

WHITE PAPER:

# HOME REMODELING & AFCI PROTECTION



NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION  
Low Voltage Distribution Equipment Section

## **Introduction**

Americans spent more than \$235 billion on home remodeling in 2007<sup>1</sup>, fueled in part by do-it-yourself home centers, television channels devoted to home improvement, and countless numbers of magazines, books and Web sites that cater to this ever-increasing trend. In addition, in the first 12 months after purchasing a newly-built home, owners spend an average of \$8,900 to furnish, decorate and improve it.<sup>2</sup>

While many home improvement and remodeling projects can be tackled by the homeowner, some others may call for professional assistance, for example those requiring changes to the home's electrical system. Several electrical-related factors may come into play over the course of a remodeling project, such as the removal and replacement of wiring, addition of electrical receptacles and lighting or an increase in the home's overall electrical capacity. Consideration for each of these factors during the remodeling process will help to guarantee the integrity of the home's electrical system.

Remodeling has a significant impact on the home's overall value. Considering the often high costs associated with many remodeling projects, homeowners should take the extra steps to ensure their homes are appropriately protected by adding electrical safeguards during the remodeling process. One way to do this is by upgrading the electrical system with arc-fault circuit interrupters (AFCIs), an innovative form of circuit breakers designed to detect dangerous electrical conditions that may lead to an electrical fire in the home.

Upgrading to AFCI protection during the course of a remodeling project not only is cost-effective, but also significantly enhances the overall safety of the home.

## **Keys to Remember**

A national survey of more than 75 million Americans found that one out of four home owners never checks for electrical hazards such as overheated cords, overloaded outlets / circuits or other potentially dangerous conditions.<sup>3</sup> These findings stress the importance of making electrical safety a priority in the remodeling process, where an uncorrected electrical problem can lead to a potentially disastrous situation, such as an electrical fire.

Whether it's tearing down a wall or putting one up, many remodeling projects come with some form of consideration for the home's electrical system, such as adding lighting fixtures, moving wall receptacles or replacing the wiring. With this in mind, homeowners should educate themselves about potential life-saving technology that can significantly decrease the chance of an electrical fire starting in the first place.

## **Common Scenarios**

The following section reviews three common remodeling scenarios where the home's electrical system may need to be altered in some form. While the complexity of each depends on the construction of the house, an opportunity to install AFCIs exists, and homeowners should strongly consider spending the additional minimal expense to ensure their new investment is further protected.

### **1) Basement Remodel**

One of the more popular remodeling projects homeowners undertake is to transform an unfinished basement into additional living space. The average cost to finish the lower level of a house is approximately \$59,000.<sup>4</sup> This may include the creation of a 20-by-30-foot entertaining area and a 5-by-8-foot full bath, as well as a partition to enclose an area for storage and mechanical equipment.

Many electrical needs must be addressed for finishing an area. Since basements tend to be dark and gloomy, one of the first steps a homeowner typically considers is to add lighting, which makes a significant difference in the basement's overall feel. Lighting options can include fixtures hung from the ceiling, mounted on walls, table and floor lamps or recessed lighting coming out of a low ceiling. All of these options require alterations or additions to the electrical wiring.

In addition to lighting needs, electrical wiring may need to be installed to accommodate the outlet needs for audio/video equipment. Additional electrical work will be needed for the bathroom, including lighting fixtures and electrical outlets. Also, a homeowner may want to install a wet bar featuring an under-counter refrigerator and other appliances, again requiring additional electrical work.

In other situations, the electrical needs associated with a remodeling project of this magnitude may require the homeowner to install additional circuits to the home's existing load center, which may lead to the installation of an additional sub-panel to accommodate the extra circuit breakers.

As you can see, the amount of electrical work needed for a basement remodel may vary, but it's vital that it's done correctly and safely by a qualified electrician. This common scenario provides an excellent opportunity to increase the level of protection to the home's electrical system. Adding AFCI protection to the circuits that serve the lighting, audio/video and other appliances will provide a safeguard to detect hidden issues such as:

- damaged electrical wire from the installation process
- light fixture or outlet grounding problems that can occur during installation
- potential electrical problems that can be detected with appliances or electronic equipment connected to the circuits in the future

It is important that electrical wiring for AFCIs be correct so that the device works properly and avoids nuisance tripping. Installing a new circuit will eliminate any wiring issues that may have crept in over the years on existing circuits.

