Significant Changes to the IHWAP Field Guide – 2021

July 1, 2021

Section 300 – Mechanical

Section 31113 Combustion Air

Deleted our language and inserted language from the SWS.

Calculate combustion air needs in conformance with the applicable code (i.e., *NFPA* 54, *IFGC*, or *NFPA* 31) and manufacturer requirements.

In instances where conflicts occur between the code and the manufacturer's installation instructions, the more restrictive provisions shall apply (i.e., more air rather than less).

The minimum required volume is 50 cubic feet per 1,000 *BTU*/h of input, except that where the air infiltration rate is known to be less than 0.40 air changes per hour (ACH), then use alternate calculation from *IFGC*.

~~A combustion appliance located in a confined space, surrounded by materials that are tight or marginal air barriers may need an outdoor source of combustion air. For every 1,000 Btu input, there should be 2 square inches (in^2) of free ventilation area. For example, the furnace and water heater are in a furnace closet. The furnace has an input rating of 100,000 Btus. The water heater has an input rating of 40,000 Btus. There should be 280 in^2 of free ventilation area to the furnace room [(100,000 + 40,000)/1,000 = 140 x 2 in^2 = 280 in^2].~~

Section 3112 & 31122 Fuel Oil Systems

Deleted

312 Combustion Safety Testing

Added this photo and language.

If the natural draft appliance is common vented (multiple combustion appliances sharing chimney and/or venting system) to an induced draft appliance the water heater diverter should be checked for spillage after firing the common vented induced draft appliance. Spillage must stop within 2 minutes (Figure 312-3). The appliance with the lowest BTU input should be fired first – this is usually the water heater.

Removed fireplace as a CAZ zone.

Figure 312-2: Checking for spillage at the water heater after firing the furnace

3121 Worst Case Depressurization

Added this caveat for exceptions to worst case depressurization:

1. All vented combustion appliances are sealed combustion (direct vent) or power vented with no woodstoves or fireplaces.

3152 Furnace Operation Standards and Improvement

Added the following language:

- Measure total external static pressure (TESP). TESP should be ≤ 175 Pa (≤ 0.70 in w.g.). See section 3191, "Total External Static Pressure", for additional information.

31531 Duct Leakage Sites

Added to following caveat:

- Seal return air grilles in basement (Figure 31531-6). Re-check temperature rise and total external static pressure (see section 3191, "Total External Static Pressure) to assure that it is within the operating limits of the furnace.

31532 Duct Sealing Materials

Included language from the SWS.

Duct mastic is the required duct sealing material because of its superior durability and adhesion. Tapes cannot be used for duct sealing in the Illinois Weatherization Program (Figure 31532-1)**.**

Seal leaks less than 1/4" using fiberglass mesh and mastic. Mastic alone is acceptable for holes less than 1/8" in size that are more than 10' from air handler if total external static pressure is less than 1" of water column (250 Pa)[1].

Seal leaks between 1/4" and 3/4" using a two stage process. Install temporary tape as a backing material. Seal with fiberglass mesh and mastic that extends at least 1" past the temporary tape on all sides.[2]
Repair leaks larger than 3/4" using a sheet metal patch. Mechanically fasten patch before applying mastic. Install fiberglass mesh and mastic over the seam, overlapping repair joint by at least 1" on all sides.[3]

[1] SWS 5.0106.1f, "Seal Leaks Less than ¼"
[2] SWS 5.0106.1g, "Seal Leaks Between ¼" and ¾"
[3] SWS 5.0106.1h, "Seal Leaks Greater than ¾"

~~Apply at least 1/16-inch thick mastic and use reinforcing fiberglass mesh tape for all joints wider than 1/16 inch or joints that may experience some movement (Figure 31532-2). Duct sealing mastics should be UL181A or UL181B labeled.~~

Tape by itself is not to be used as it cannot be expected to hold a joint together nor expected to resist the force of compacted insulation or joint movement (Figure 31532-3). Joints should rely on mechanical fasteners to prevent joint movement or separation and mastic for sealing.

3155 Heat Pumps

New language

All heat pump systems and mini-splits should be sized with adequate auxiliary heat to supply the structure with adequate heat in case of heat pump failure, during defrost modes and as auxiliary heat during low outdoor temperatures. Most properly sized air source heat pumps and mini-splits in Illinois will not be able to maintain indoor design temperatures when outdoor temperatures reach typical outdoor design temps without auxiliary heat.

