

 <p style="text-align: center;">State of Ohio Weatherization Program Standards</p>	Section	MECHANICAL SYSTEMS INSPECTION
	Subject	Domestic Hot Water

FUEL SUPPLY 201-4.1

Fuel must be available to begin the inspection process of the DHW heater.

fuel availability
201-4.1a

Use a combustible gas leak detector to determine if propane or natural gas is leaking from all accessible gas supply lines and gas-fired appliances. Verify every suspected leak with soap bubble solution. Determine the source and severity of the problem.

fuel leakage, gas
201-4.1b

If the gas leak is major (see 1504 Abbreviations and Definitions), immediately inform the customer and leave the dwelling. Contact the fuel vendor and have the problem corrected. Document all actions taken in the customer file.

major gas leaks
201-4.1c



No weatherization work may be done until major gas leaks are corrected.



If the gas leak is minor (see 1504, Definitions), inform the customer and have the problem corrected.

minor gas leaks
201-4.1d

Visually check for fuel leakage in kerosene and fuel oil DHW units.

fuel leakage, oil
201-4.1e

When appropriate, test to determine if the gas DHW unit is over- or under-fired by clocking the meter on natural gas units and calculating the actual Btu input. On propane units, take a gas pressure test, measure the orifice, and calculate the actual Btu input. Determine corrective actions.

Btu input
201-4.1f

ELECTRICAL POWER SUPPLY 201-4.2

Inspect the main electrical power supply to an electric tank to determine that it is safe.

main power safety
201-4.2a



Inspect the wiring to the DHW unit and determine whether the electrical line to the heating unit is a dedicated circuit that is properly sized and fused. If no dedicated circuit exists, it is not necessary to install one unless the wiring is in poor condition, there is a history of circuit failure, or the unit is to be replaced.

dedicated circuit
201-4.2b



hazardous wiring
201-4.2c



Visually inspect all wiring at or in, the DHW unit to detect charred, frayed or missing wire insulation and improper or loose connections. If the wiring is hazardous, inform the customer of the problem and have the problem corrected.

DHW UNIT CLEARANCES 201-4.3

unit clearances
201-4.3a

Note whether combustion-type DHW tanks are located with the required clearances from combustible materials PMI or the appropriate NFPA code. If they are not, have the DHW tank moved to achieve required distance from combustible surfaces.

VENT SYSTEM VISUAL INSPECTION 201-4.4

clearance
201-4.4a



Determine whether the vent system is in accordance with the applicable NFPA code for the fuel type (#54 for gas, #31 for fuel oil, #211 for solid fuel). Visually inspect the vent system to determine that it extends from the heating unit to the outside of the dwelling. Look for excessive corrosion or rust, cracks, holes and loose, unsealed, or disconnected sections. Repair of an existing problem is mandatory.

vent connections
201-4.4b

Inspect the vent/chimney connections to make sure that they are securely fastened.

vent slope
201-4.4c

Determine whether the vent connector is installed with no dips or sags, and rises at least 1/4" per foot of run.

vent elbows
201-4.4d

Determine whether the number of elbows exceeds that allowed in the codes cited in Table 201-4.4a.

chimney condition
201-4.4e

Determine whether any chimney in use is in sound condition. Determine whether existing liners, bricks or blocks and mortar are in good condition.

chimney liner
201-4.4f

Determine whether chimney repair or a new chimney liner is needed.

**combustion air/
backdrafting**
201-4.4g

Determine whether the combustion air requirements are in accordance with the applicable NFPA code for the fuel type (#54 for gas, #31 for fuel oil, #211 for solid fuel). If the requirements are met, and carbon deposits and corrosion exist around the draft diverter, recheck for proper venting and backdrafting potential.

