SECTION 7

AIR CONDITIONING (COOLING)

UNIT 38

INSTALLATION

UNIT OBJECTIVES

After studying this unit, the reader should be able to

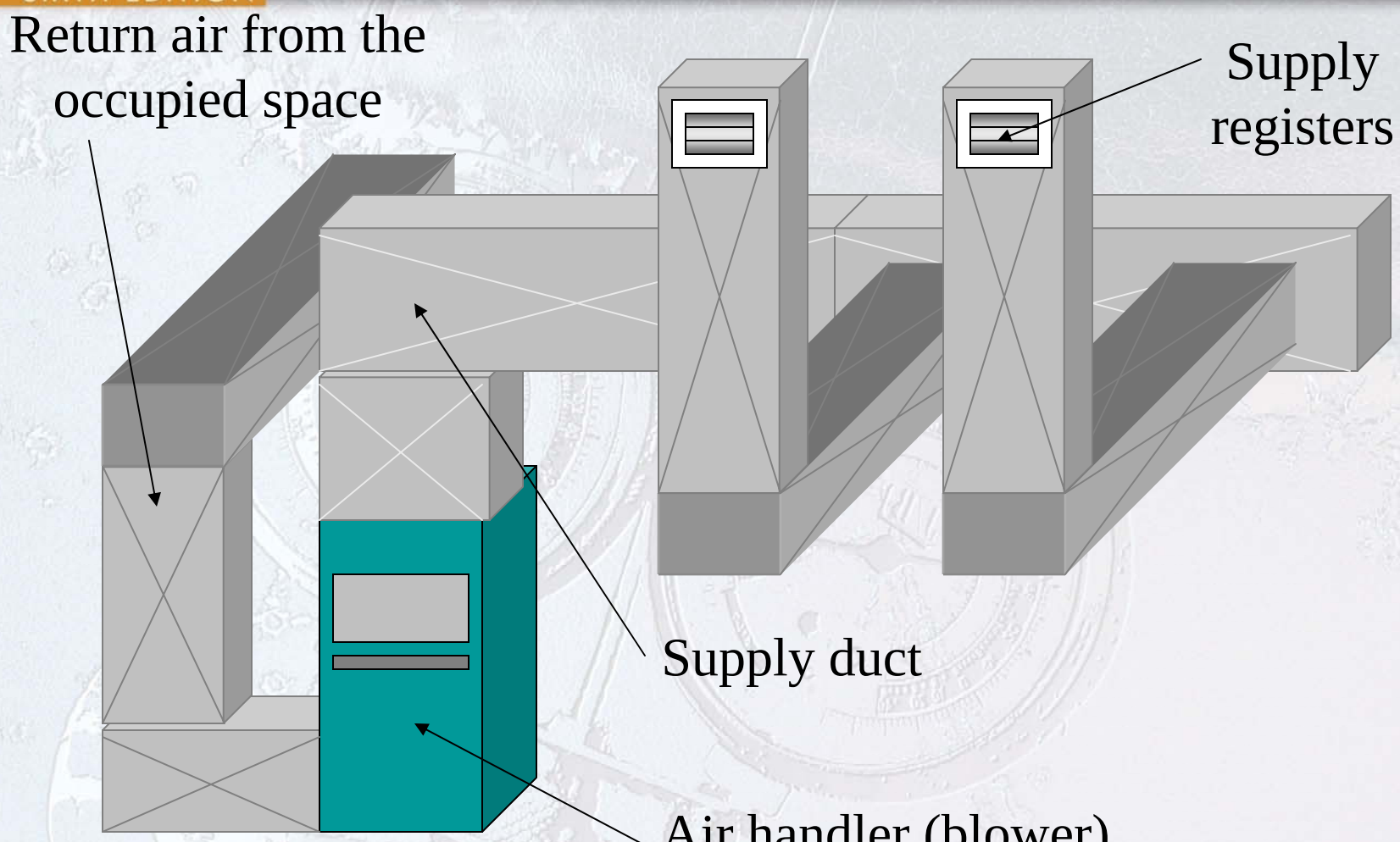
- List three crafts involved in air-conditioning installation.
- Identify types of duct system installations.
- Describe the installation of metal duct.
- Describe the installation of duct board systems.
- Describe the installation of flexible duct.
- Recognize good installation practices for package air conditioning equipment.
- Discuss different connections for package air conditioning equipment.
- Describe the split air-conditioning system installation.
- Recognize correct refrigeration piping practices.
- State start-up procedures for air-conditioning equipment.

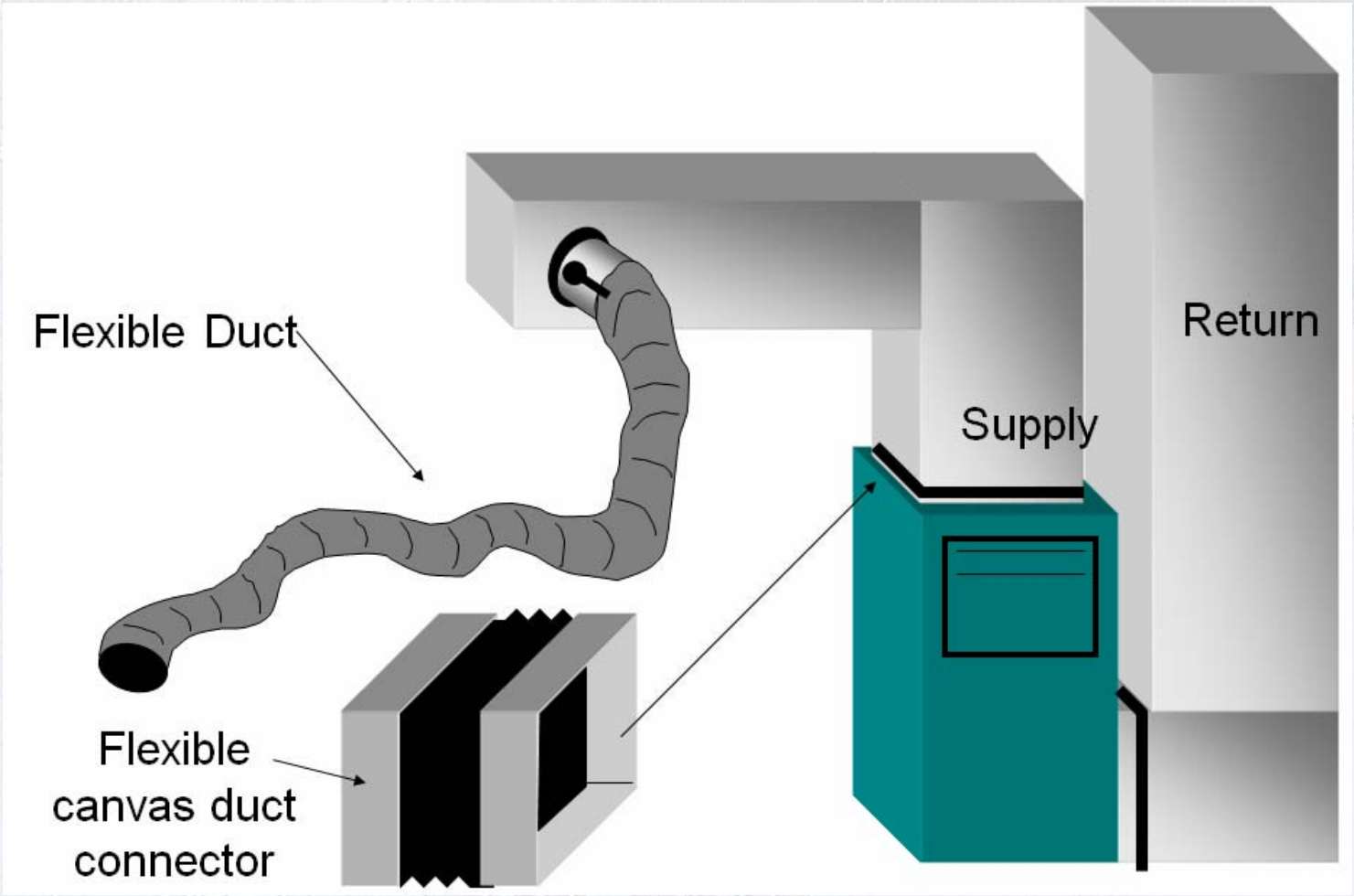
INTRODUCTION TO EQUIPMENT INSTALLATION

- Installations require ductwork, electrical, and mechanical work
- Some contractors use separate crews
- The three disciplines are licensed at state and/or local levels