Auxiliary heat can be a separate heating source such as electric resistance baseboard heat when installing mini-splits, or resistance heat strips can be added to the air handler in cases where an air source heat pump central system is being installed. or electric space heaters. Cost of including these heat sources should be included with the heat pump installation cost. Other auxiliary heat sources should be reviewed with your Weatherization Specialist.

Existing central heating appliances cannot be used as auxiliary heat sources unless a common thermostat can automatically operate the appliance when auxiliary heat is required.

NEW SECTION – comment: the neutralizer seems like a major change

Language from the SWS.

3157 Condensate Removal

Convey all condensate from all cooling coils, condensing furnaces, etc. to the exterior of the building. Condensate from condensing furnaces must first pass through a neutralizer if using waste lines for disposal.

Install condensate piping with not less than 1/8" per foot (1% slope) towards the termination point.

Install vents and traps on condensate drain lines in accordance with manufacturer specifications and applicable building code and in a manner that allows for cleaning of condensate lines without cutting the existing pipe.

Install a secondary drain pan under all condensing appliances installed in or above conditioned space and where water damage may occur to the structure. Install an independent condensate drain for the secondary drain pan that drains to a visible termination location. Slope drain pan towards the condensate drain.

When there is potential for condensation or freezing of the drain line, insulate condensate drain lines to a minimum of R-4 with insulation that contains a Class II or greater vapor retarder.

Install condensate drain pumps when condensate cannot be drained by gravity.

If termination of condensate drain is to the outdoors, direct it downwards with an elbow fitting at the end of the exterior termination.

NEW SECTION

3191 Total External Static Pressure (TESP)

Total external static pressure (TESP) shall be measured to determine appropriate fan motor type for furnace replacement or if high static pressure in the system must be addressed.

- If the TESP ≤ 175 Pa (≤ 0.70 in. w.g.), a variable speed fan motor may be used.
- If the TESP is between 175 Pa (0.70 in. w.g.) and 250 Pa (1.0 in. w.g.),
    - An X13 fan motor must be used, or
    - The static pressure in the duct system may be addressed. If the TESP can be reduced to under 175 Pa, a variable speed fan motor may be used.
- If the TESP > 250 Pa (1.0 in. w.g.), the static pressure in the duct system must be addressed as part of furnace replacement.

TESP is to be measured as shown in Figure 319-1. Measure pressure at B and C. Add the absolute value of the two pressure readings.

If the TESP is between 175 Pa and 250, additional readings may be taken at points A and D to help determine the cause of the high TESP reading or a furnace with an X13 fan motor must be installed.

If the TESP exceeds 250 Pa, additional readings must be taken at points A and D to help determine the cause of the high TESP reading. TESP must be brought under 250 as part of the furnace replacement measure or the furnace cannot be replaced. If the TESP can be brought under 175 Pa, a furnace with a variable speed fan motor may be used. Otherwise, a furnace with an X13 fan motor must be installed. See TESP reference document for guidance on lowering TESP.

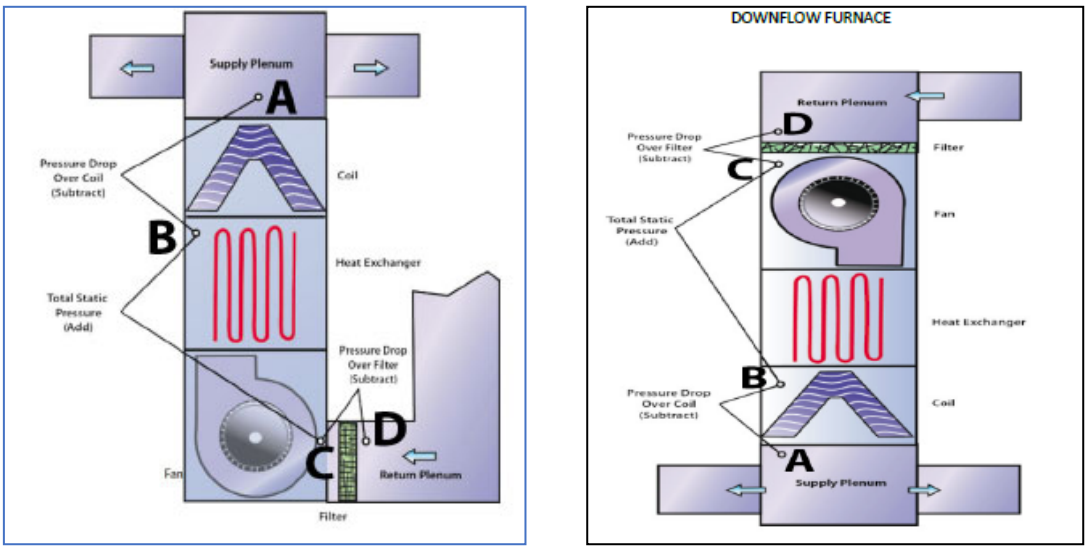

Figure 3191-1: Static pressure reading locations for upflow and downflow furnaces

