

Revisions to the amendments

The following is an itemized list:

Changed all references from 09 to 12

[IBC 01-04](#) IBC Table 1607.1, live loads

[IBC 02-04](#) IBC 3109, pool enclosures

[IBC 04-12](#) revision and addition to IBC sections [202](#), [308.3](#), [308.3.2](#), 308.4, 308.4.1, [310.2](#), [310.5.1](#), 310.6, [310.6.1](#) (new), [310.6.2](#) (new), [425](#) (new), [1008.1.2](#) ex 4, dealing with R-4 occupancies

[IRC 09-01](#) IRC 102.5 Appendices

[IRC 01-04](#) IRC Table 301.5, modifying live loads

[IRC-08-12](#) revision to: IRC N1101.7.1, testing and inspections protocol

[IRC-03-12](#) revision to: IRC N1103.9.3, pool motors

[IRC-02-12](#) revision to: IRC 1503.1, transition fittings

[IRC 41-02](#) revision to: IRC G2415.12, G2415.12.1 burial depth PE pipe

[IRC-05-12](#) revision to: Appendix E, ARS requirements

[IRC-06-12](#) revision to: Appendix I AI101.1, ARS requirements

[IPC 01-12](#) revision to: IPC 405.1, side clearance water closet

[IFGC-41-02](#) revision to: IFGC 404.12, 404.12.1 burial depth for PE pipe

[IMC-02-12](#) revision to: Section 505.1, transition fittings

[IMC-07-12](#) revision to: Section 1004.1, boilers

[IECC-08-12](#) revision to: IECC R102.1.2, testing and inspections protocol

[IECC-03-12](#) revision to: Section R403.9.3, pool motors

AZBO Code Review and Development Committee

AZBO 2012 ICC Codes Amendments recommended for the 2012 ICC Codes

This report is a compilation of the AZBO amendments to the 2012 ICC codes that the Code Review and Development Committee have recommended to be included with the 2012 ICC codes to assist those jurisdictions in the adoption of the 2012 ICC codes. In addition, previous amendments that were not successful in the ICC code change process have been deleted. The items noted as "AZ only"

have been determined by the committee to be items unique to Arizona in accordance with the guidelines approved by the AZBO Board of Directors.

The items are identified by the initials of the affected code, the original number assigned by the committee and the year the item was originally approved by the committee.

2012 INTERNATIONAL BUILDING CODE

IBC-01-04 (AZ Only)

Revision to: Table 1607.1

Revise as follows:

| OCCUPANCY OR USE | UNIFORM (psf) | CONCENTRATED (lbs.) |
|---|-------------------------|------------------------|
| 25. Residential One- and two-family dwellings | | - |
| Uninhabitable attics with storage ^{i,j,k} | 20 <u>40</u> | |
| Habitable attics and sleeping areas ^k (no other changes in item 25) | 30 <u>40</u> | |

Reason: Industry standards in Arizona indicate designers based their calculations on the 40 psf for all second floor areas. Although this does exceed the minimum requirements set forth by the code, the committee members representing the building industry indicated the homebuilders and designers preferred to continue with the 40 psf in bed room areas. The increased design would lessen deflection in floor systems, provide a uniform design for headers and lessen complaints from buyers.

IBC-02-04 (AZ Only)

Revision to: 3109

Revise as follows:

Section 3109 is hereby REPEALED

Reason: The requirements of this section do not comply with Arizona state law governing swimming pool enclosure requirements.

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IBC-04-12 (AZ only)

Revision to: Sections 202, 308.3, 308.3.2, 308.4, 308.4.1, 310.5.1, 310.6, 310.6.1 (new), 310.6.2 (new), 425 (new), 1008.1.2 ex 4

Revise as follows:

SECTION 202

DEFINITIONS

PERSONAL CARE SERVICE ~~The care of persons who do not require medical care. Personal care involves responsibility for the safety of persons while inside the building.~~ Assistance with activities of daily living that can be performed by persons without professional skills or professional training and includes the coordination or provision of intermittent nursing services and administration of medications or treatments.

SUPERVISORY CARE SERVICE General supervision, including daily awareness of resident functioning and continuing needs.