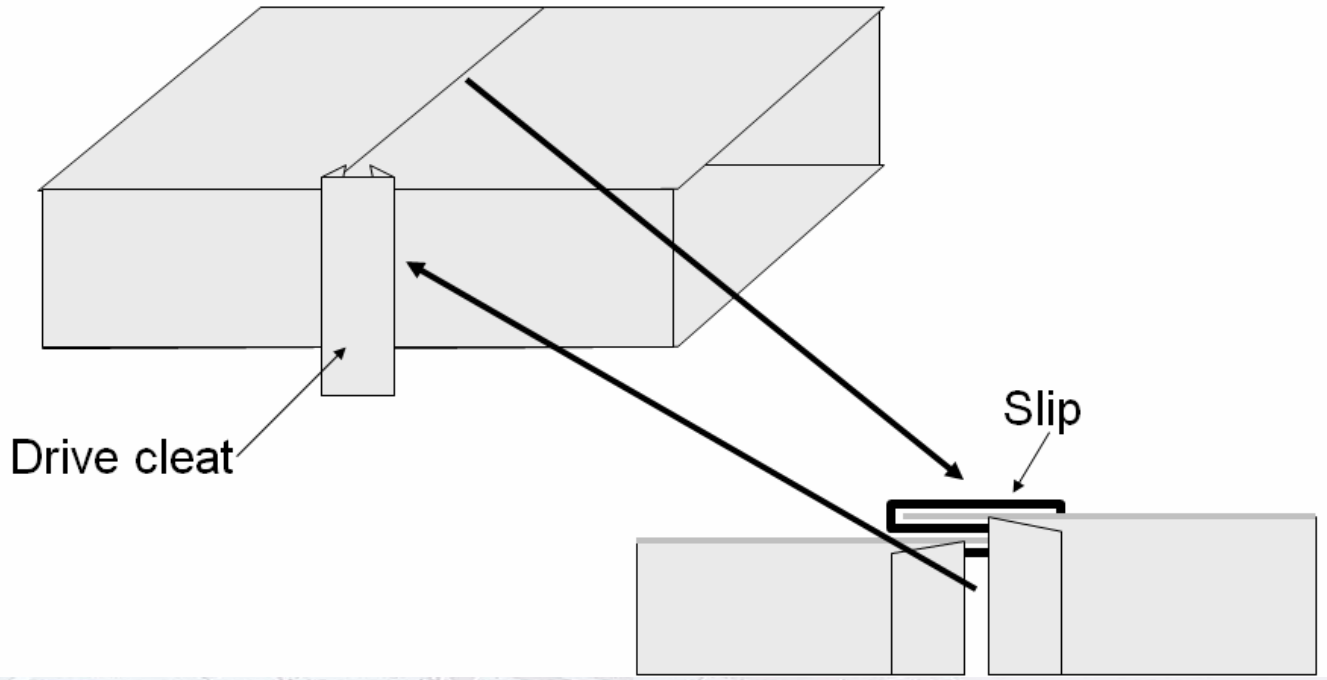
SQUARE AND RECTANGULAR DUCT

- Duct sections are assembled in the field
- All duct sections must be measured accurately
- Sections connected with “S” fasteners and drive cleats
- Duct systems must be fastened securely
- Flexible duct connections reduce vibration noise