DRAFT TESTING 201-4.5

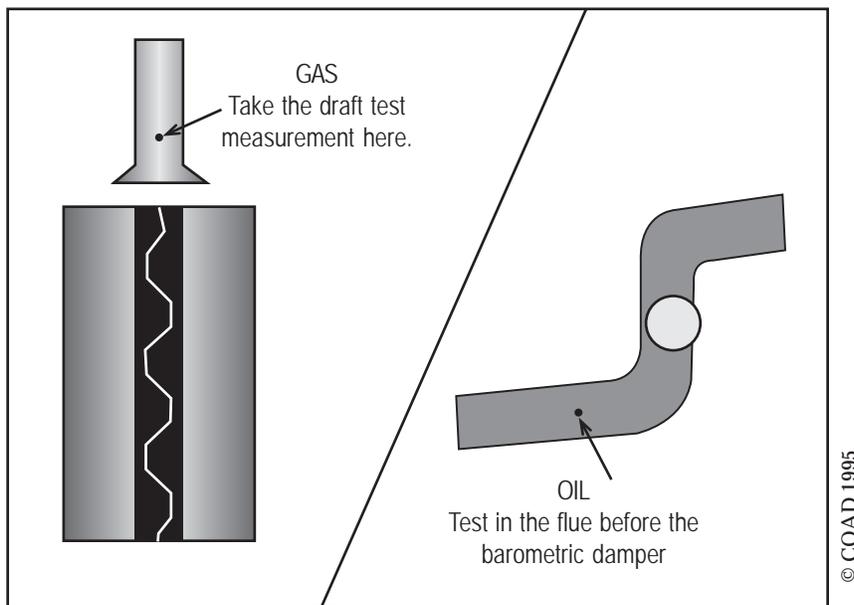
Set up the "worst case scenario" for draft testing (see 1506-4). All draft tests must be taken under "worst case scenario" conditions.

draft, "worst case"
201-4.5a

Start the DHW unit. Insert the draft probe into a hole in the vent pipe above the draft diverter (see figure 201-4.5.) Measure the draft at two minutes and determine whether the draft reading is within the acceptable ranges identified in Table 201-4.5.

draft
201-4.5b

Figure 201-4.5 Draft Test Probe Placement



COMBUSTION SAFETY & EFFICIENCY TESTING
201-4.6

With the DHW unit operating, insert the sampling probe into the appropriate location illustrated in Figure 201-4.6. Measure and record the amount of CO in the flue gasses. More than 100 ppm in the flue is not permitted.

carbon monoxide (CO)
201-4.6a

Table 201-1.6 Draft Test Locations and Acceptable Readings

Heating Unit Type	Draft Gauge Probe Placement	Worst Case Acceptable Draft Readings at Listed Outdoor Temperatures (F)				
		<20	21-40	41-69	61-80	>80
Gas Atmospheric Appliances (Furnace, Space Heater, Boiler Floor Furnace)	Flue (after diverter)	-5 Pa -.02 wc'	-4 Pa -.016 wc"	-3 Pa -.012 wc'	-2 Pa -.008 wc"	-1 Pa -.004 wc"
Gas Fan-Assisted	Flue (1 1/2 times the diameter of the flue from the flue collar or elbow)	-5 Pa -.02 wc'	-4 Pa -.016 wc"	-3 Pa -.012 wc'	-2 Pa -.008 wc"	-1 Pa -.004 wc"
Oil Burners	Flue (before Barometric Damper)	-15 Pa -.06 wc'	-13 Pa -.053 wc"	-11 Pa -.045 wc'	-9 Pa -.038 wc"	-7 Pa -.03 wc"
Gas 90+ Furnace	Exhaust Pipe	PMI	PMI	PMI	PMI	PMI

combustion analysis
201-4.6b



With the DHW unit operating, insert the probe of a calibrated digital combustion analyzer into the appropriate location illustrated in Figure 201-4.6. After the unit has been operating at least ten minutes, measure and record the O₂ and the stack temperature readings. Determine whether the readings are within the acceptable limits listed in Table 201-4.6.