DIRECTED CARE SERVICE Care of residents, including personal care services, who are incapable of recognizing danger, summoning assistance, expressing need, or making basic care decisions.

ASSISTED LIVING FACILITY A residential care institution, including adult foster care, that provides or contracts to provide supervisory care services, personal care services or directed care services on a continuing basis.

ASSISTED LIVING CENTER An assisted living facility that provides resident rooms or residential units to eleven or more residents.

ASSISTED LIVING HOME An assisted living facility that provides resident rooms to ten or fewer residents.

INSTITUTIONAL GROUP I

308.3 Institutional Group I-1. This occupancy shall include buildings, structures or portions thereof for more than 16 persons who reside on a 24 hour basis in a supervised environment, ~~and receive custodial care, and~~ The persons receiving care are capable of self-preservation, except as provided for assisted living centers. This group shall include, but not be limited to, the following:

Alcohol and drug centers

~~Assisted living facilities~~ centers

Congregate care facilities

Convalescent facilities

Group homes

Halfway houses

Residential board and *custodial care* facilities

Social rehabilitation facilities

308.3.2 Six to sixteen persons receiving care. A facility such as above, housing not fewer than six and not more than 16 persons receiving such care, shall be classified as Group R-4, except as provided for assisted living homes.

308.4 Institutional Group I-2. This occupancy shall include buildings and structures used for *medical care* on a 24-hour basis for more than five persons who are *incapable of self-preservation*. This group shall include, but not be limited to, the following:

Foster care facilities

Detoxification facilities

Hospitals

Nursing homes Assisted Living Centers (Ed. Note: In AZ, this term is used within the licensing program as a general descriptor. However, since the licensing scheme includes both small (max 10), and larger (>10) facilities, including under I-2 is misleading, I suggest we replace with ALC. Retaining the nursing home definition in Ch 2 does no harm.)

Psychiatric hospitals

~~**308.4.1 Five or fewer persons receiving care.** A facility such as the above with five or fewer persons receiving such care shall be classified as Group R-3 or shall comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3 or with Section P2904 of the *International Residential Code*.~~

SECTION 310

310.2 Definitions The following terms are defined in Chapter 2:

ASSISTED LIVING FACILITY

ASSISTED LIVING CENTER

ASSISTED LIVING HOME

BOARDING HOUSE

CONGREGATE LIVING FACILITIES.

DIRECTED CARE SERVICES

DORMITORY

GROUP HOME

PERSONAL CARE SERVICE

SUPERVISORY CARE SERVICES

TRANSIENT

310.5.1 Care facilities within a dwelling. ~~Licensed care facilities for five 10 or fewer persons receiving care that are within a single-family dwelling are permitted, to comply with the *International Residential Code* provided an *automatic sprinkler system* is installed in accordance with Section 903.1.3 or Section P2904 of the *International Residential Code* provided that the requirements of Section 425 of this code are met.~~

310.6 Residential Group R-4. This occupancy shall include buildings, structures or portions thereof for more than five but not more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised residential environment and receive *custodial care*, **but does not include *assisted living centers***. The persons receiving care are capable of self-preservation, **except as provided for *assisted living homes***. This group shall include, but not be limited to, the following:

Alcohol and drug centers

Assisted living facilities-homes

Congregate care facilities

Convalescent facilities

Group homes

Halfway houses

Residential board and *custodial care* facilities

Social rehabilitation facilities

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code and Section 425.

310.6.1. Condition 1. This occupancy condition shall include facilities licensed to provide supervisory care services, in which occupants are capable of self-preservation by responding to an emergency situation without physical assistance from staff. Condition 1 facilities housing more than 10 persons shall be classified as Group I-2-I-1.

310.6.2 Condition 2. This occupancy condition shall include facilities licensed to provide personal or directed care services , in which occupants are incapable of self-preservation by responding to an emergency situation without physical assistance from staff. Condition 2 facilities housing more than 10 persons shall be classified as Group I-2.

SECTION 425 ASSISTED LIVING HOMES

425.1 Applicability. The provisions of this section shall apply to a building or part thereof housing not more than 10 persons, excluding staff, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment, which provides licensed care services. Except as specifically required by this division, R-4 occupancies shall meet all the applicable provisions of Group R-3.

