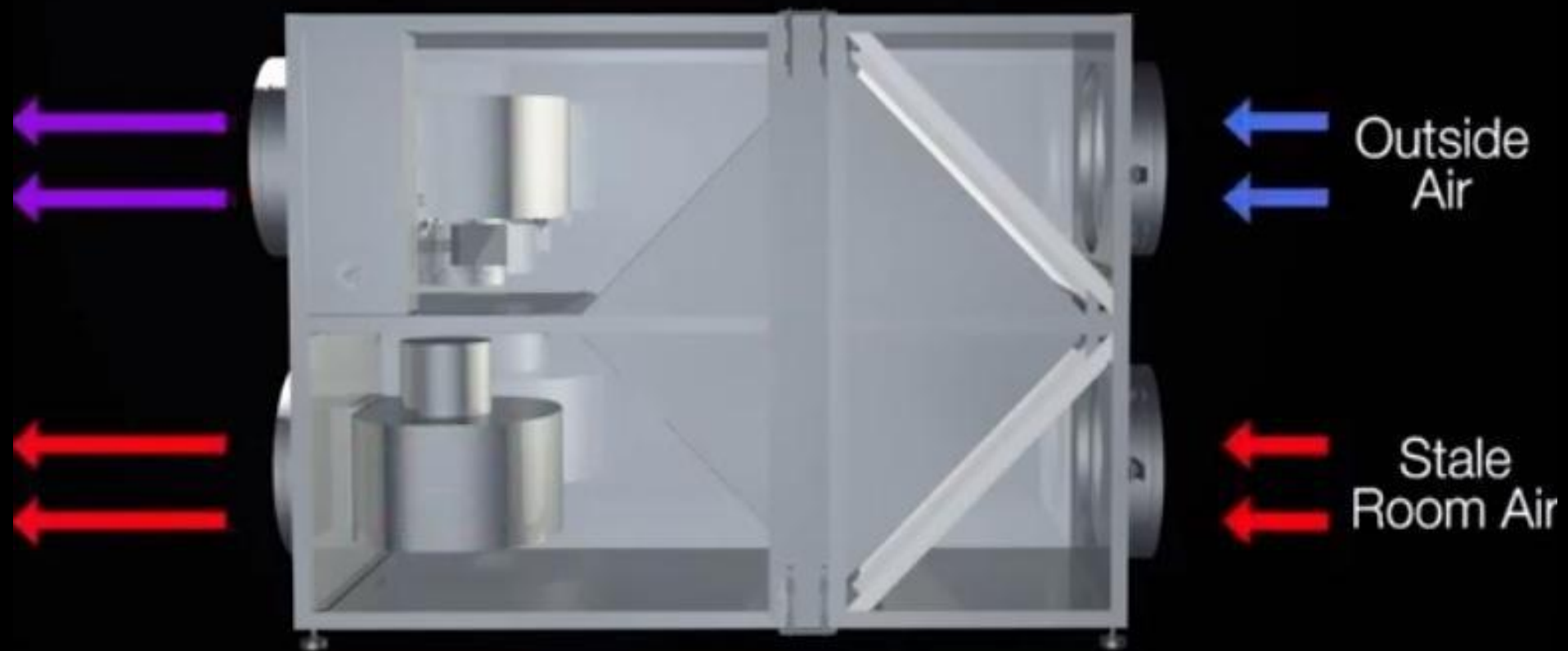
Model	Airflow Performance (CFM)	Collar System	Port Location	Variable Speed	Motor Warranty	Dimensions	Weight (approx.)
HR100V	30-100 CFM (14 L/s-47 L/s)	5"Oval Dia. (127 mm)	Top	Yes	5 years	18"x 20"x 14-1/2" (45.7 cm x 50.8 cm x 36.8 cm)	40 lbs. (18.6 Kg)
HR160H	30-160 CFM (14 L/s-76 L/s)	6"Round Dia. (152 mm)	Side	Yes	5 years	21-1/2"x 23-7/8"x 11-3/8" (54.6 cm x 60.6 cm 28.9 cm)	48.5 lbs. (22 Kg)
HR220H	50-220 CFM (24 L/s-104 L/s)	6"Round Dia. (152 mm)	Side	Yes	5 years	21-1/2"x 23-7/8"x 16-1/2" (54.6 cm x 60.6 cm x 41.9 cm)	58.5 lbs. (26.5 Kg)













Whole-house Ventilation Requirements **EXCEPTION**

- **Exception:** The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour segment and the ventilation rate prescribed in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).



