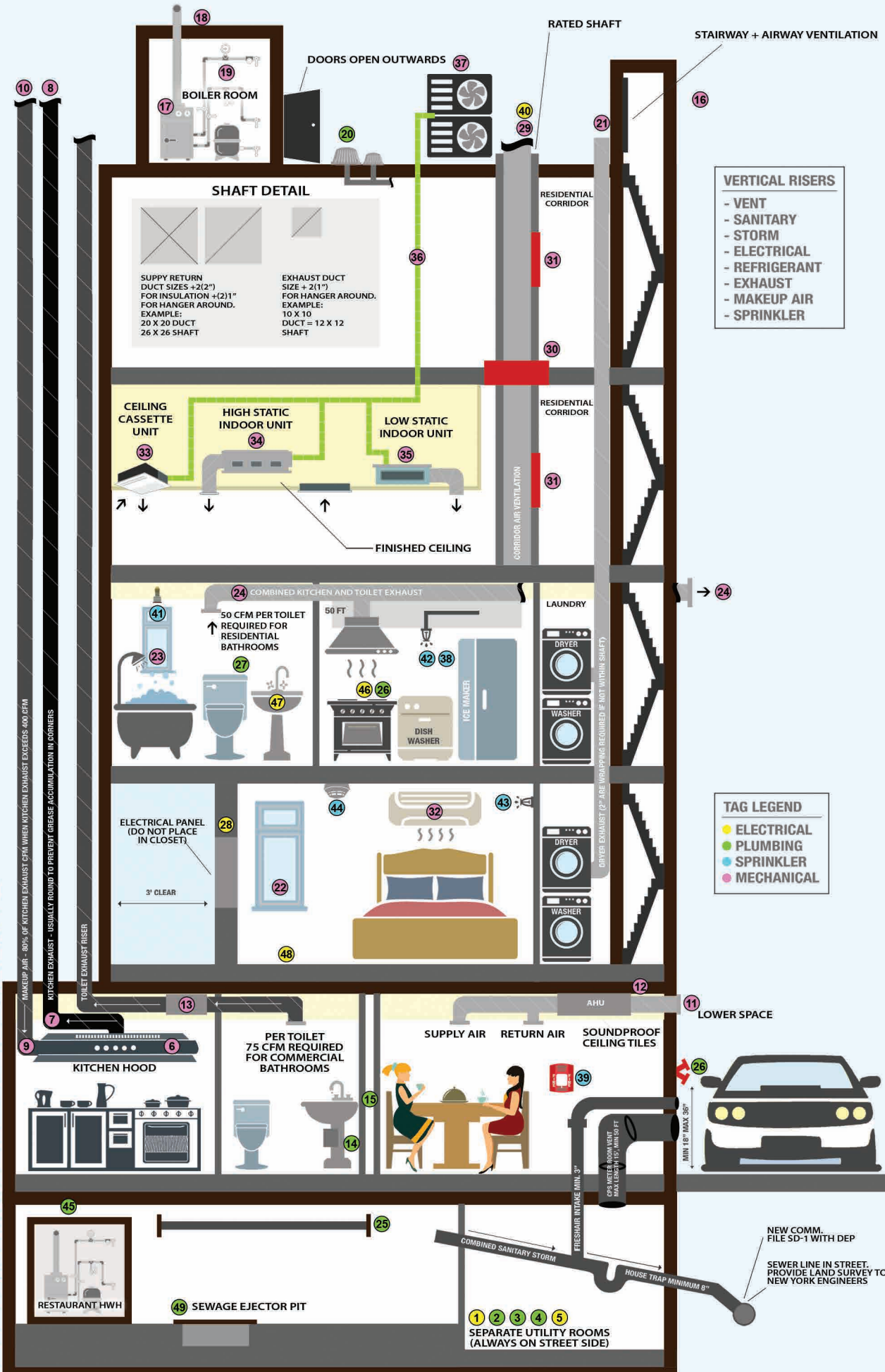


NEWYORK ENGINEERS QUICK REFERENCE SHEET

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TYPICAL MIXED USE BUILDING



- VERTICAL RISERS**
- VENT
 - SANITARY
 - STORM
 - ELECTRICAL
 - REFRIGERANT
 - EXHAUST
 - MAKEUP AIR
 - SPRINKLER

- TAG LEGEND**
- ELECTRICAL
 - PLUMBING
 - SPRINKLER
 - MECHANICAL

- ELECTRIC ROOM** – 2 HR RATED ROOM WITH EGRESS DOOR OPENING INTO THE PATH OF EGRESS, EXACT DIMENSIONS WILL VARY PER PROJECT BUT BUDGET MINIMUM 7' X 6' SPACE, WITH 8'6" HEAD ROOM. MUST BE LOCATED AT PROPERTY LINE AFFRONTING STREET. ALL PANELS TO HAVE 3' CLEARANCE IN FRONT.
- GAS METER ROOM** – INDIVIDUAL RATED ROOM REQUIRING EXPLOSION PROOF UNIT HEATER, AND MINIMUM 50 SQUARE INCHES (8 INCH DIAMETER), MAX 15' LENGTH DUCT TO OUTDOORS, MUST TERMINATE 24" ABOVE GRADE.
- HOUSE TRAP ROOM** - HOUSE TRAP MINIMUM 8", WITH MINIMUM 3" FRESH AIR INTAKE
- WATER METER ROOM** – REQUIRES A BACKFLOW PREVENTER FOR DEPARTMENT OF ENVIRONMENTAL PROTECTION, REQUIRES MINIMUM 36" CLEARANCE ON FRONT OF DEVICE.
- FIRE PUMP ROOM** – 2 HR RATING REQUIRED, FIRE PUMP REQUIRES MIN 36" CLEARANCE AND 12" MIN CONCRETE PAD. SPRINKLER BOOSTER PUMPS REQUIRE MIN 36" CLEARANCE IN FRONT.
- KITCHEN HOOD** – REQUIRED FOR ALL COOKING APPLIANCES THAT PRODUCE HEAT/GREASE.
- KITCHEN EXHAUST** – REQUIRED TO REMOVE THE ODOR OF COOKING FROM THE SPACE. DUCT IS USUALLY ROUND TO PREVENT GREASE ACCUMULATION, AND MUST BE FIRE WRAPPED IN ITS OWN SHAFT. MAXIMUM VELOCITY 1800 FPM.
- KITCHEN EXHAUST FAN** – CAN BE AT THE ROOF OR INLINE. MUST BE 10 FEET FROM PROPERTY LINE AND FROM INTAKES.
- MAKEUP AIR** – REQUIRED WHEN KITCHEN EXHAUST CFM IS MORE THAN 400 CFM, TO REPLACE MIN. 80% OF AIR EXHAUSTED FROM SPACE BY KITCHEN HOOD. THE OTHER 20% COMES FROM ADJACENT SPACES. MUST TURN ON WHEN KITCHEN HOOD IS TURNED ON.
- MAKEUP AIR OPTIONS** – A MAKEUP AIR UNIT CAN BE INSTALLED, WITH AN INTERNAL GAS UNIT TO TEMPER AIR. A MAKEUP AIR FAN WITH AN ELECTRIC DUCT HEATER CAN BE INSTALLED, BUT THE HIGH KW CAN RESULT IN HIGH OPERATING COST.