425.2 General. Building or portions of buildings classified as R-4 may be constructed of any materials allowed by this code, shall not exceed two stories in height nor be located above the second story in any building and shall not exceed two thousand square feet above the first story, except as provided in Section 506.

425.3 Special Provisions. R-4 occupancies having more than 2000 square feet above the first story shall be of not less than one-hour fire-resistive construction throughout.

425.3.1 Mixed Uses. R-4 occupancies shall be separated from other occupancies as provided in Table 508.4.

425.4 Access and Means of Egress Facilities

425.4.1 Accessibility. R-4 occupancies shall be provided with at least one accessible route as provided in Section 1104.1.

425.4.2 Exits

425.4.2.1 Number of Exits. Every story, basement, or portion thereof shall have not less than two exits.

Exception: Basements and stories above the first floor containing no sleeping rooms used by residents may have only one means of egress as provided in Chapter 10.

425.4.2.2 Distance to Exits. The maximum travel distance shall comply with Section 1016, except that the maximum travel distance from the center point of any sleeping room to an exit shall not exceed 75 feet.

425.4.2.3 Emergency Exit Illumination. In event of a power failure, exit illumination shall be automatically provided from an emergency system powered by storage batteries or an onsite generator set installed in accordance with the International Electric Code.

425.4.2.4 Emergency Escape and Rescue. R-4 occupancies shall comply with the requirements of Section 1029, except that Exception #1 to 1029 does not apply to R-4 occupancies.

425.4.2.5 Delayed Egress Locks. In R-4 Condition 2 occupancies, delayed egress locks shall be permitted in accordance with 1008.1.9.7, Items 1, 2, 4, 5, and 6.

425.5 Smoke Alarms and Sprinkler Systems.

425.5.1 Smoke Alarms. R-4 occupancies shall be provided with smoke alarms installed in accordance with 907.2.1.1.2, and such alarms shall be installed in all habitable rooms.

425.5.2 Sprinkler Systems. R-4 occupancies shall be provided with a sprinkler system installed in accordance with 903.3.1.3. Sprinkler systems installed under this section shall be installed throughout, including attached garages, and in Condition 2 facilities, shall include concealed spaces of or containing combustibles. Such systems may not contain unsupervised valves between the domestic water riser control valve and the sprinklers. In Condition 2 occupancies, such systems shall contain water flow switches electrically supervised by an approved supervising station, and shall sound an audible signal at a constantly attended location.

1008.1.2, Door Swing, delete the text of exception #4, and replace with the following:

4. Doors within or serving a single dwelling unit in Groups R-2 and R-3, as applicable in 101.2, and R-4.

Reason: The purpose of this amendment is to bring the provisions of the code into agreement with the licensing rules of the Arizona Department of Health Services. DHS license categories have a threshold of 10 residents to move from a residential home setting to an institutional setting. DHS rules (R9-10-701) state, "Assisted living home" or "home" means an assisted living facility that provides resident rooms to (10) or fewer residents, as distinct from an "assisted living center", which provides services to more than (10) persons. In addition, the license classifications to provide "personal care services" and "directed care services" to residents allow for residents to be bed-bound. The use of "Condition" distinctions is reflective of similar distinctions in I-occupancies.

Each state has unique agency programs for assisted living occupancies, which establish license categories based on numbers of residents and the familiar ambulatory/non-ambulatory distinction. Uniformity could be accomplished by either trusting health service agencies nationally to agree to uniform thresholds and other licensing characteristics, or by amending building codes to allow each state to adapt to that state's unique rules. If numerical thresholds are provided on a "fill in the blanks" basis, condition categories can be added or deleted, and definitions can be customized to match licensure definitions, the hazards associated with these facilities can be addressed comprehensively on a state-by-state basis.

The most hazardous scenario is a facility in an ordinary, un-rated residential structure, occupied by (10) bed-bound residents, supervised by a single caregiver. Provisions for exiting, smoke detectors, emergency

illumination, sprinklers, et al, can substantially increase the chances of survival in a fire or other emergency for these residents.