JOINING SECTIONS OF GALVANIZED DUCT WITH SLIPS AND DRIVES



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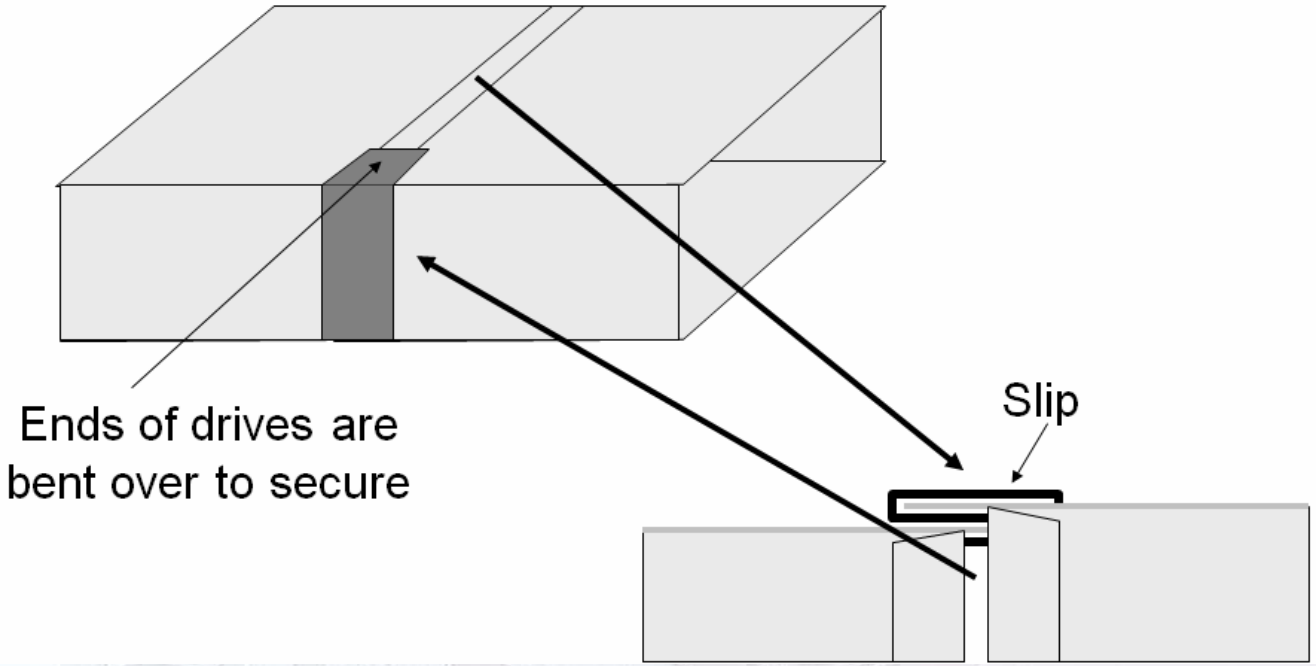
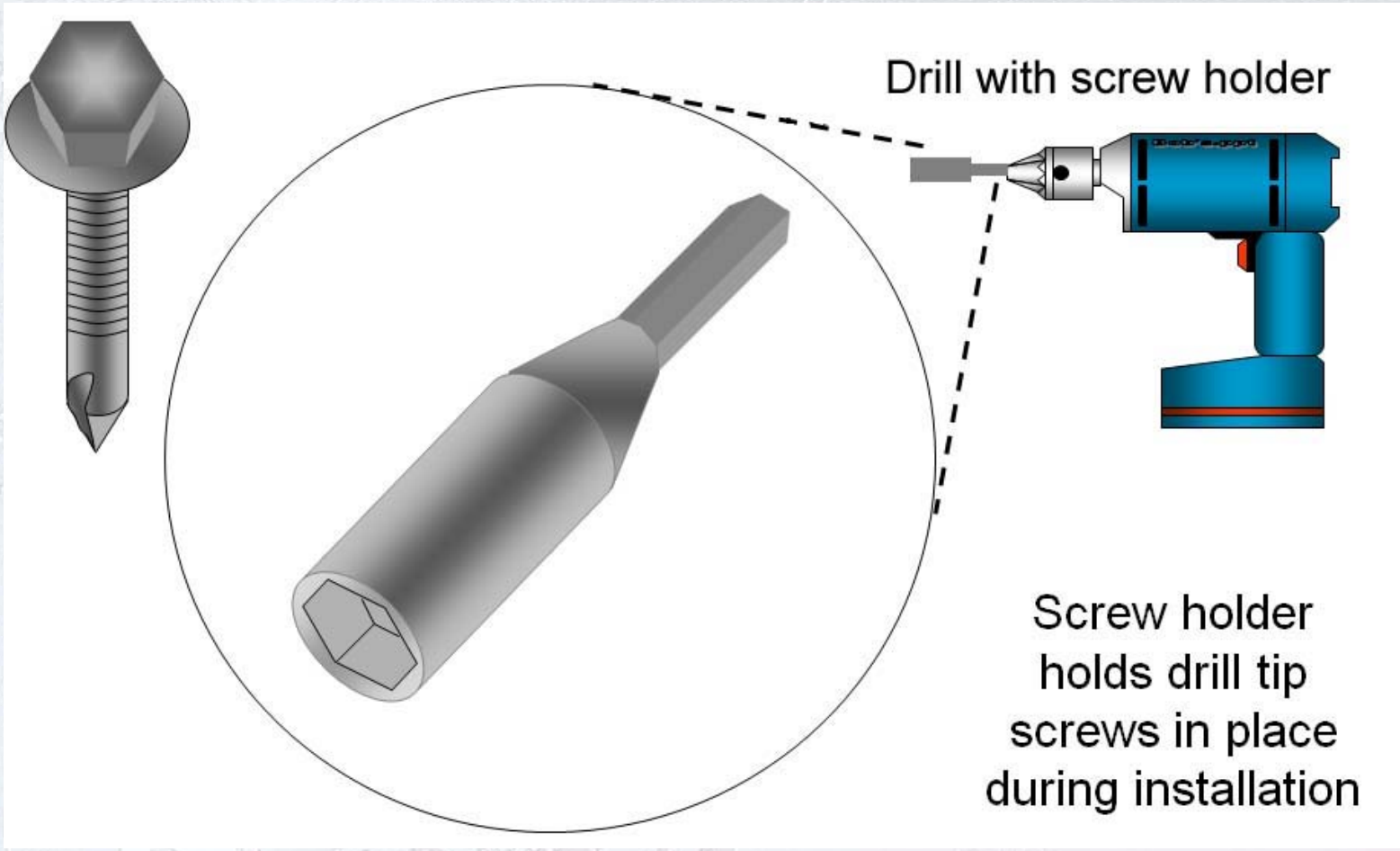


ROUND METAL DUCT SYSTEMS

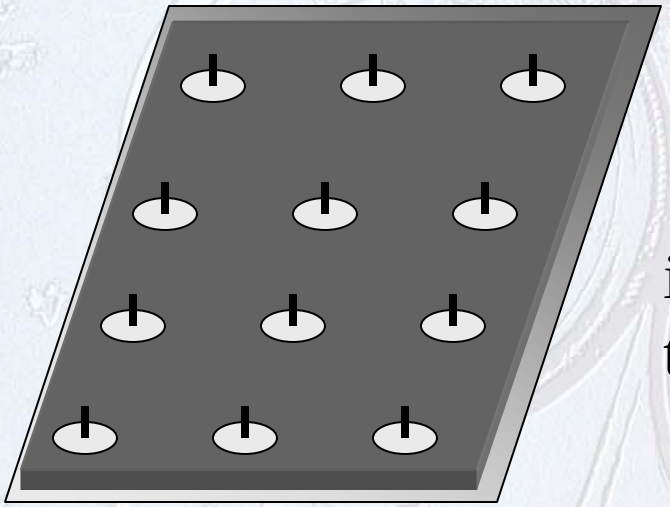
- Duct sections are available from supply houses
- Sections are connected with self-tapping sheet metal screws
- Occupy more clearance space than square or rectangular duct



INSULATION FOR METAL DUCT

- Can be applied to the inside or outside of the duct
- Interior duct insulation
  - Usually applied during fabrication in the shop
  - Secured with tabs and washers or glue
  - Must be secured to prevent blocking airflow
  - Usually coated fiberglass

