

 <p style="text-align: center;">State of Ohio Weatherization Program Standards</p>	Section	<b>APPENDICES AND REFERENCES</b>
	Subject	<b>Materials Standards Appendix A</b>

*STANDARDS FOR WEATHERIZATION MATERIALS 1501*

Weatherization materials installed under the HWAP shall conform to these specifications and standards and to those standards in Appendix A of 10 CFR Part 440.

**materials shall conform**  
1501-1

*HEATING SYSTEM REPAIRS/TUNE-UPS/REPLACEMENT/MODIFICATIONS 1501-2*

Repairs/Tune-ups to heating systems must be performed using:

**repairs/tune-ups**  
1501-2.1

The manufacturer’s instructions, if provided; or

**manufacturer's instructions**  
1501-2.1a

The appropriate NFPA manual if no manufacturer instructions are provided:

**NFPA Manual**  
1501-2.1b

1. Natural Gas and Propane - NFPA 54
2. Fuel Oil and Kerosene - NFPA 31
3. Chimneys, Fireplaces, Vents - all fuel types - NFPA 211, Solid Fuel Burning Appliances - NFPA 211
4. Electric - NFPA 70; or

Local Codes

**local codes**  
1501-2.1c

*HEATING UNIT REPLACEMENTS 1501-3*

Replacement units shall be purchased for installation in a location for which they are designated according to Unit Type Designations as listed in the most current edition of the Gas Appliance Manufacturers’ Association “Consumer’s Directory of Certified Efficiency Ratings for Residential Heating and Water Heating Equipment”.

**replacement heating units**  
1501-3.1

Indoor rated units are models installed indoors and which use indoor air for all combustion and ventilation air.

**indoor rated units**  
1501-3.1a

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## OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A

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**non-weatherized**  
1501-3.1b

Non-weatherized - Isolated Combustion System models are installed indoors with all combustion and ventilation air admitted through grills or ducts from outdoors.

**outdoor units**  
1501-3.1c

Outdoor units are models intended for installation out-of-doors. Fuel gas replacement furnaces to be purchased for installation shall be of ANSI Category II or III.

### *SITE-BUILT/MULTI-FAMILY UNITS 1501-4*

The following standards shall apply to all heating unit replacements for site-built and multifamily dwelling units

**less than 225,000 Btu/hr** 1501-4.1

For natural gas, propane and oil-fired central furnaces rated at less than 225,000 Btu/hr.

1501-4.1a

All units shall have a GAMA certified minimum AFUE rating of 78%.

1501-4.1b

All units shall include electronic ignition.

1501-4.1c

All units shall be either power combustion or power vent (induced draft).

1501-4.1d

All fuel-gas fired units shall meet ANSI Z21.13, except direct vent central furnaces which shall meet ANSI Z21.64.

1501-4.1e

All oil-fired central furnaces shall meet UL 727.

**electric forced air furnaces**  
1501-4.2

For electric forced-air furnaces all units shall meet UL-1096.

**boilers/less than 300,000Btu/hr**  
1501-4.3

For natural gas, propane and oil-fired boilers rated at less than 300,000 Btu/hr.

1501-4.3a

All units shall have a GAMA certified minimum AFUE rating of 78%.

1501-4.3b

All units shall include electronic ignition.

1501-4.3c

All units shall be either power combustion or power vent (induced draft).

1501-4.3d

All fuel gas units shall meet ANSI Z21.13.