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2012 INTERNATIONAL RESIDENTIAL CODE

IRC-01-04 (AZ only)

Revision to: TABLE R 301.5

Revise as follows:

| USE | LIVE LOAD |
|------------------------------------|-------------------------|
| Attics with storage ^{b,g} | 20 <u>40</u> |
| Sleeping rooms | 30 <u>40</u> |

(No other changes to Table)

Reason: Industry standards in Arizona indicate designers based their calculations on the 40 psf for all second floor areas. Although this does exceed the minimum requirements set forth by the code, the committee members representing the building industry indicated the homebuilders and designers preferred to continue with the 40 psf in bed room areas. The increased design would lessen deflection in floor systems, provide a uniform design for headers and lessen complaints from buyers.

IRC-09-01 (AZ only)

Revision to: IRC 102.5

Revise as follows:

102.5 Appendices. Provisions in the appendices shall not apply unless specifically adopted. The following appendices are adopted:

Appendix A SIZING AND CAPACITIES OF GAS PIPING

Appendix B SIZING OF VENTING SYSTEMS SERVING APPLIANCES EQUIPPED WITH DRAFT HOODS, CATEGORY I APPLIANCES, AND APPLIANCES LISTED FOR USE AND TYPE B VENTS

Appendix C EXIT TERMINALS OF MECHANICAL DRAFT AND DIRECT-VENT VENTING SYSTEMS

Appendix D RECOMMENDED PROCEDURE FOR SAFETY INSPECTION OF AN EXISTING APPLIANCE INSTALLATION

Appendix E MANUFACTURED HOUSING USED AS DWELLINGS

Appendix H PATIO COVERS

Appendix I PRIVATE SEWAGE DISPOSAL

Appendix J EXISTING BUILDINGS AND STRUCTURES

Appendix K SOUND TRANSMISSION

Reason: Comply with State and Federal laws.

IRC-08-12

Revision to: Section N1102.1

Revise as follows:

RESNET Testing & Inspection Protocol. The Residential Energy Services Network (RESNET) Mortgage Industry National Home Energy Rating System Standards Protocol for third party testing and inspections, shall be deemed to meet the requirements of sections N1102.4.1.1, N1102.4.1.2 and N1103.2.2, and shall meet the following conditions:

1. Third Party Testing and Inspections shall be completed by RESNET certified Raters or Rating Field Inspectors and shall be subject to RESNET Quality Assurance Field Review procedures.
2. Sampling in accordance with Chapter 6 of the RESNET Standards shall be performed by Raters or Rating Field Inspectors working under a RESNET Accredited Sampling Provider.
3. Third Party Testing is required for the following items:
 - a. 402.4.1.1 –Building Envelope – Thermal and Air Barrier Checklist
 - b. R402.4.1.2 –Testing – Air Leakage Rate
 - c. R403.2.2 – Sealing – Duct Tightness
4. The other requirements identified as “mandatory” in Chapter 4 shall be met.
5. Alternate testing and inspection programs and protocols shall be allowed when approved by the Code Official.

Reason: Maricopa Association of Governments Building Code Committee has reviewed the Third Party Testing and Inspection procedures of the Residential Energy Services Network (RESNET) with the intent to promote and present uniform guidelines for the acceptance of the RESNET Mortgage Industry National Home Energy Rating System Standards (Standards) as an “Above Code Program” for the jurisdictions within Maricopa County.

The inspection and testing required under the 2012 International Residential Code (IRC) and the 2012 International Energy Conservation Code (IECC) is currently being performed under the RESNET Standards for home builders participating in the Environmental Protection Agency’s ENERGY STAR for Homes Program.

The RESNET Standards (Chapters 3, 6, and 8) are in the process of being certified as ANSI Standards; and The utilization of the RESNET Standards would assure home builders of the ability to continue a testing and inspection process that has been proven to be successful in saving energy while protecting the health, safety and welfare of the public in the building code sections covered by the program.

The committee has researched and discussed this issue and determined that the intent of the code is being met by the acceptance of the testing and inspection protocols of the RESNET Standards.

The committee will hear the final form and draft requested of the Ad Hoc committee (as proposed above) at their meeting scheduled for January 16, 2013, and will be voting on this item (after full committee review) as a new MAG standard.