Figure 201-4.6 Proper Probe Placement for Testing DHW Tanks

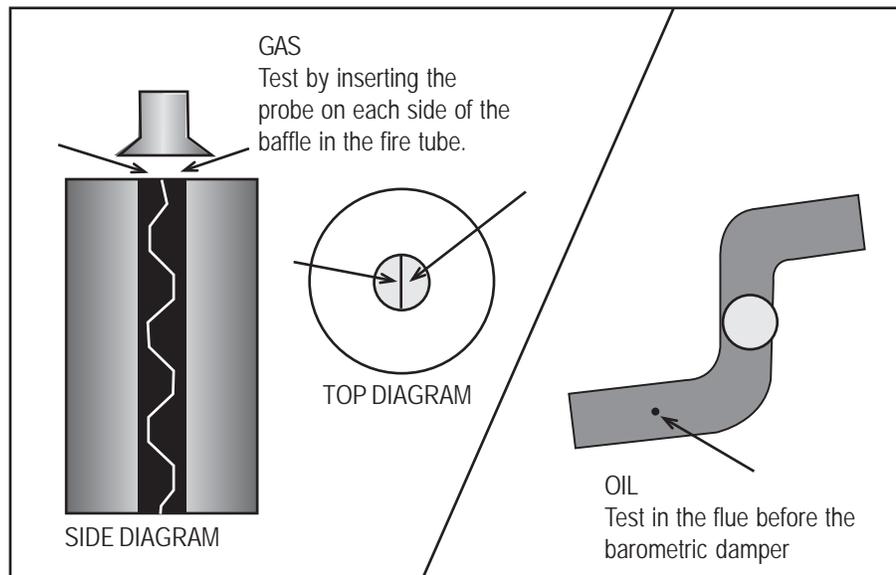


Table 201-4.6 Acceptable Combustion Test Analysis Measurements

DHW Unit Type	(O ₂) Oxygen	Stack Temp.	Smoke Test	(CO) Carbon Monoxide Max. ppm
GAS (Natural Gas, Propane) Atmospheric	4-9%	300-600° F	N/A	100
	Fan-assisted	300-480° F	N/A	100
OIL Conventional Oil Burner	4-9%	325-600° F	1 or less	100
	Flame Retention	325-600° F	0 or trace	100

Determine whether the combustion air requirements are in accordance with those listed in the codes in Table 201-4.4g. If the requirements are met, and carbon deposits and corrosion exist around the draft diverter, recheck for proper venting and backdrafting potential.

combustion air
201-4.6c

WATER TANK CONDITION 201-4.7

Determine if the tank is leaking water. If it is leaking, it may be replaced using HWAP Health and Safety funds.

tank leakage
201-4.7a



Determine whether a pressure relief valve and a discharge pipe are present. If the relief valve and/or the discharge pipe is not present and there is an existing location for them, have them installed. If the relief valve and/or discharge pipe are not present and there is no existing location for them, have them installed in the hot water line.

**pressure relief valve/
discharge pipe**
201-4.7b



Do not call for insulation on tanks that have a manufacturer’s warning against adding additional insulation.

**tank insulation
warning**
201-4.7c



Determine whether the tank is insulated. Measure the tank to determine the amount of insulation needed to cover the tank.

tank insulation
201-4.7d



Examine the temperature setting on the gas valve or thermostat. Consult with the customer to determine if lowering of the temperature can be accomplished without affecting the customer’s life-style.

**temperature
setting**
201-4.7e



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flame roll-out
201-4.7f

Turn up the thermostat to activate the water heating system. For a combustion-type system, determine whether flame roll-out is occurring.

gas valve
201-4.7g

If the DHW tank is a gas-fired model, determine whether the gas valve is functioning properly (see 1506-8).

thermostat
201-4.7h

Determine whether the thermostat is operating properly.

DHW DISTRIBUTION 201-4.8

water lines
201-4.8a

Inspect the water lines leading into, and out of, the water tank to determine whether they are leaking. If water lines are leaking, inform the customer and repair the leaks.

water line insulation
201-4.8b



CEE

Determine whether there is insulation present on the first six feet of both the hot and cold water lines.

fixture leaks
201-4.8c

CEE

Examine plumbing fixtures to determine if they are leaking. If plumbing fixtures are leaking, inform the customer. Repair of hot water leaks is mandatory. Determine whether cold water leaks are contributing to moisture problems.

low-flow devices
201-4.8d

CEE

Examine plumbing fixtures to determine whether low-flow devices are present. Consult the customer to determine whether low-flow devices can be installed in the shower and at sink fixtures.

consumer energy education
201-4.8e

CEE

Provide consumer energy education to the customer(s) regarding the management of hot water usage.