## APPENDICES AND REFERENCES—Materials Standards Appendix A OWPS 1501

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All oil-fired units shall meet UL 726.	1501-4.3e
For natural gas, propane and oil-fired boilers rated at greater than 300,000 Btu/hr.	<b>boilers/greater than 300,000Btu/hr</b> 1501-4.4
RESERVED.	1501-4.4a
For electric boilers:	<b>electric boilers</b> 1501-4.5
RESERVED.	1501-4.5a
For natural gas or propane vented floor furnaces:	<b>vented floor furnaces</b> 1501-4.6
All units shall have a minimum GAMA certified AFUE rating of 56%.	1501-4.6a
All units shall meet ANSI Z21.48.	1501-4.6b
For oil-fired floor furnaces all units shall meet UL 729.	<b>oil-fired floor furnaces</b> 1501-4.7
For natural gas or propane vented room heaters:	<b>vented room heaters</b> 1501-4.8
All units shall have a minimum GAMA certified AFUE rating of 58%.	1501-4.8a
All vented room heaters shall be equipped with a spill switch to shut down the unit in the event of flue gas spillage.	1501-4.8b
All units shall meet ANSI Z21.11.1.	1501-4.8c
For oil-fired vented room heaters all units shall meet UL 896.	<b>oil-fired vented room heaters</b> 1501-4.9
For natural gas or propane vented wall furnaces:	<b>vented wall furnaces</b> 1501-4.10
All units shall have a minimum GAMA certified AFUE rating of 63%.	1501-4.10a

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## OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A

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1501-4.10b All units shall meet ANSI Z21.49, except that direct vent wall furnaces shall meet Z21.44.

1501-4.10c Wall furnaces placed in an exterior wall cavity shall be of the sealed-combustion (direct vent) type.

**oil-fired vented wall furnaces**  
1501-4.11 For fuel oil vented wall furnaces all units shall meet UL 730.

**electric direct air**  
1501-4.12 For electric direct air heaters all units shall meet UL 1025.

**electric baseboard**  
1501-4.13 For electric baseboard heating equipment all units shall meet UL 1042.

**solid fuel room heaters**  
1501-4.14 For solid fuel type room heaters all units shall meet UL 1482.

### *MOBILE HOMES 1501-5*

The following standards apply to all replacement units for mobile homes.

**forced air**  
1501-5.1 For natural gas and propane forced air furnaces:

1501-5.1a All units shall have a minimum GAMA certified AFUE rating of 78%.

1501-5.1b All units shall meet the following ANSI, UL, or other listed standards as applicable:

For central furnaces (except direct vent and separated combustion system central furnaces), ANSI Z21.47.

For direct vent central furnaces, ANSI Z21.64.

For other heating appliances, UL 307(B).

**oil-fired forced air**  
1501-5.2 For liquid fuel-burning (fuel oil) forced air furnaces:

1501-5.2a All units shall have a minimum GAMA certified AFUE of 80%.

All units shall meet the following ANSI, UL, or other listed standards as applicable: 1501-5.2b

UL 307A

For electric central air heating equipment all units shall meet the following ANSI, UL, or other listed standards as applicable: **electric central air**  
1501-5.3

UL 1096

For electric baseboard heating equipment all units shall meet the following ANSI, UL, or other listed standards as applicable: **baseboard heating**  
1501-5.4

UL 1042

For electric air heaters all units shall meet the following ANSI, UL, or other listed standards as applicable: **electric air heaters**  
1501-5.5

UL 1025

For solid-fuel type room heaters all units shall meet the following ANSI, UL, or other listed standards as applicable: **solid-fuel room heaters**  
1501-5.6

UL 1482

For fireplace stoves all units shall meet the following ANSI, UL, or other listed standards as applicable: **fireplace stoves**  
1501-5.7

UL 737

#### *VENTING SYSTEMS 1501-6*

Venting Systems Components shall meet the materials standards set forth in the NFPA code for the specific heating appliance being replaced. **venting systems**  
1501-6.1

Power vents must meet ANSI Z-21.47. **power vents**  
1506-6.2

#### *SUPPLY AND RETURN SYSTEMS 1501-7*

Supply and return system components for central warm air furnaces shall meet the materials standards specified in NFPA 90B. **supply and return systems**  
1501-7