- OUTSIDE AIR INTAKE LOUVERS** – MUST BE MIN 10 FEET FROM LOT LINES OR BUILDINGS ON THE SAME LOT BUT WHERE OPENINGS FRONT ON A STREET OR PUBLIC WAY, THE DISTANCE SHALL BE MEASURED TO CENTERLINE OF STREET.
- AHU OPTION** - PACKAGED UNIT WITH ECONOMIZER (IF UNIT IS OVER 4.5 TONS) – CEILING MOUNTED AIR HANDLING UNIT WITH LOUVER BAND AT STOREFRONT, TYPICALLY REQUIRE MINIMUM 48"L X 48"W X 30"D IN CEILING WITH SOUNDPROOFING AND ACCESS PANEL FOR INSPECTION AND MAINTENANCE.
- IN LINE TOILET EXHAUST FAN** – LOCAL TOILET EXHAUST FAN ABOVE CEILING OF BATHROOM, TYPICAL DEPTH 15"
- INSTANTANEOUS HWH** – SMALL POINT OF USE HOT WATER HEATERS, USUALLY USED AT SINKS ONLY.
- PLUMBING WET WALLS** - REQUIRE MINIMUM 8" CLEARANCE FOR BATHROOM GROUPS
- STAIRWAY VENTILATION** – MIN 3 SQUARE FEET FREE AREA VENT REQUIRED, PROVIDED WITH SELF CLOSING MOTORIZED DAMPER. A SKYLIGHT OR WINDOW CAN ALSO BE PROVIDED IN LIEU OF A LOUVER OPENING.
- BOILER ROOM** – MUST BE 2 HR RATED, DOORS MUST BE SELF-CLOSING AND OPEN OUTWARD, HAVE EMERGENCY SHUTOFF SWITCH NEAR EXIT, BE PROVIDED WITH FLOOR DRAIN, COMBUSTION AIR (BY DUCT OR LOUVER), AND FLUE.
- BOILER FLUE** – MUST TERMINATE 10' AWAY FROM LOT LINE, 10' AWAY FROM INTAKE, AND MUST BE TYPICALLY 3' HIGHER THAN NEAREST CONSTRUCTION WITHIN 10'. FLUE LENGTH SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATIONS.
- COMBUSTION AIR** – REQUIRED FOR GAS COMBUSTION PROCESS OF BOILER. CAN BE PROVIDED WITH FAN, BY DUCT, OR LOUVER EQUIPPED WITH A MOTORIZED DAMPER.
- ROOF DETENTION/CONTROLLED FLOW** – REQUIRED TO PROVIDE CONTROLLED MEANS OF WATER DISPOSAL SO AS TO PREVENT FLOODING OF LOCAL SEWER SYSTEM. IF ROOF AREA IS INSUFFICIENT, A DETENTION TANK WILL BE REQUIRED. [HTTP://WWW.NY-ENGINEERS.COM/BLOG/STORMWATER-MANAGEMENT-OPTIONS](http://www.ny-engineers.com/blog/stormwater-management-options)
- DRYER EXHAUST** – REQUIRED FOR GAS AND ELECTRIC VENTED DRYERS. INSTALLATIONS EXHAUSTING MORE THAN 200 CFM SHALL BE PROVIDED WITH MAKEUP AIR. IF DRYER IS IN CLOSET, AN OPENING PER MANUFACTURER'S INSTRUCTIONS SHALL BE PROVIDED IN THE CLOSET ENCLOSURE OR MAKEUP AIR SHALL BE PROVIDED BY OTHER APPROVED MEANS. DRYER EXHAUST DUCT REQUIRES A DEDICATED 2 HR RATED SHAFT.