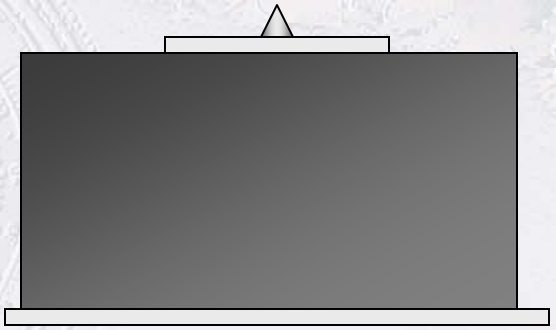
Tabs are glued to the metal sheet

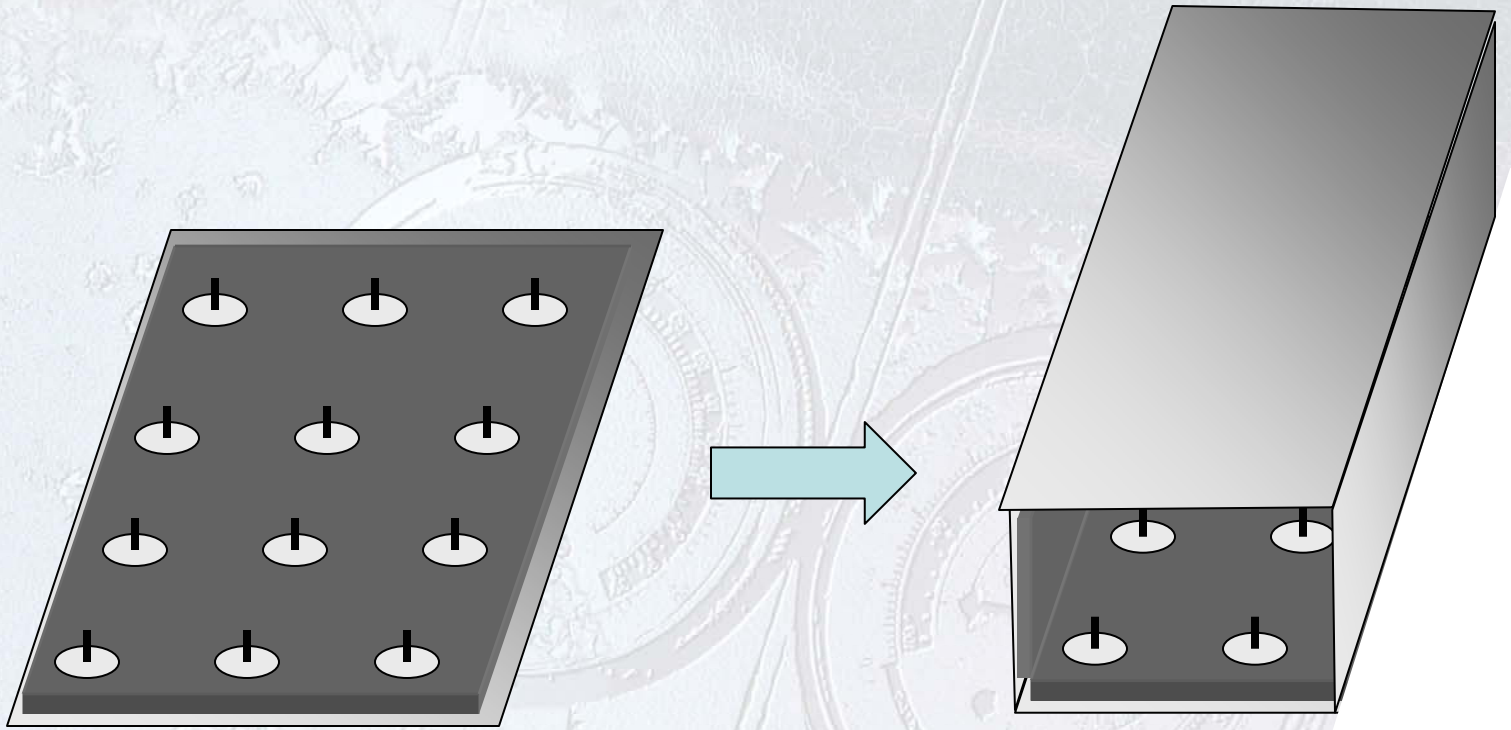


Piece of sheet metal used to make a duct section

Inulation liner is glued in place on the duct and pierced by the tabs

Washers are installed to hold the insulation in place





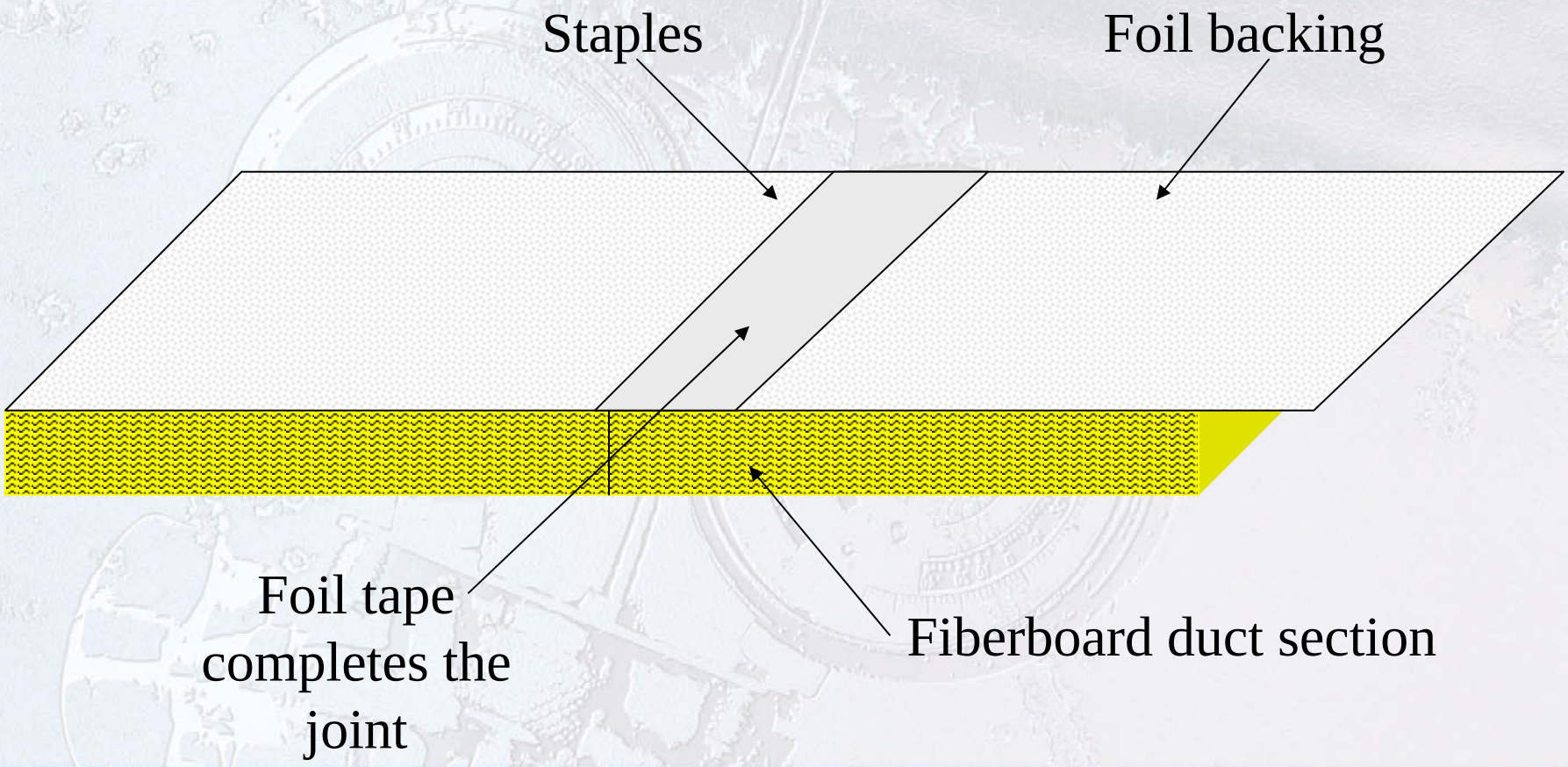
The section is folded as needed…

And assembled

DUCTBOARD SYSTEMS

- Can be fabricated easily using special knives
- Insulation is already attached
- Sections are secured by taping and stapling
- Must be properly supported
- Does not transmit noise
- Best used in low traffic areas, as they are not as durable as galvanized metal duct systems

JOINING SECTIONS OF FIBERBOARD SECTIONS

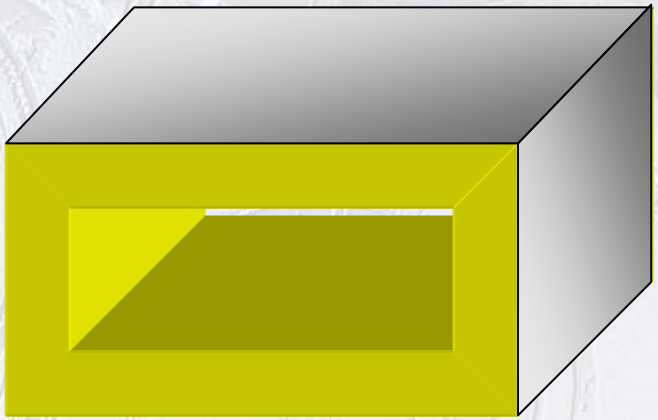


SECTION OF FIBERBOARD DUCT MATERIAL

Notches are cut in the board to facilitate the folding of the board into a duct section