*HEATING UNIT EFFICIENCY MODIFICATIONS  
1501-8*

<b>gas power draft burners</b> 1501-8.1	Gas Power Draft Burners
<b>replacement</b> 1501-8.1.a	Replacement - conformance to ANSI Z 223.1, Natural Fuel Gas Code; ANSI 283.1 "Gas Installations".
<b>conversion</b> 1501-8.1.b	Conversion (for gas or oil-fired systems) - conformance to ANSI Z21.8a; ANSI Z 21.17; Installation, ANSI Z 223.1; AGA Laboratories Certification Seal.
<b>oil flame retention burners</b> 1501-8.2	Oil Flame Retention Burners - conformance to NFPA31, Oil Equipment; ANSI Z 96.2, (UL-296); ANSI Z 91.2.
<b>modulating aquastat</b> 1501-.8.3	Modulating Aquastat - conformance with ANSI/ASME CDS.1; applicable sections of ANSI Z 223.1 and NFPA 31.
<b>gas vent dampers</b> 1501-8.4	Gas Fueled Heating System Vent Dampers - conformance to:
1501-8.4a	Applicable sections, National Fuel Gas Code including Appendices H, I, J, K.
<b>electrical</b> 1501-8.4b	Electrically Operated - ANSI Z 21.66 and Addenda A and B.
<b>mechanical</b> 1501-8.4c	Mechanically Actuated - ANSI Z 21.67 and Appendices A and B.
<b>thermal</b> 1501-8.4d	Thermally Activated - ANSI Z 21.68 and Appendices A and B.
<b>oil vent dampers</b> 1501-8.5	Oil Fueled Heating System Vent Dampers - conformance with applicable sections of NFPA 31 for installation and UL 17.
<b>clock thermostats</b> 1501-8.6	Clock Thermostats - conformance to NEMA DC 3 or NEMA DC 15 and performance test requirements.
<b>gas iid</b> 1501-8.7	Gas Intermittent Ignition Devices - Z 21.71.
<b>downsizing gas units</b> 1501-8.8	Downsizing gas units - conformance with local utility company procedures if applicable and appendices C and F of NFPA 54.

Downsizing oil units - conformance to NFPA 31.

**downsizing oil units**  
1501-8.9

*WATER FLOW CONTROLLERS 1501-9*

Low-flow shower heads - “commercial availability” aerated and with a maximum flow of 2.5 gallons per minute.

**low-flow shower heads**  
1501-9.1

*THERMAL INSULATION MATERIALS 1501-10*

Mineral fibrous materials, such as glass, rock, or slag wool.

**fibrous minerals**  
1501-10.1

Blanket/batt - conformance to ASTM C665.

**blanket/batt**  
1501-10.1a

Thermal insulation used to insulate warm air heating system duct work, domestic hot water heaters, and foundation perimeters - conformance to ASTM C971, flame spread classification not exceeding 25/50 and a minimum R-value of 6.

**ducts/ water heaters/  
perimeters**  
1501-10.1b

Board - conformance to ASTM C726.

**board**  
501-10.1c

Loose-fill - conformance to ASTM C764.

**loose fill**  
1501-10.1d

Mineral cellular materials such as perlite and vermiculite.

**mineral cellular  
materials**  
1501-10.2

Perlite loose-fill - conformance to ASTM C549.

**perlite loose fill**  
1501-10.2a

Vermiculite loose fill - conformance to ASTM C516.

**vermiculite**  
1501-10.2b

Cellular glass block - conformance to ASTM C552.

**glass block**  
1501-10.2c

Perlite board - conformance to ASTM C728.

**perlite board**  
1501-10.2d

Organic cellular materials such as wood, paper or synthetic fibers.