- OPERABLE WINDOW REQUIREMENT FOR RESIDENTIAL** – MINIMUM OPENABLE AREA TO THE OUTDOORS SHALL BE 4 PERCENT OF THE FLOOR AREA OF THE OCCUPIABLE SPACE BEING VENTILATED.
- WINDOW FOR RESIDENTIAL BATHROOMS** – MINIMUM OPENABLE AREA TO THE OUTDOORS SHALL BE 5 PERCENT OF THE FLOOR AREA OF THE SPACE BEING VENTILATED. WINDOW SHOULD BE MIN 3 SF WITH MIN 1.5 SF OPENABLE AREA.
- COMBINED KITCHEN AND TOILET EXHAUST** – APPLICABLE TO RESIDENTIAL ONLY, PER MC501, KITCHEN AND TOILET EXHAUST CAN BE COMBINED INTO ONE CONTINUOUSLY OPERATING FAN SERVING ONE UNIT ONLY, TERMINATING 2 FT FROM OPENINGS IN SAME UNIT, 3 FT FROM OPENINGS IN ADJACENT UNIT, 3 FT FROM ANY OTHER OCCUPANCY GROUP IN SAME UNIT, 10' FROM OUTDOOR AIR INTAKE, 10' ABOVE SIDEWALK.
- GAS PIPING AT CEILING** – 2 HR RATED ENCLOSURE REQUIRED.
- PLUMBING KITCHEN WET WALL REQUIRED** – 6" MIN.
- PLUMBING BATHROOM WET WALL REQUIRED** – 8" MIN
- ELECTRICAL PANEL WALL THICKNESS** – 6" WALL REQUIRED WITH 3' CLEARANCE (CANNOT BE PLACED IN A CLOSET)
- CORRIDOR VENTILATION** – REQUIRED PER CODE TO HAVE AN OUTLET ON EACH FLOOR FOR EACH CORRIDOR WITH CONTINUOUSLY OPERATING FAN.
- FD BETWEEN FLOORS** – REQUIRED TO MAINTAIN RATING BETWEEN FLOORS WHERE A SHAFT IS NOT PROVIDED (FSD MUST BE USED IF THE SYSTEM IS DESIGNED TO HAVE A RETURN)
- FD AT WALL** – REQUIRED TO MAINTAIN RATINGS WHEN PENETRATING A RATED WALL (FSD MUST BE USED IF THE SYSTEM IS DESIGNED TO HAVE A RETURN)
- WALL MOUNTED AHU** – TYPICAL DIMENSION 32"W X 12"H X 8"D, NO DUCTS REQUIRED, WITH 8" MIN CLEARANCE FROM BOTTOM OF CEILING FOR RETURN
- CEILING CASSETTE** – TYPICAL DIMENSION 23"W X 10"H X 23"H, NO DUCTS REQUIRED
- HIGH STATIC INDOOR** – REQUIRED FOR DUCTED MULTI-ROOM APPLICATION, TYPICAL DIMENSION 48"W X 15"H X 26"D
- LOW STATIC INDOOR** – REQUIRED FOR DUCTED SINGLE ROOM APPLICATION, WITH A SHORT DUCT RUN, TYPICAL DIMENSION 44"W X 8"H X 24"D
- REFRIGERANT PIPING** – TWO TO THREE PIPES REQUIRED AT A MINIMUM, REQUIRES 1-1/2" INSULATION PER PIPE, CONNECTS INDOOR UNIT TO OUTDOOR UNIT. WITH SPLIT SYSTEMS, EACH INDOOR UNIT HAS ONE OUTDOOR UNIT. WITH VRF, MANY INDOOR UNITS CAN BE CONNECTED TO ONE OUTDOOR UNIT. MUST BE ENCLOSED IN SHAFT.