IRC-03-12

Revision to: Section N1103.9.3

Revise as follows:

~~N1103.9.3. Heated pools and in-ground permanently installed spas shall be provided with a vapor-resistant cover.~~

~~Exception: Pools deriving over 70% of the energy for heating from site recovered energy, such as a heat pump or solar energy source computed over an operating season.~~

(New) N1103.9.3 Motors-Motors with a total horsepower of one or more for pools and in-ground permanently installed spas shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate and shall be operated with a pump control with the capability of operating the pump at two or more speeds. Residential pool pump motor controls that are sold for use with a two or more speed motor shall have a default circulation speed setting no more than one-half of the motor's maximum rotation rate. Any high speed override capability shall be for a temporary period not to exceed one twenty-four hour cycle without resetting to the default setting.

Reason: Swimming pools are the second largest electrical load for most single-family residential buildings with pools, and multi-speed pumps can perform satisfactorily using 1/3 less energy than traditional single-speed pumps. These savings will be achieved continuously and require no effort by the homeowner. Pool covers can be shown to conserve water and energy, but may not be used consistently by homeowners, and are problematic for many pool designs.

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IRC-02-12

Revision to: Section 1503.1

Revise as follows:

1503.1 **General.** Range hoods shall discharge to the outdoors through a single wall duct. The duct serving the hood shall have a smooth interior surface, shall be airtight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Changes in size or direction shall be accomplished with an approved transition fitting. Ducts serving range hoods shall not terminate in an attic or crawl space or in areas inside the building.

Reason: The taped connections allowed by the code fail quickly in the event of a grease fire occurring when the exhaust is operating, and taped connections are recognized as non-durable. Without mechanical connections to keep the exhaust system intact, flame can be fan-forced into unprotected attics in the event of a fire. Under normal (non-emergency) circumstances, taped connections will fail, and allow exhaust directly into attics. This change clarifies the Code's intent, that these connections be made permanently, reliably intact.

IRC-41-02 (AZ only)

Revision to: Section G2415.12

Revise as follows:

G2415.12 (IFGC404.12) Minimum burial depth. Underground piping systems shall be installed a minimum depth of 12 inches (305 mm) below grade ~~except as provided for in section G2415.12.1 for metal piping and 18 inches (457mm) for plastic piping.~~

~~**G2415.12.1 (IFGC 404.12.1) Individual outside appliances.** Individual lines to outside lights, grills or other appliances shall be installed a minimum of 8 inches (203 mm) below finished grade, provided that such installation is approved and is installed in locations not susceptible to physical damage.~~

Reason: The distinction between metal piping and plastic piping in regards to burial depth is because the plastic piping is more susceptible to damage and needs the increased depth for protection.

The elimination of the section addressing individual outside appliances is because the risks are the same whether the line serves multiple appliances or a single appliance. With similar risks, similar depths should be required.

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IRC-05-12

Revision to: Appendix E

DELETE this portion in its entirety and REPLACE as follows:

See State office of Manufactured Housing Regulations.

Reason: Changes to coordinate with ARS

IRC-06-12

Revision to: Appendix I A1101.1

DELETE this portion in its entirety and REPLACE as follows:

See State Department of Environmental Quality Regulations.

Reason: Changes to coordinate with ARS

2012 INTERNATIONAL PLUMBING CODE

IPC-01-12

Revision to: Section 405.3.1

Revise as follows:

Exception. Side Clearances for accessible or ambulatory water closets shall comply with ICC/ANSI A117.1.

Reason: Side clearances for water closets range from 10” to 18” in ANSI A117.1 and in the 2010 ADA Standards. The IPC needs to acknowledge these requirements.

2012 INTERNATIONAL FUEL GAS CODE

IFGC-41-02

Revision to: Section 404.12 and 404.12.1

Revise as follows:

404.12 Minimum burial depth. Underground piping systems shall be installed a minimum depth of 12 inches (305 mm) below grade, ~~except as provided for in Section 404.12.1 for metal piping and 18 inches (457mm) for plastic piping.~~

~~**404.12.1 Individual outside appliances.** Individual lines to outside lights, grills or other *appliances* shall be installed a minimum of 8 inches (203 mm) below finished grade, provided that such installation is *approved* and is installed in locations not susceptible to physical damage.~~

Reason: The distinction between metal piping and plastic piping in regards to burial depth is because the plastic piping is more susceptible to damage and needs the increased depth for protection.