**cellulose**  
1501-10.3

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**OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A**

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<b>cellulose, loose-fill</b> 1501-10.3a	Cellulose, loose-fill - conformance to ASTM C739 (or latest amended version) and Interim Safety Standard 16 CFR Part 1209.
<b>cellulose board</b> 1501-10.3b	Cellulose fiberboard - conformance to ASTM C208.
<b>polystyrene or polyurethane</b> 1501-10.4	Organic cellular materials such as polystyrene or polyurethane.
<b>polystyrene block</b> 1501-10.4a	Preformed block-type polystyrene - conformance to ASTM C578.
<b>polyurethane board</b> 1501-10.4b	Rigid preformed polyurethane board - conformance to ASTM C591.
<b>felt faced board</b> 1501-10.4c	Polyurethane or polyisocyanurate board faced with felts on both sides - conformance to F.S. HH-1.
<b>aluminum faced board</b> 1501-10.4d	Polyurethane or polyisocyanurate board with aluminum foil on both sides - conformance to F.S. HH-1.
<b>composite board</b> 1501-10.5	Composite Boards
1501-10.5a	Mineral fiber and rigid cellular polyurethane composite board - conformance to ASTM C726.
1501-10.5b	Perlite and rigid cellular polyurethane composite board - conformance to ASTM C984.
1501-10.5c	Gypsum board and polyurethane or polyisocyanurate composite board - conformance to F.S. HH-1.
	<i>VAPOR BARRIERS 1501-11</i>
<b>vapor barriers</b> 1501-11	Vapor barriers used in conjunction with attic, sidewall, floor and perimeter insulation shall be selected according to the provisions cited in ASTM C755. Permeance not greater than 1 perm when determined according to the desiccant method described in ASTM E96.

***RADIANT BARRIERS 1501-12***

Radiant barriers used to wrap domestic water heater tanks under conditions allowed by DOE shall have a Reflectivity Rating of .9 or greater (Emissivity Rating of .1 or less), an ASTM E84 Flame Spread Rating of 25 or less, and a Smoke Developed Index of 450 or less.

**radiant barriers**  
1501-12

***VENTILATION DEVICES 1501-13***

Attic ventilation - “commercial availability”.

**attic**  
1501-13.1

Basement/crawl space ventilation - “commercial availability” and closeable.

**basement/crawl space**  
1501-13.2

Mechanical ventilation devices to expel excess moisture/pollutants shall:

**mechanical**  
1501-13.3

Carry an independent testing laboratory seal.

**approvals**  
1501-13.3a

Have a rated capacity against a static pressure of at least 0.1" W.C.

**capacity**  
1501-13.3b

Provide a positive closure of the air path when the fan is not in operation.

**damper**  
1501-13.3c

Provide the option to be installed in conjunction with a humidistat control or a timed automatic control switch.

**controls**  
1501-13.3d

Operate with a CFM capacity to certified sone rating ratio of no lower than 50 CFM per sone.

**sone rating**  
1501-13.3e

Be sized in accordance with H.V.I. sizing methods.

**sizing**  
1501-13.3f

***AIR LEAKAGE SEALING MATERIALS 1501-14***

Materials used to seal air leakage sites must be as nearly impermeable to air movement as possible and form a continuous, nonporous surface over the opening being sealed.

**air sealing materials**  
1501-14

Caulks and sealants must meet either the intermediate or the high performance category. Material standards shall be:

**caulks/sealants**  
1501-14.1

Latex - conformance to ASTM C834.

1501-14.1a

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## OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A