- CONDENSER** – OUTDOOR UNIT REQUIRED FOR OPERATION OF INDOOR UNIT. TYPICAL DIMENSION FOR VRF IN RESIDENTIAL APPLICATION IS 37"W X 48"H X 13" D. FOR MULTIPLE CONDENSER INSTALLATION, CLEARANCES MUST BE MAINTAINED PER MANUFACTURER'S RECOMMENDATION
- SPRINKLERS** – FOR LIGHT HAZARD (EXAMPLE: RESIDENTIAL), 7'-6" FROM WALL, MIN 6' BETWEEN HEADS, MAX 15' BETWEEN HEADS, HEADS REQUIRED IN BATHROOMS OVER 50 SF, AND CLOSETS OVER 12 SF.
- FIRE ALARM DEVICES** - FACP LOCATED AT THE ENTRANCE OF THE BUILDING OR PROVIDE RAP WITH FACP AS BASEMENT.
- POST FIRE SMOKE PURGE** – REQUIRED IN HIGH RISE BUILDINGS, BUILDINGS WITH FLOOR AREA >50K SF, SPACES LOCATED >100F FROM OPERABLE OPENINGS, AND HIGH-PILED STOCK OR RACK STORAGE. [HTTP://WWW.NY-ENGINEERS.COM/BLOG/POST-FIRE-SMOKE-PURGE-SYSTEMS-WHEN-ARE-THEY-R-REQUIRED](http://www.ny-engineers.com/blog/post-fire-smoke-purge-systems-when-are-they-required)
- CONCEALED SPRINKLER HEAD** – FOR FINISHED CEILINGS.
- PENDANT SPRINKLER HEAD** – FOR EXPOSED CEILINGS.
- SIDEWALL SPRINKLER HEAD** – FOR AREAS THAT TRY TO REDUCE THE PIPING CROSSINGS IN EXPOSED CEILINGS.
- RESIDENTIAL SMOKE DETECTORS** – REQUIRED IN EACH BEDROOM
- RESTAURANT HWH** – CAN BE ELECTRICAL OR GAS. IF GAS, MUST HAVE COMBUSTION AIR AND FLUE. MUST BE SEPARATE FROM BASE BUILDING SYSTEMS AS RESTAURANTS TYPICALLY REQUIRE HIGHER WATER TEMPERATURES FOR CLEANING PURPOSES.
- KITCHEN RECEPTACLE LAYOUT** – EACH COUNTERTOP MORE THAN 12" WIDE REQUIRES A GFCI RECEPTACLE. RECEPTACLES SHALL BE NO MORE THAN 2' ON CENTER
- BATHROOM RECEPTACLE LAYOUT** – EACH BATHROOM SHALL HAVE ONE GFCI RECEPTACLE WITHIN 12" OF THE SINK.
- BEDROOM/LIVING SPACE RECEPTACLE LAYOUT** – NO SPACE ON THE WALLS SHALL BE MORE THAN 6' FROM A RECEPTACLE. PLACE RECEPTACLES NO MORE THAN 12 FT ON CENTER.
- SEWAGE EJECTOR PIT** – REQUIRED WHEN SEWER CONNECTION IS ABOVE CELLAR FLOOR LEVEL, SO CELLAR FLOOR DRAINS MUST BE PUMPED, SEWAGE EJECTOR PITS SHOULD BE 60" FROM EXTERIOR WALLS.