SECTION OF FIBERBOARD DUCT MATERIAL

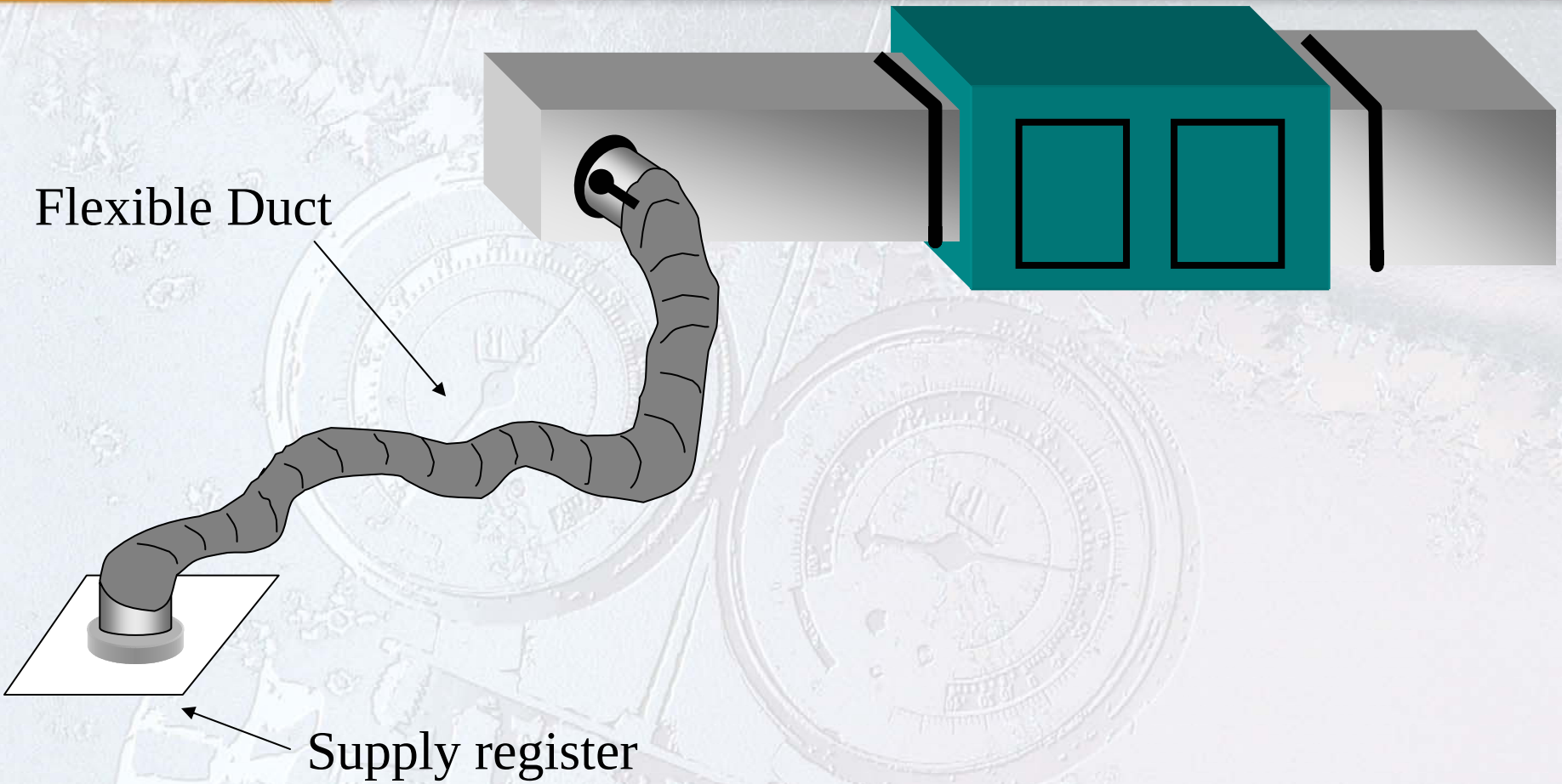
The fiberboard section is then bent to form the duct



Notches are cut in the board to facilitate the folding of the board into a duct section

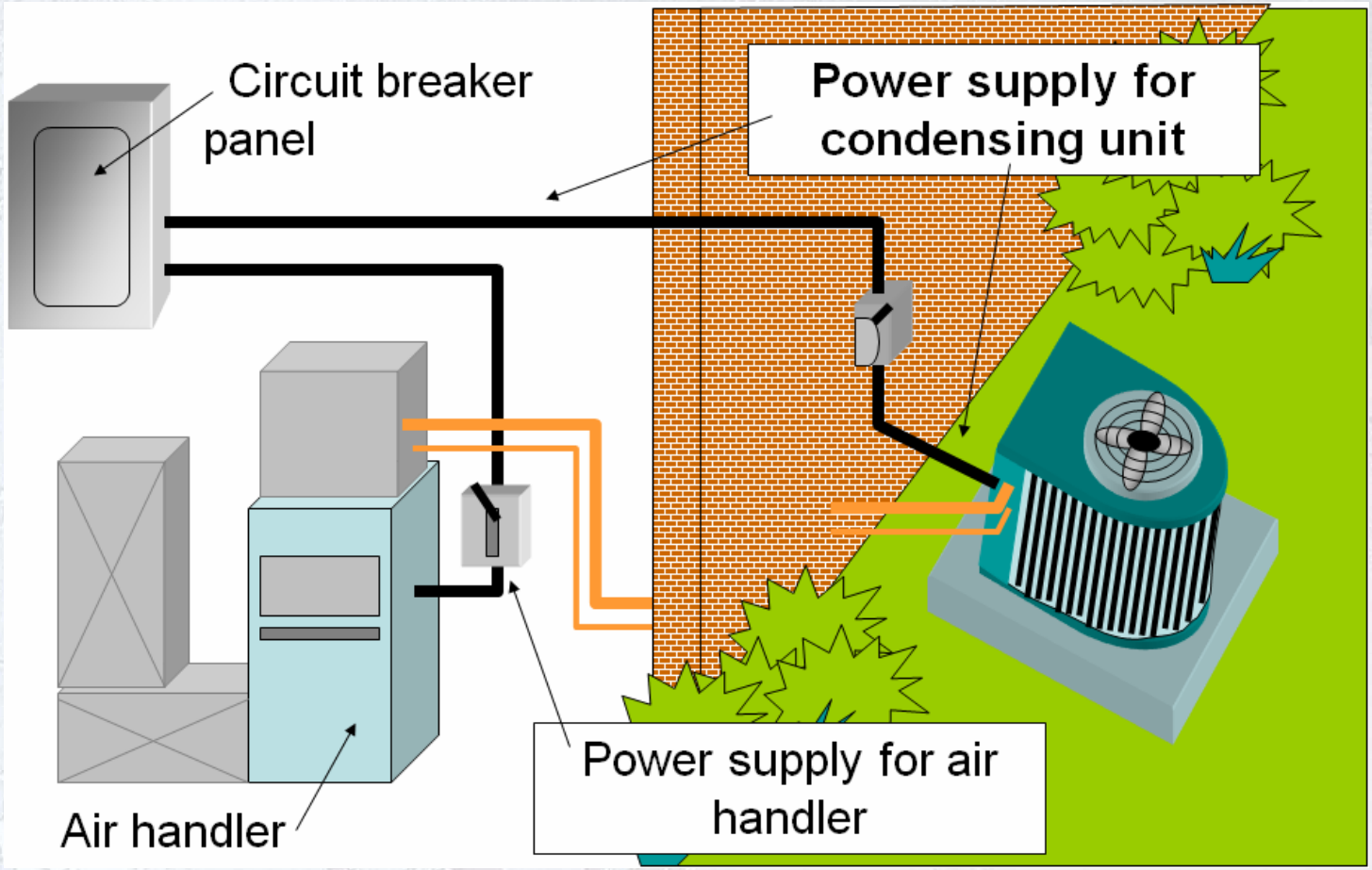
FLEXIBLE DUCT

- Has a flexible liner and may be insulated
- Low initial cost (Materials and labor)
- Used as supply or return duct
- Must be properly supported to prevent collapsing
- Should be stretched to prevent duct from collapsing
- Does not transmit noise well