EXCEPTION: Whole-house Ventilation Specifies:

1. Outdoor (makeup) air must be provided at a **continuous** rate (ref. Table 1507.3.3)
 1. **Exception: if you use controls that enable operation for at least 25% of each 4 hour segment you can operate intermittently.**
 2. Use Chart 1503.3.3 to determine intermittent factor
(Whole House Required CFM x Factor = Intermittent CFM):

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor	4	3	2	1.5	1.3	1.0

Exception Example: 2000 sq. ft. Home with 2 Baths

- Whole House Requirement = 60 CFM continuous
- Exception: Use a timer to run fan 25% of the four hour period
- The intermittent CFM requirement would be 240 CFM to operate at 25%



The Code Specifies:

1. Whole-house Ventilation AND Local Exhaust is required
2. Bathroom & toilet air must be exhausted directly to the outdoors and shall not be recirculated within residence

Local Exhaust Ventilation Requirements

1. Exhaust the minimum air flow rate based on **Table M1507.4**

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

S&P's Recommended Solutions for Local Exhaust

- **GOOD:** PC-Premium CHOICE Ventilation Fan (Ceiling Mounted Fan)
- **BETTER:** TD-MIXVENT (Mixed Flow Fan)
- **BEST:** TR or HR (ERV or HRV)



Section 2

IMC SECTIONS: THE CODE IN REGARDS TO VENTILATION



Sections Requiring Ventilation

- Ventilation System (403.1)
- Outdoor Air Required (403.2)
- Min Air Flow Rates (403.3)
- Exhaust Ventilation (403.4)
- Variable Air Volume system control (403.6)
- Balancing (403.7)



403.1 (Ventilation System) - The Code Specifies:

1. Supply and Return (Exhaust) Air is required
2. Supply Air must equal amount of Exhaust Air

403.2 (Outdoor Air Required) – The Code Specifies

1. Minimum airflow rate determined by Section 403.3
2. Must deliver required rate of outdoor airflow to the BREATHING ZONE within each OCCUPIABLE SPACE

403.4 (Exhaust Ventilation) – The Code Specifies

1. Exhaust airflow rate determined by Section 403.3
2. Exhaust makeup air can be combination of outdoor air, recirculated air and transfer (except as limited by Section 403.2)

All IRC 2012 Residential Solutions can be used as IMC 2012 Commercial Solutions!

Section 403.3 Minimum Air Flow Rates



**OCCUPIABLE
SPACE**

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE,	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE,	EXHAUST AIRFLOW RATE
	#/1000 FT ^{2a}	R, CFM/PERSON	R, CFM/FT ^{2a}	CFM/FT ^{2a}
Correctional facilities				
Cells				
without plumbing fixtures	25	5	0.12	—
with plumbing fixtures ^a	25	5	0.12	1
Dining halls (see food and beverage service)	—	—	—	—
Guard stations	15	5	0.06	—
Day room	30	5	0.06	—
Booking/waiting	50	7.5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.06	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	25	—	—
Storage, pick up	30	7.5	0.12	—
Education				
Auditoriums	150	5	0.06	—
Corridors (see public spaces)	—	—	—	—
Media center	25	10	0.12	—
Sports locker rooms ^a	—	—	—	0.5
Music/theater/dance	35	10	0.06	—
Smoking lounges ^a	70	60	—	—
Day care (through age 4)	25	10	0.18	—
Classrooms (ages 5-8)	25	10	0.12	—
Classrooms (age 9 plus)	35	10	0.12	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—
Art classroom ^a	20	10	0.18	0.7
Science laboratories ^a	25	10	0.18	1
Wood/metal shops ^a	20	10	0.18	0.5
Computer lab	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Locker/dressing rooms ^a	—	—	—	0.25
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Cafeteria, fast food	100	7.5	0.18	—
Dining rooms	70	7.5	0.18	—
Kitchens (cooking) ^a	—	—	—	0.7

**BREATHING
ZONES**

**Exhaust
Airflow Rate**

Section 404.6 Variable Air Volume System Control



The Code Specifies:

1. Controls required to regulate the flow of outdoor air
2. Control system must be designed to maintain the outdoor airflow rate required by Section 403.3

S&P Solutions for Controls

1. CVC – Continuous Ventilation Controls
 1. Designed exclusively for TD-100, TD-100x and TD-150 to allow the fans to run continuously at a low rate
2. Percentage Timers
 1. Multiple options based on fan chosen!



TR Specific



HR Specific



General Options

What we have learned

- Supply Air is just as important as Exhaust Air
- S&P offers a number of efficient and cost effective solutions to the IRC 2012 Chapter 15 Requirements
- All the products we discussed in the residential section translate into commercial.

S&P Exhaust & Supply Options

TD-MIXVENT and TD-SILENT



PC-Premium CHOICE Fans



TR & HR (ERVs & HRVs)





Training Complete

Thank you!

Any Questions?