ALWAYS CONSIDER:
ACCESS PANELS – REQUIRED AT MECHANICAL UNITS FOR SERVICING AND CHANGING FILTERS AND INSPECTION, SIZE DESIGNATED BY MANUFACTURER. ALSO REQUIRED FOR DAMPERS, COILS, AND ANY PIECE OF MECHANICAL EQUIPMENT THAT NEEDS SERVICING.

FOR INFORMATIONAL PURPOSES ONLY, ALWAYS CONSULT AN ENGINEER FOR DESIGN ASSISTANCE

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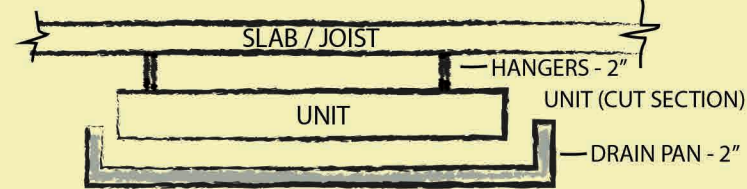
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MECHANICAL SYSTEMS GENERAL REFERENCE

WHAT'S THE DIFFERENCE BETWEEN A VRF & A SPLIT SYSTEM?

"VRF" STANDS FOR "VARIABLE REFRIGERANT FLOW" WHICH MEANS WE CAN CONNECT MULTIPLE INDOOR UNITS TO ONE OUTDOOR UNIT.

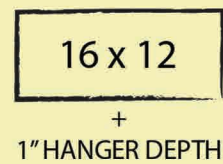
HOW MUCH CEILING SPACE DO I NEED FOR A CEILING MTD UNIT?



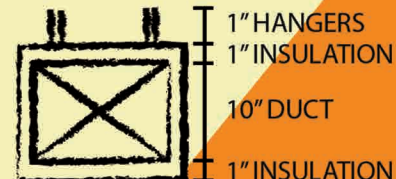
SECTION VIEW

YOUR DRAWING SAYS DUCT SIZES ARE 14"x10", FOR EXAMPLE, HOW MUCH CEILING SPACE DO I NEED?

14"x10" ARE THE INSIDE DIMENSIONS OF THE DUCT FOR FLOW - WE ALSO NEED TO TAKE INTO ACCOUNT HANGERS, DUCT THICKNESS, AND INSULATION. SO 14" x 10" BECOMES:



16 x 12
+
1" HANGER DEPTH



SECTION VIEW

MECHANICAL SYSTEMS TYPES

SMALL TO MEDIUM SIZE PROJECTS

WHAT ARE MY OPTIONS?