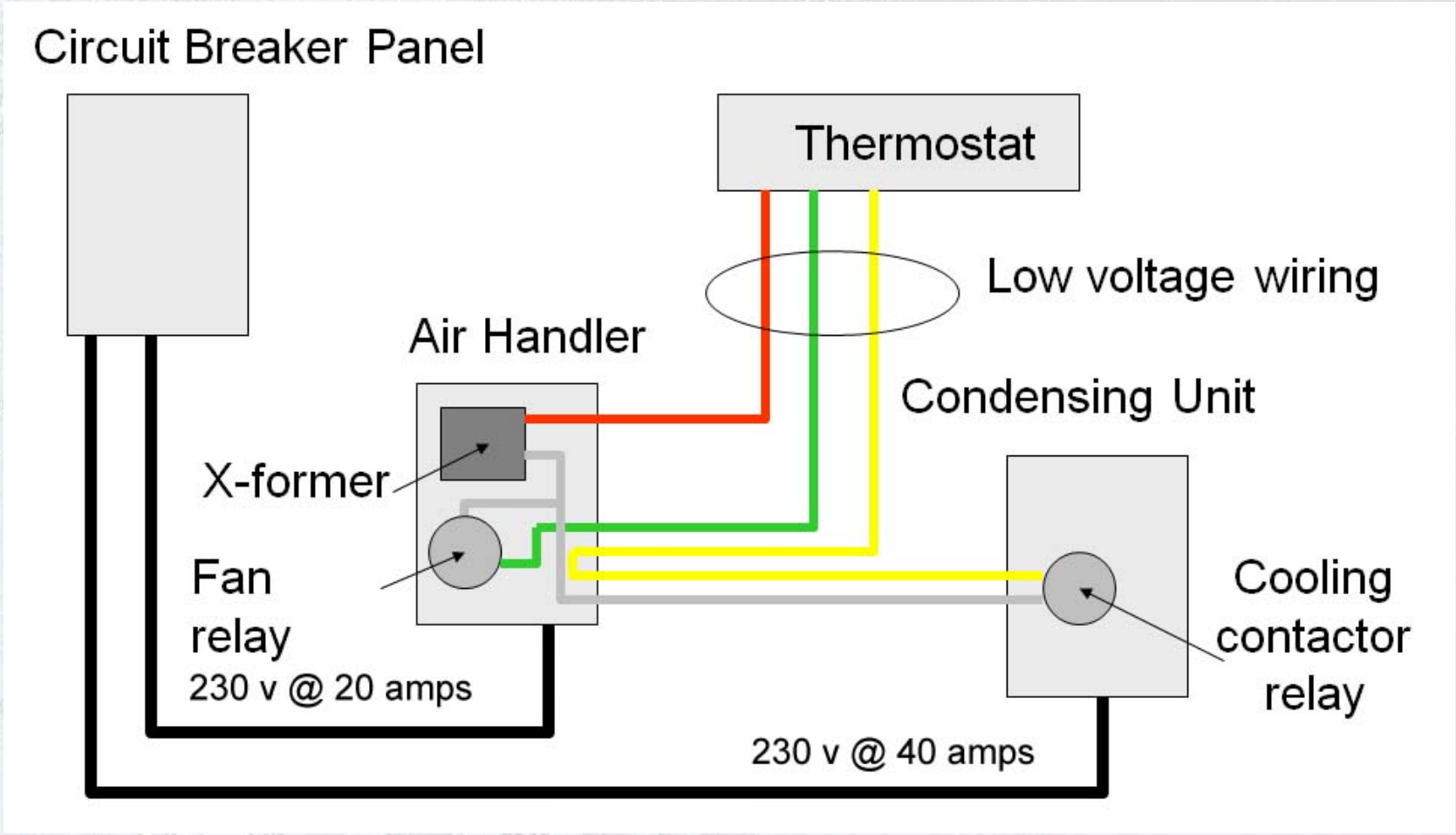


ELECTRICAL INSTALLATION

- Care should be taken whenever working on or around electrical circuits
- Power supply must provide correct voltage and wire size
- Split systems require two power supplies
- There should be a service disconnect close to each piece of equipment
- Control voltage is obtained through a step-down transformer



Wire used for running low voltage control wiring is color-coded, usually in the range of 18 gage and comes supplied in a vinyl casing