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1501-14.1b	Acrylic (solvent type) - conformance to F.S. TT-S-00230C.
1501-14.1c	Butyl Rubber - conformance to F.S. TT-S-001657.
1501-14.1d	Chlorosulfonated Polyethylene - conformance to F.S. TT-S-00230C.
1501-14.1e	Polysulfide, Polyurethane, and Silicone - conformance to ASTM C920.
1501-14.1f	Acrylic/Latex/Silicone Hybrids - conformance to ASTM C834.
1501-14.1g	Polymeric Isocyanate with Polyol Resin - “commercial availability”.
1501-14.1h	Acoustical Sealants - “commercial availability”.
<b>packing materials</b> 1501-14.2	Packing materials used to fill gaps too large for caulks or sealants to seal properly must be flexible closed cell or otherwise nonporous materials that will not absorb moisture and will remain flexible at low temperatures.
<b>preformed gaskets</b> 1501-14.2a	Preformed Gasket and Sealing Materials - conformance to ASTM C509-.
<b>weatherstripping</b> 1501-14.3	Weatherstripping material - “commercial availability”, excluding felt and flexible foam weatherstripping. Flexible foam adhesive-backed weatherstripping may only be used to seal ceiling-mounted attic accesses and should be mechanically fastened. Weatherstripping around doors and windows, including window channel, door sweeps and thresholds must be able to be mechanically fastened in place.
<b>glazing</b> 1501-14.4	Glazing material - “commercial availability”. Safety glazing material shall conform to 16 CFR Part 1201 and have a minimum thickness of 1/16 inch.
<b>glazing - metal sashes</b> 1501-14.5	Glazing sealant compounds for metal sashes - conformance to ASTM C669.
<b>glazing - wood sashes</b> 1501-14.6	Glazing sealant compounds for wood sashes - conformance to F.S. TT-P-00791 B.
<b>general air barriers</b> 1501-14.7	General Air Impermeable Barrier materials - “commercial availability”. These materials shall be selected as appropriate to their use as described in these standards. The following air barrier materials shall be used for the following conditions:

Polyethylene Sheet Plastic shall have a minimum thickness of 6 mil. and be used as an interior air barrier material when moisture must be kept out of the conditioned space.

**polyethylene**  
1501-14.7a

Spun olefin membrane air infiltration barrier shall be used when moisture must escape from the conditioned space.

**spun olefin**  
1501-14.7b

Wood or Wood Composite Products shall be used where flame retardant abilities are not a factor. When exposed to moisture or weather, all raw exposed wood must be an exterior grade material and primed on all sides.

**wood/wood composites**  
1501-14.7c

Drywall shall be used in interior applications where excessive moisture is not a problem and where flame retardant abilities are a factor.

**drywall**  
1501-14.7d

Metal Flashing shall be used when high temperature or high moisture is a factor.

**metal flashing**  
1501-14.7e

Specialty Air Barrier material - “commercial availability”. Specialty materials include such items as electrical outlet gaskets and plugs, window pulley gaskets and interior wall patching materials.

**special air barriers**  
1501-14.8

Plastic films used to cover prime windows shall be clear vinyl, reusable, have a minimum thickness of 4 mils and seal tightly into a frame which is secured to the casing.

**plastic films**  
1501-14.9

#### *REPLACEMENT PRIME WINDOWS 1501-15*

Replacement prime windows should be thermally improved and the material standards shall meet the following standards.

**prime windows**  
1501-15

Aluminum Frame - conformance to ANSI/AAMA 101.

**aluminum frame**  
1501-15.1

Steel Frame - conformance to Steel Window Institute recommended specifications for steel windows.

**steel frame**  
1501-15.2

Wood Frame - conformance to ANSI/NWMA I.S. 2.

**wood frame**  
1501-15.3

Rigid Vinyl Frame - conformance to ASTM D4099.

**rigid vinyl frame**  
1501-15.4

## OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A

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**manufactured units**  
1501-15.5 For Manufactured dwelling units - conformance to HUD Manufactured Home Construction and Safety Standards, 24 CFR Part 3280, section 3280.403(b); or 3280.404 for egress (fire escape) windows.

### *REPLACEMENT PRIME DOORS 1501-16*

**hinged steel**  
1501-16.1 Hinged Steel - conformance to SDI 100.

**hinged wood**  
1501-16.2 Hinged Wood - Flush Doors - conformance to exterior door provisions of ANSI/NWWDA I.S. 1.

**wood**  
1501-16.3 Pine, Fir, Hemlock, Spruce Doors - conformance to ANSI/NWWDA I.S. 6.

**manufactured units**  
1501-16.4 For manufactured dwelling units - conformance to HUD Manufactured Home Construction and Safety Standards, 24 CFR Part 3280, section 340.405(d).