PTACS

- COST EFFECTIVE
- CAN USE ELECTRIC OR GAS, HEAT OR HEATING COIL (BOILER & PIPING REQUIRED)
- NOISY, FACADE PENETRATION REQUIRED
- TYPES OF PROJECTS: HOTELS, RENTALS
- TYPICAL SLEEVE DIMENSIONS:



WALL MOUNTED VRF

VRF

- HIGH EFFICIENCY
- ELECTRIC HEAT
- CAN CONNECT MULTIPLE INDOOR UNITS TO ONE OUTDOOR UNIT
- QUIET
- NO FACADE PENETRATIONS
- TYPES OF PROJECTS: CONDOS, SMALL RESTAURANTS, SMALL OFFICES, SMALL RETAIL
- LONG DISTANCE ALLOWED BETWEEN OUTDOOR UNIT & INDOOR UNIT



FLOOR MOUNTED VRF



CEILING MOUNTED VRF/
CASSETTE UNIT



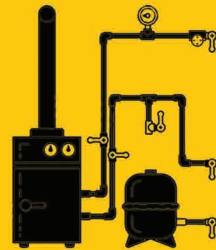
SPLIT SYSTEM

- ELECTRIC RESISTANCE HEATING
- ONE OUTDOOR UNIT TO ONE INDOOR UNIT
- TYPICALLY NOISIER THAN VRF
- LIMITED IN REFRIGERANT LINE LENGTH

LARGE PROJECTS

BOILER PLANT & COOLING TOWER

- USED IN TALLER BUILDINGS WHERE INDIVIDUAL SYSTEMS BECOME IMPRACTICAL DUE TO NUMBER OF PIPES THAT WOULD OTHERWISE BE REQUIRED, AND IN SITUATIONS WHERE LARGE TONNAGE IS REQUIRED.
- CAN PROVIDE ENERGY SAVINGS DURING WINTERS IF SYSTEM SERVES TWO THERMALLY DIFFERENT SPACES.
- TYPES OF PROJECTS: HOTELS, CONDOS, OFFICES



RTU & VAV

- USED MOSTLY IN COMMERCIAL APPLICATIONS
- VAV BOXES ALLOW INDIVIDUAL CONTROL OF SPACES
- DUCTS & SHAFT SPACE REQUIRED FOR SUPPLY AND RETURN.
- DUNNAGE REQUIRED FOR ROOF INSTALLATIONS
- TYPES OF PROJECTS: RESIDENTIAL CORRIDOR VENTILATION, OFFICES, COMMERCIAL.



SPECIAL CONSIDERATIONS

EMERGENCY GENERATORS

- REQUIRED IN OCCUPANCY GROUPS R1, B & E HAVING AN OCCUPIED FLOOR ABOVE 75FT OR HAVING AN AREA EXCEEDING 15,000 SF PER FLOOR OR 100,000 SF IN TOTAL. MUST HAVE ON SITE FUEL SUPPLY (DIESEL TANK) & ALL PIPING AND TANKS MUST BE ENCLOSED IN 3HR RATED SHAFT.
- REQUIRED IN OCCUPANCY GROUP R2 ABOVE 125FT IN HEIGHT. NATURAL GAS IS ACCEPTABLE BUT MUST HAVE DEDICATED GAS PIPING & METER.

WHAT MUST BE POWERED?

TYPICAL LOADS INCLUDE FIRE ALARM SYSTEM, FIRE PUMP, ELEVATORS, EMERGENCY LIGHTING & ARCS SYSTEM.

ARCS: AUXILIARY RADIO COMMUNICATION SYSTEM

- REQUIRED IN HIGH RISE BUILDINGS IN ALL OCCUPANCY GROUPS
- WHAT IS IT? AN INSTALLED SYSTEM THAT ACTS LIKE AN ANTENNA TO ALLOW FIRE DEPARTMENT COMMUNICATION

POST FIRE SMOKE PURGE SYSTEMS

- AFTER A FIRE SITUATION, A BUILDING IS FILLED WITH SMOKE. A POST FIRE SMOKE PURGE SYSTEM ALLOWS THE FIRE DEPARTMENT OF NEW YORK TO MANUALLY CONTROL A SMOKE PURGE FAN TO EXHAUST THE STAGNANT SMOKE.
- WHERE REQUIRED: HIGH RISE BUILDINGS, BUILDINGS WITH ANY FLOOR AREA EXCEEDING 50,000 SF, BUILDING WITH SPACES LOCATED ATLEAST 100FT FROM NATURAL VENTILATION OPENINGS, OR LOCATIONS WITH HIGH PILED STOCK.