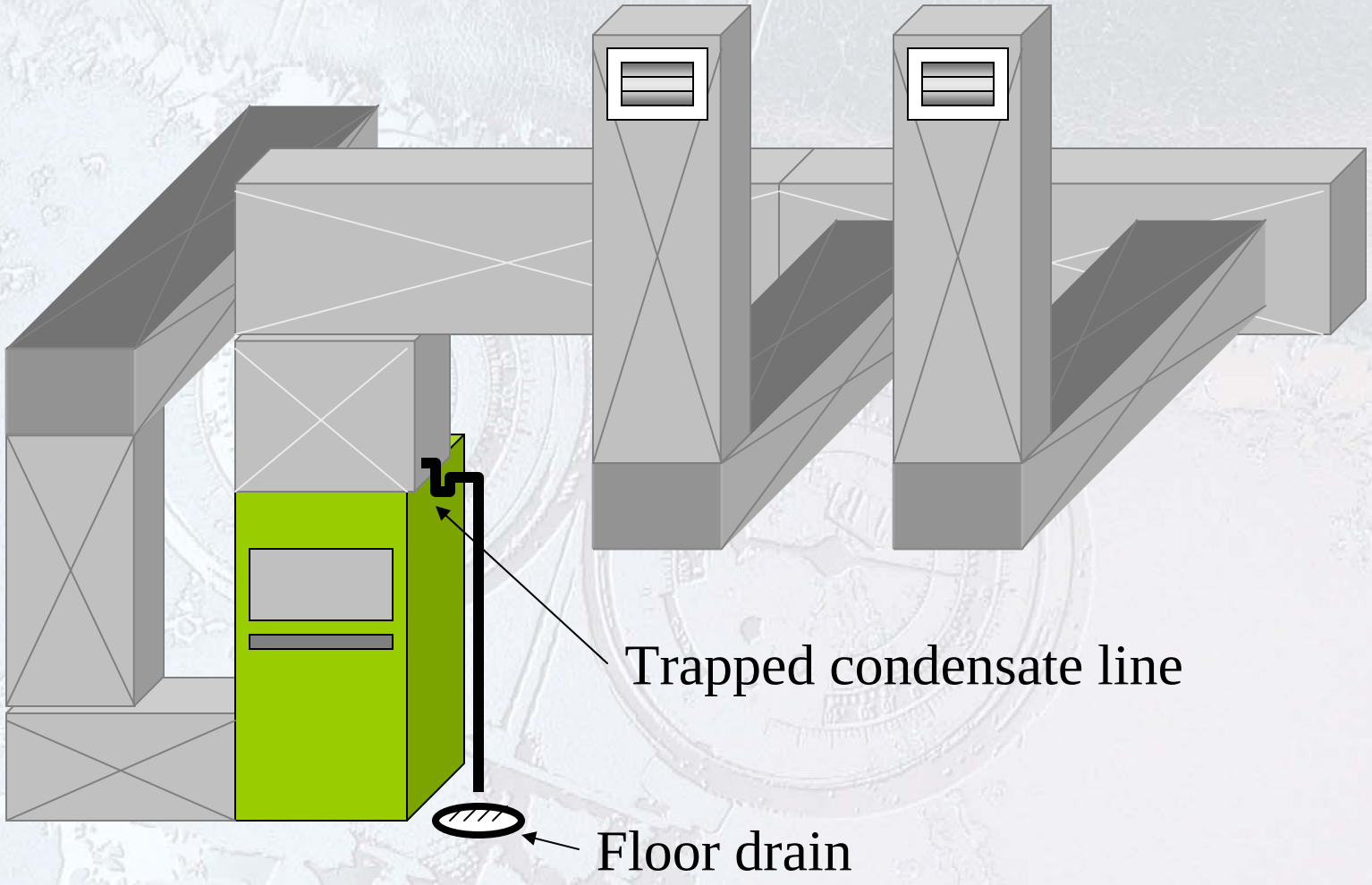


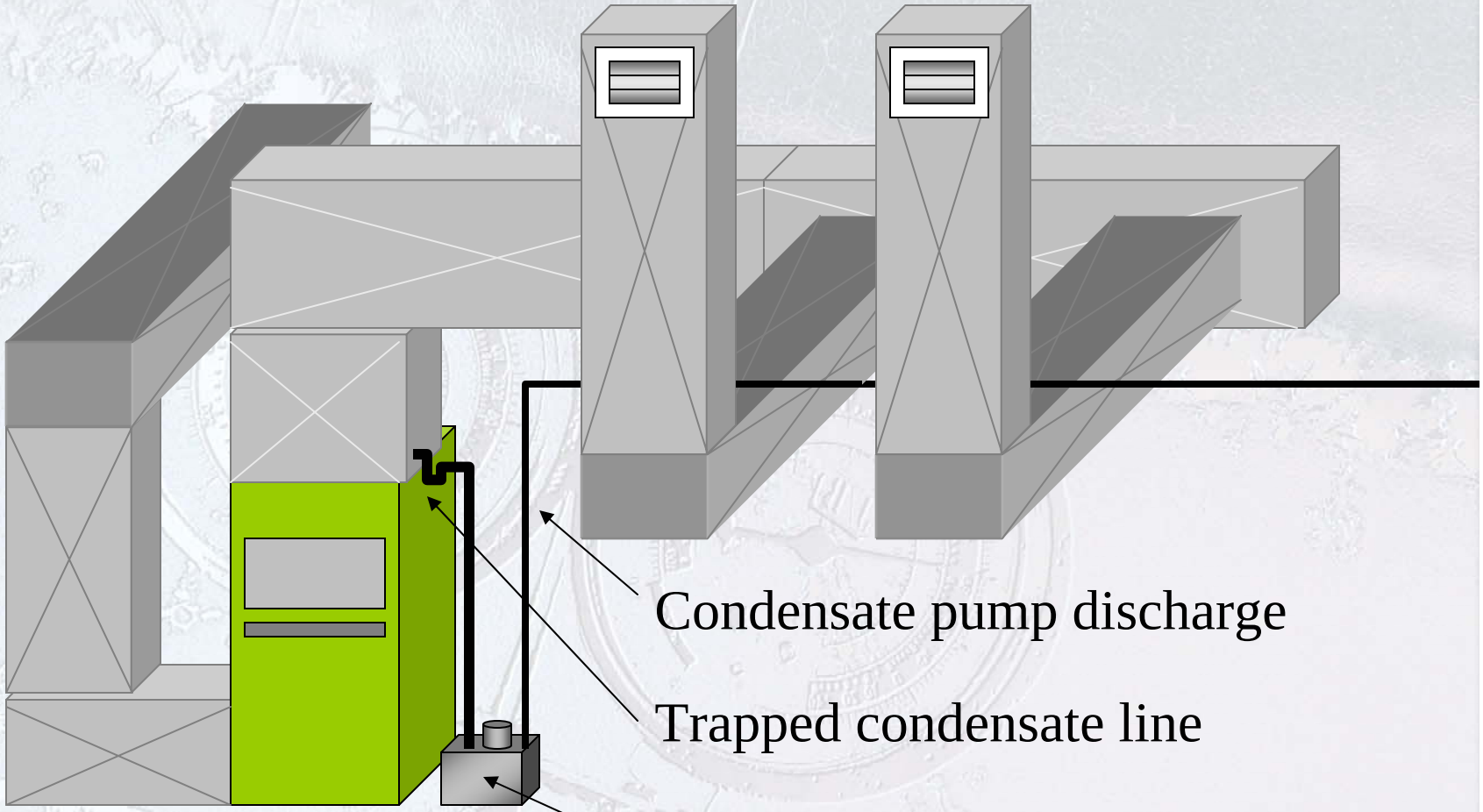
INSTALLING THE PACKAGE SYSTEM

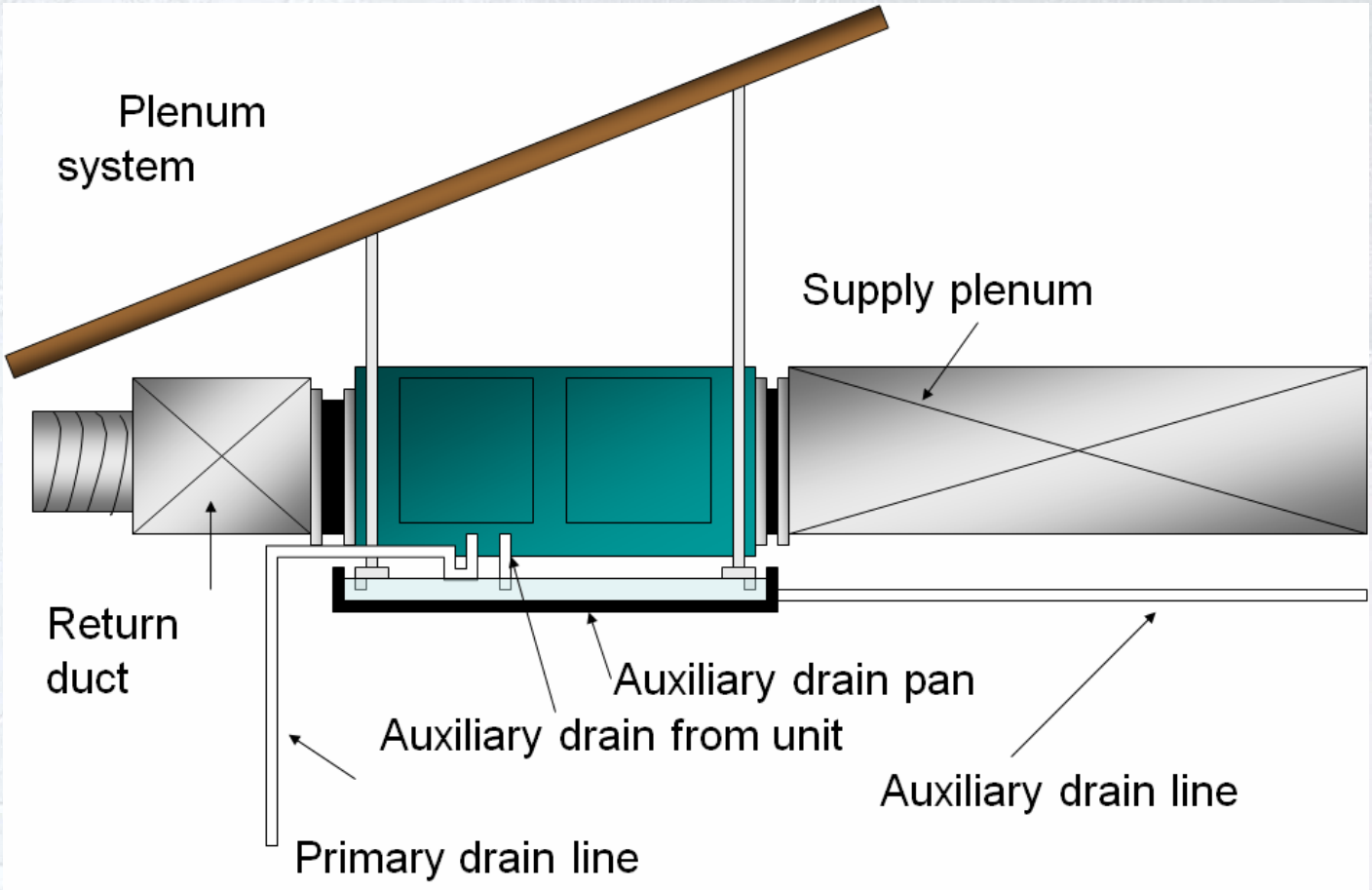
- All components are in one cabinet
- Range from window unit size to over 100 tons
- Air-cooled equipment is most common in residential and light commercial applications
- Unit vibration should not be transmitted to the structure
- Duct connections must be water tight and insulated
- Crankcase heat must be energized before the system is started up