~~Replacement furnaces equipped with electrically commutated motors (ECM) may be installed. However, external static pressure should be less than 0.5" w.c. (125 Pa) before installing a furnace with an ECM air handler. The replacement furnace must still have a minimum AFUE of 95%.~~

319 Heating System Replacement Standards

Updated Table, no change to the Energy Star requirements.

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Replacement System Minimum Efficiencies

Table 300-6

Natural Gas/LP Furnaces	95%, Direct vent sealed combustion
Oil Furnaces	83%
Warm Water Gas Boilers	~~90%~~ 95%
Steam Boilers	80%
Oil Boilers	80%
Central Air Conditioners	Current ENERGY STAR minimum[1]
Air Source Heat Pumps & Mini-Split Systems	Current ENERGY STAR minimum[2]

[1] As of April 2018, minimum SEER is 15.0

[1] As of April 2018, minimum HSPF of 8.5, minimum SEER of 15 (or 12.5 EER)

3193 Oil Fired Heating Systems

Deleted

3203 Water Heater Replacement

Added language from the SWS:

Water heaters may be replaced with DOE funds only if the SIR is 1.0 or greater, or if the local agency has obtained OCA approval for a Health and Safety related replacement.

Replacement water heaters must be installed by licensed plumbers.

All water heater work must comply with the International residential Code (IRC), the National Fire Prevention Association (NFPA), local codes (where they exist) and the water heater manufacturer's specification. No used water heaters may be installed.

Note that water heaters installed in garages must be a minimum of 18 inches off the floor.

All replacement water heaters must have a pressure relief valve and a discharge pipe extending within 6 inches of the floor.

Provide a level working space not less than 30" in length and 30" in width in front of the control side of the appliance. Install appliance and plumbing to allow for inspection, maintenance, and replacement of the appliance and its components, without disturbing other installed equipment, controls, piping, and components, other than what requires repair/replacement. Ensure that anode rod is accessible for replacement.

Provide a level working space not less than 30" in length and 30" in width in front of the control side of the appliance. Install appliance and plumbing to allow for inspection, maintenance, and replacement of the appliance and its components, without disturbing other installed equipment, controls, piping, and components, other than what requires repair/replacement. Ensure that anode rod is accessible for replacement.

If appliance is installed in or above conditioned space or in a location where water damage could occur, install a drain pan according to the requirements of the International Residential Code (IRC). Drain pan to the exterior of the building.

Install a separate water cut-off valve for both the hot and cold water lines.

Install an expansion tank anytime a storage water heater is supplied with cold water that passes through a check valve, pressure reducing valve or backflow preventer. Connect the tank to the cold water supply line at a point that is downstream of all check valves, pressure reducing valves and backflow preventers. Size thermal expansion tanks in accordance with the tank manufacturer's instructions and applicable code.

Install dielectric unions when connecting copper to galvanized steel piping in accordance with the *IRC* and manufacturer specifications.

Install heat traps on the inlet and outlet piping where not provided by manufacturer.

Permanently remove equipment from job site and recycle or dispose of removed equipment and refrigerant in accordance with local and federal law.

Provide occupants/owners with user's manual, warranty information, installation instructions, and installer contact information.

32032 Heat Pump Water Heaters

New section - added the following language from the SWS:

Install appliance where it is in conditioned space and is accessible for service. Must have sufficient volume of air per manufacturer specifications. Install in location such that it will not affect indoor thermostat readings or blow directly on occupants.

32035 Tankless On-Demand Water Heaters

New section

Gas and propane tankless water heaters must have a minimum UEF of 0.87 and be ENERGY STAR rated.

Ensure water heater fits in the installation space with required clearances and will provide sufficient hot water for the occupants.

Ensure gas line to water heater is of properly sized for water heater burners. Note that some homes may not have the proper size gas line to the home or pressure to support the addition of a tankless water heater.