The elimination of the section addressing individual outside appliances is because the risks are the same whether the line serves multiple appliances or a single appliance. With similar risks, similar depths should be required.

2012 INTERNATIONAL MECHANICAL CODE

IMC-02-12

Revision to: Section 505.1

Revise as follows:

505.1 Domestic Systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are located within dwelling units, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum, or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems. Changes in size or direction shall be accomplished with an approved transition fitting.

Reason: The taped connections allowed by the code fail quickly in the event of a grease fire occurring when the exhaust is operating, and taped connections are recognized as non-durable. Without mechanical connections to keep the exhaust system intact, flame can be fan-forced into unprotected attics in the event of a fire. Under normal (non-emergency) circumstances, taped connections will fail, and allow exhaust directly into attics. This change clarifies the Code's intent, that these connections be made permanently, reliably intact.

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IMC-07-12

Revision to: Section 1004.1

Revise as follows:

1004.1 Standards. Oil-fired boilers and their control systems shall be listed and labeled in accordance with UL 726. Electric boilers and their control systems shall be listed and labeled in accordance with UL 834. ~~Solid fuel fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed and constructed in accordance with the requirements of ASME CSD 1 and as applicable, the ASME Boiler and Pressure Vessel Code, Section I or IV; NFPA 8501; NFPA 8502 or NFPA 8504.~~ Boilers shall be designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code, and Arizona Boiler Rules, Title 20 Chapter 5.

Reason: Changes to coordinate with ARS.

2012 INTERNATIONAL ENERGY CONSERVATION CODE

IECC-08-12

Revision to: Section R102.1

Revise as follows:

RESNET Testing & Inspection Protocol. The Residential Energy Services Network (RESNET) Mortgage Industry National Home Energy Rating System Standards Protocol for third party testing and inspections, shall be deemed to meet the requirements of sections R402.4.1.1, R402.4.1.2 and R403.2.2. and shall meet the following conditions:

1. Third Party Testing and Inspections shall be completed by RESNET certified Raters or Rating Field Inspectors and shall be subject to RESNET Quality Assurance Field Review procedures.
2. Sampling in accordance with Chapter 6 of the RESNET Standards shall be performed by Raters or Rating Field Inspectors working under a RESNET Accredited Sampling Provider.
3. Third Party Testing is required for the following items:
 - d. 402.4.1.1 –Building Envelope – Thermal and Air Barrier Checklist
 - e. R402.4.1.2 –Testing – Air Leakage Rate
 - f. R403.2.2 – Sealing – Duct Tightness
4. The other requirements identified as “mandatory” in Chapter 4 shall be met.
5. Alternate testing and inspection programs and protocols shall be allowed when approved by the Code Official.

IECC-03-12

Revision to: Section R403.9.3

Revise as follows:

~~R403.9.3. Heated pools and in-ground permanently installed spas shall be provided with a vapor-resistant cover.~~

~~Exception: Pools deriving over 70% of the energy for heating from site recovered energy, such as a heat pump or solar energy source computed over an operating season.~~

(New) R403.9.3. Motors with a total horsepower of one or more for pools and in-ground permanently installed spas shall have the capability of operating at two or more speeds with a low speed having a rotation rate that is no more than one-half of the motor's maximum rotation rate and shall be operated with a pump control with the capability of operating the pump at two or more speeds. Residential pool pump motor controls that are sold for use with a two or more speed motor shall have a default circulation speed setting no more than one-half of the motor's maximum rotation rate. Any high speed override capability shall be for a temporary period not to exceed one twenty-four hour cycle without resetting to the default setting.

Reason:

Swimming pools are the second largest electrical load for most single-family residential buildings with pools, and multi-speed pumps can perform satisfactorily using 1/3 less energy than traditional single-speed pumps. These savings will be achieved continuously and require no effort by the homeowner. Pool covers can be shown to conserve water and energy, but may not be used consistently by homeowners, and are problematic for many pool designs.

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