INSTALLING SPLIT SYSTEM AIR CONDITIONERS

- Air handler must be secured or mounted properly
- Access to the unit must be considered before installing
- Condensate must be properly removed
- Average condensate is 3 pints per hour per ton
- Auxiliary drain pans
  - Used when the evaporator is above the conditioned space
  - Piped to a conspicuous location

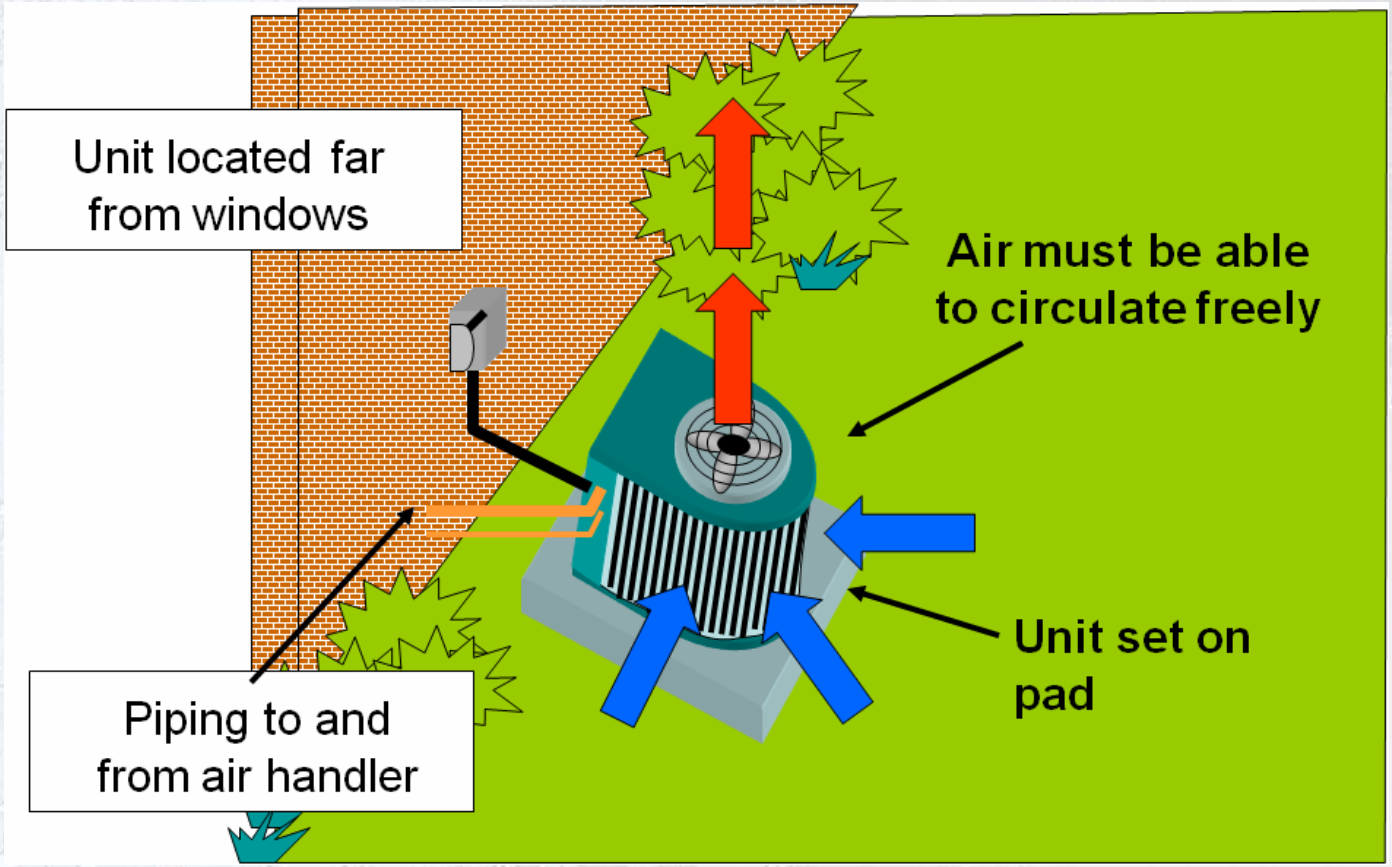






THE SPLIT SYSTEM CONDENSING UNIT

- Discharged air must not re-circulate
- Piping is connected to the condensing unit from the evaporator
- Units must be able to be serviced properly
- Units should be set on pads
- Condensing units should be located in the shade
- Noise should not be objectionable



INSTALLING REFRIGERANT PIPING

- Piping runs should be as short as possible
- The refrigerant charge is usually shipped in the condensing unit
- Suction line should be insulated
- Leak check piping before introducing refrigerant
- Properly evacuate system

EQUIPMENT STARTUP

- Allow crankcase heater to run overnight before starting system
- Check fan rotation
- Check fan amperage
- Check airflow at registers
- Check the amperage of the compressor
- Check operating pressures and temperatures

SUMMARY - 1

- Installations require ductwork, electrical, and mechanical work
- Rectangular galvanized duct sections must be measured and fabricated accurately, properly supported and installed with canvas collars to reduce noise transmission
- Galvanized duct sections are often joined with slips and drives
- Round metal duct sections are connected with self-tapping sheet metal screws

SUMMARY - 2

- Metal duct systems must be insulated
- Fiberboard duct sections do not need to be insulated and are joined by stapling and taping
- Flexible duct can be used for return and branch duct connections
- Flexible duct should be stretched and properly supported to prevent the material from collapsing
- Always exercise caution when installing electric circuits

SUMMARY - 3

- Power supplies must match the system requirements
- Split systems require two power supplies
- Package systems require only one power supply
- Low voltage control wiring is obtained through a control transformer
- Package systems have all system components contained in a single cabinet

SUMMARY - 4

- Condensate from the system must be properly removed: gravity or pump
- Auxiliary drain pans catch condensate overflow and protect living space below the unit
- Condenser discharge air must not recirculate back through the coil
- Condensing units should be positioned so that noise factor is low and service panels are accessible

SUMMARY - 4

- Refrigerant piping runs should be as short as possible
- The suction line should be insulated
- Piping circuit should be leak checked and evacuated before introducing refrigerant to the system
- When starting up an air conditioning system, be sure to check operating amperages, voltages and system operating pressures