Infrared Thermometer
Home Energy Assessment Questionnaire

Please use this questionnaire along with an infrared thermometer to identify areas that might need attention.

A detailed procedure for determining insulation levels and R-values is described in NDSU Extension publication AE1373, “Determining Insulation and Air Infiltration Levels Using an Infrared Thermometer.”

The bigger the difference between inside and outside air temperatures, the better the following measurements will work.

For information on insulation types and recommended insulation levels consult NDSU Extension publication AE1368, “Insulating to Reduce Heating Costs.”

BASEMENT

❑ Are basement walls or foundations insulated?
  ❑ Yes ❑ No ❑ Not sure

❑ If yes, are they insulated on the inside ____ or outside ____
  – Amount of insulation ______ inches
  – Type of insulation (fiberglass, rigid foam, etc.) _____________________

❑ Are the rim joists, where the basement foundation meets the house framing, insulated? (See image at right.)
  ❑ Yes ❑ No ❑ Not sure

❑ Are there areas where plumbing, electrical or other penetrations are not sealed and insulated? This would be indicated by a difference in temperature or visible air space.
  ❑ Yes ❑ No

❑ Are the basement windows single pane?
  ❑ Yes ❑ No

❑ Can you detect any air leaking around the window frames?
  ❑ Yes ❑ No

❑ What areas did you find that needed attention? __________________________________________________________
  ______________________________________________________________________________________________________
  ______________________________________________________________________________________________________

❑ What actions did you take to remedy any problem areas? _____________________________________________________
  ______________________________________________________________________________________________________
  ______________________________________________________________________________________________________

❑ What actions do you plan to remedy any problem areas? _____________________________________________________
  ______________________________________________________________________________________________________
  ______________________________________________________________________________________________________
LIVING SPACE

Living Room

Use the procedure outlined in NDSU Extension publication AE1373, “Determining Insulation and Air Infiltration Levels Using an Infrared Thermometer,” to estimate wall insulation levels, R-values and possible air leaks in the living room, then use the same basic procedure in each room in the house.

❑ Interior wall temperature _________  Exterior wall temperature _________  Estimated R-value _________

Temperature difference between interior surface of an exterior wall and an interior wall surface for various outside temperatures and insulation values. Insulation R-values are estimates due to inaccuracies in the measuring device.

<table>
<thead>
<tr>
<th>Outside Temp (°F)</th>
<th>Estimated R-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>4.1 2.0 1.4</td>
</tr>
<tr>
<td>20</td>
<td>5.4 2.7 1.8</td>
</tr>
<tr>
<td>25</td>
<td>6.8 3.4 2.3</td>
</tr>
<tr>
<td>30</td>
<td>8.2 4.1 2.7</td>
</tr>
<tr>
<td>35</td>
<td>9.5 4.8 3.2</td>
</tr>
<tr>
<td>40</td>
<td>10.9 5.4 3.6</td>
</tr>
<tr>
<td>45</td>
<td>12.2 6.1 4.1</td>
</tr>
</tbody>
</table>

For example, if you measure the temperature of an exterior wall and the difference in temperature between that wall and an interior wall is 4 °F and the outside air temperature is minus 20 °F, the estimate of the level of insulation in that wall is R-15.

❑ Do you have small areas of exterior walls with differences in temperatures that could indicate no or failing insulation?  Yes  ❑ No

❑ Check for insulation levels in the ceilings that have unheated space above them, such as an attic or exterior roof. Use the same procedure for determining R-values in walls. What is the estimated insulation level in the ceiling?
  – Ceiling R-value ________________

❑ Do you have temperature differences (indicating air leaking) around the windows?  Yes  ❑ No

❑ Do you have air leaking around outlet covers and light switches indicated by a temperature difference?  Yes  ❑ No

❑ Insulation levels often are lower and air often leaks around light fixtures, especially recessed lights. Do you have any temperature difference around light fixtures (that are off for several minutes before testing), indicating lack of insulation or leaking air?  Yes  ❑ No

❑ Do you have a temperature difference around exterior doors indicating air leakage?  Yes  ❑ No

Now repeat the same procedure in each room in the house ➔
<table>
<thead>
<tr>
<th>Room</th>
<th>Estimated wall R-value</th>
<th>Ceiling R-value</th>
<th>Window air leaks</th>
<th>Outlet air leaks</th>
<th>Missing insulation</th>
<th>Light fixture air leaks</th>
<th>Exterior door leaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master Bedroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dining Room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ATTIC

☐ What type of insulation is in the attic?
  ☐ Fiberglass batts ☐ Loose cellulose or fiberglass ☐ Expanding foam ☐ Other _______________________
  ☐ None ☐ Not sure

☐ Roughly how many inches of insulation do you have in the attic? __________

☐ Is the attic access (ladder, door or hatch) in a heated portion of the home?
  ☐ Yes ☐ No

☐ If yes, is the access insulated? ☐ Yes ☐ No

☐ Is air leaking around the attic access? ☐ Yes ☐ No

☐ Do you have a partially finished attic space? ☐ Yes ☐ No
  – If yes, are the knee walls insulated? ☐ Yes ☐ No

☐ Is air leaking around any heating, plumbing or electrical penetrations? ☐ Yes ☐ No

☐ What areas did you find that were in need of attention? __________________________________________________________

☐ What actions did you take to remedy any problem areas? __________________________________________________________

☐ What actions do you plan to remedy any problem areas? __________________________________________________________

ADDITIONAL HOME ENERGY-RELATED ITEMS

☐ What is the age of the home’s heating source (furnace)? __________
  In 1992, the U.S. government established a minimum efficiency rating of 78 percent for furnaces. If your furnace was manufactured prior to 1992, it could be very inefficient.

☐ Are you using a programmable thermostat on your furnace? ☐ Yes ☐ No

☐ Do you have a low-flow shower head installed in your shower? ☐ Yes ☐ No
  Water heating accounts for about 10 percent of household energy consumption. Installing low-flow shower heads reduces this energy use.

For more information on this and other topics, see www.ag.ndsu.edu

NDSU encourages you to use and share this content, but please do so under the conditions of our Creative Commons license. You may copy, distribute, transmit and adapt this work as long as you give full attribution, don’t use the work for commercial purposes and share your resulting work similarly. For more information, visit www.ag.ndsu.edu/agcomm/creative-commons.

County commissions, North Dakota State University and U.S. Department of Agriculture cooperating. NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, mental status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable.

Direct inquiries to Vice Provost for Title IX/ADA Coordinator, Old Main 201, NDSU Main Campus, 701-231-7708, ndsu.eoaa.ndsu.edu. This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881.