### *SECONDARY WINDOWS 1501-17*

**aluminum frame**  
1501-17.1 Aluminum frame - conformance to ANSI/AMMA 1002.10.

**wood frame**  
1501-17.2 Wood frame - conformance to Section 3 of ANSI/NWWDA I.S. 2.

**rigid vinyl frame**  
1501-17.3 Rigid vinyl frame - conformance to ASTM D4099.

**removable glazing**  
1501-17.4 Removable, non self-storing - acrylic glazing thickness 1/8 inch and rigid tight sealing frame.

### *REPLACEMENT GAS LINES FOR STOVE 1501-18*

**gas flex line**  
1501-18.1 Flexible gas lines for stoves shall meet ANSI-Z21.24

### *REPLACEMENT WATER HEATERS 1501-19*

**site-built DHW**  
1501-19.1 For site-built units, all replacement DHW units must be UL listed.

**mobile home DHW**  
1501-19-2 For mobile homes all replacement DHW units must be UL listed and must meet the following standard:

HUD Construction and Safety Standards, section 3280.707(d)(1) or (2).

If the DHW unit is to be installed in an area that is isolated from living area, and accessed from the exterior, it can be an atmospheric unit.

**isolated from living area**  
1501-19.3

If the DHW unit is to be installed in an area that is not isolated from living area, and which has either an interior or exterior access, it must be a sealed combustion unit.

**not isolated from living area**  
1501-19.4

### *CARBON MONOXIDE ALARMS 1501-20*

All carbon monoxide alarms shall:

**carbon monoxide alarms**  
1501-20.1

UL 2034-98

**approvals**  
1501-20.1a

Incorporate semiconductor technology.

**sensor type**  
1501-20.1b

Be tamper resistant.

**security**  
1501-20.1c

NOT have a field sensitivity adjustment which is accessible without removing covering.

**adjustment**  
1501-20.1d

Activate the alarm to indicate a gas concentration in excess of 30 ppm carbon monoxide for thirty days or 70 ppm carbon monoxide for 1 hour.

**thresholds**  
1501-20.1e

Not activate in the presence of a CO concentration of less than 70 ppm for less than 60 minutes or 30 ppm for less than 30 days.

**false alarms**  
1501-20.1f

Have a reset button with maximum 6 minute mute (hush).

**reset**  
1501-20.1g

Operate with 24V or 120 V AC power source.

**power**  
1501-20.1h

Have a minimum five year warranty.

**warranty**  
1501-20.1i

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## OWPS 1501 APPENDICES AND REFERENCES—Materials Standards Appendix A

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<b>all raceways</b> 1501-20.2	All types of raceways shall comply with applicable provisions of Article 352 of the NEC.
<b>metallic raceways</b> 1501-20.3	Metallic raceways shall be UL listed for 120 volt applications.
<b>nonmetallic raceways</b> 1501-20.4	Nonmetallic raceways shall be flame resistant per UL 94-VO.
<b>fixture/outlet boxes</b> 1501-20.5	Fixture boxes and outlet boxes shall be UL listed.

### *SMOKE DETECTORS 1501-21*

<b>smoke detectors</b> 1501-21.1	All smoke detectors shall be:
<b>approvals</b> 1501-21.1a	UL listed.
<b>power source</b> 1501-21.1b	Battery operated unless of the hard-wired type, which is connected to the dwelling's electrical system, is required by local code.
<b>all raceways</b> 1501-21.2	All types of raceways shall comply with applicable provisions of Article 352 of the NEC.
<b>metallic raceways</b> 1501-21.3	Metallic raceways shall be UL listed for 120 volt applications.
<b>nonmetallic raceways</b> 1501-21.4	Nonmetallic raceways shall be flame resistant per UL 94-VO.
<b>fixture/outlet boxes</b> 1501-21.5	Fixture boxes and outlet boxes shall be UL listed.