- HOW ACCOMPLISHED? WITH A DEDICATED FAN, OR A REVERSIBLE MECHANICAL UNIT. MUST EXHAUST 6 AIR CHANGES PER HOUR OR 1 CFM/SF OF LARGEST FLOOR AND HAVE AN EXHAUST OUTLET ON EACH FLOOR WITH FIRE SMOKE DAMPERS CONNECTED TO FACP.

DETENTION TANKS: STORM WATER MANAGEMENT

- USUALLY REQUIRED IN BUILDINGS WHERE IMPERMEABLE AREA IS OVER 10,000 SF.
- MUST BE FILED AND APPROVED WITH DEPARTMENT & COORDINATED WITH STRUCTURAL ENGINEER.

MANUAL AND AUTOMATIC STANDPIPES:

- WHAT'S THE DIFFERENCE? MANUAL WET STANDPIPE SYSTEMS ARE TYPICALLY DRY UNTIL THE FIRE DEPARTMENT PROVIDES PUMPED WATER SUPPLY, WHERE AN AUTOMATIC SYSTEM MEETS WATER DEMAND ON ITS OWN.
- FOR STANDPIPE REQUIREMENTS, PLEASE VISIT OUR BLOG.

UTILITIES

BACK FLOW PREVENTER

- REQUIRED BY DEP TO PREVENT CONTAMINATION OF PUBLIC WATER SUPPLY
- FILING FEE IS \$350
- LEAD TIME FOR APPROVAL IS 1-2 MONTHS

HYDRANT FLOW TEST

- REQUIRED FOR ALL SPRINKLER APPROVALS, NEED BANK CERTIFIED CHECK FOR \$500 MADE OUT TO "NYC WATER BOARD"

SITE CONNECTION

- REQUIRED FOR NEW SEWER CONNECTIONS AND FILING OF STORM WATER MANAGEMENT SYSTEMS.
- LEAD TIME FOR APPROVAL IS 4-6 MONTHS AND SHOULD BE FILED AS EARLY AS POSSIBLE.
- FILING FEE IS \$325

RESTAURANT KITCHENS

ANSUL SYSTEM

- REQUIRED ABOVE TYPE 1 HOOD
- UTILIZES DRY HEMICALS FOR FIRE EXTINGUISHING
- COMPONENTS: ELECTRICAL POWER FOR SHUTDOWN SWITCH FOR HOOD EQUIPMENT, GAS SHUTOFF VALVE, DRY CHEMICAL STORAGE TANK FILLED BY ANSUL CONTRACTOR

PRECIPITATOR

- USED IN RESTAURANTS TO CLEAN GREASE AND ODORS FROM EXHAUST AIR
- PREVENTS ODOR FROM BEING NUISANCE IN SURROUNDING AREA
- REDUCES MAINTENANCE OF EXHAUST FANS.

MAKEUP AIR

- WHEN TOO MUCH AIR IS EXHAUSTED FROM A KITCHEN HOOD, IT CREATES A NEGATIVELY PRESSURED SPACE. VISIBLE EFFECTS OF THIS IS WHEN DOORS ARE HARD TO OPEN OR CLOSE.
- WHEN KITCHEN EXHAUST EXCEEDS 400CFM, 80% OF THE AIR MUST BE "MADE UP" WITH A MAKEUP AIR UNIT, WHICH MUST BE OPERATIONAL WHEN THE HOOD IS OPERATIONAL.

GREASE INTERCEPTOR

- ALL COMMERCIAL KITCHENS MUST MEET DEP REGULATIONS BY PROVIDING A GREASE INTERCEPTOR, WHICH FILTERS GREASE FROM SINK AND FLOOR DRAIN DISCHARGES.
- COMMERCIAL DISHWASHERS OPERATING IN EXCESS OF 180F SHALL NOT DISCHARGE TO GREASE INTERCEPTOR.