### 2) Attic Remodel

A similar project many homeowners undertake is to convert unfinished attic space into a bedroom or other living area for the home. The average cost for an attic remodel is approximately \$47,000.<sup>4</sup> This project would include an extensive amount of work, such as the addition of a bathroom, new windows and closet space under the eaves. Additionally, the homeowner would want to insulate and finish the ceiling and walls, as well as extend the home's HVAC system to the new space.

Many of the same electrical and lighting needs required for a basement remodel would also come into play for this project – the addition of electrical outlets, rerouting wiring from existing load centers and more. As with any project of this magnitude, adding AFCI protection to the electrical system is an element that should be taken into strong consideration as the 2008 NEC would consider this a “living area” that would require AFCI protection.

### 3) Removing or Adding a Wall

Two other common home remodeling projects homeowners undertake is tearing down a wall to increase the use of a particular living space, or create an entirely different area by putting up a wall. For example, tearing down a wall may open up the living room to the kitchen or the kitchen to the dining room, whereas the addition of a wall may be used to create a home office.

Typically, the wall that will be removed currently houses part of an electrical circuit in the cavity. This can present various problems or decisions, such as rerouting wiring through the ceiling, replacing old wiring, installing new receptacles and/or other factors.

For example, when the receptacle from the wall being torn down is moved, the homeowner may want to move it to one side of the newly open space, or add another receptacle so there is one on each side. This would require rerouting wire from its original source to its new destination, which may result in replacing the wire from the nearest junction or work box with a longer wire that can extend to the new receptacle. The electrician may also have to install two work boxes on either end of the area and purchase more wire to reroute it if a receptacle is desired on either side of where the wall was once located.

In the case of constructing a wall to create a home office, many of the same factors apply. Electrical work may consist of adding outlets and rewiring the room for a computer, fax machine and other electronic equipment, as well as cable and telephone lines.

The cost of electrical work varies on the current condition of the electrical system and scale of the project. Regardless, when electrical wiring is rerouted from one location to another or needs to be replaced entirely, the homeowner should take this opportunity and consider adding AFCI protection to these circuits therefore, protecting their investment in the project.

### **AFCI Technology: Worth Every Penny**

Each year, electrical fires claim approximately 485 lives and cause \$868 million in property damage. The U.S. Consumer Products Safety Commission (CPSC) estimates that AFCIs, if installed in all homes, could have prevented more than 50 percent of these fires<sup>5</sup>. The U.S. Department of Housing and Urban Development also lists the technology as a key device in preventing burns and fire-related injuries.<sup>6</sup>

The 1999-2005 versions of the National Electrical Code<sup>®</sup> (NEC<sup>®</sup>) require that AFCIs be installed in bedrooms during all new home construction. The NEC<sup>®</sup> is the country's most universally adopted electrical installation code with more than a 100-year track record of providing electrical safety for millions of Americans.

The 2008 NEC<sup>®</sup> expands its AFCI requirement to more locations in the home. However, AFCIs can also be retrofitted to older homes, where older wiring and outdated electrical work may increase the threat of an electrical fire. Residents considering a remodel, whether large or small, should strongly consider using it as an opportunity to upgrade their homes with the potentially life-saving device, increasing the level of protection to the home electrical system and therefore decreasing the threat of an electrical fire.

In addition, homeowners will find the cost of AFCIs to be less than many "non-safety" related upgrades that are typical during the remodeling process. In fact, the cost of AFCI protection is relatively insignificant when comparing it to other major home remodeling projects where electrical work may play a significant role, and especially when considering the device reduces the likelihood of electrical fires, and their resulting injuries and death.

AFCIs can be found at electrical distributors, hardware stores and home centers across the country for approximately \$30-\$35 each, not including the cost of installation which is essentially the same as a standard circuit breaker. As you can see from the following table, AFCIs account for a fraction of the total cost of some common remodeling projects, based on adding two AFCI circuit breakers:

<b>Remodeling Project</b>	<b>Cost</b>	<b>AFCI Unit Cost</b>	<b># of AFCI Units</b>	<b>Total AFCI Cost</b>
Basement	\$59,435	\$35.00	2	\$70
Home Office	\$27,193	\$35.00	2	\$70
Attic Bedroom	\$46,691	\$35.00	2	\$70
Family Room	\$27,193	\$35.00	2	\$70

(Remodeling Cost vs. Value Report 2007)

### **Summary**

These figures emphasize the relatively low cost of adding AFCI protection to electrical work associated with these common remodeling projects. AFCIs are a technological leap forward in electrical safety, and given the billions of dollars spent each year on home remodeling projects, homeowners should seriously consider taking the extra step and upgrade to this proven safety device.

It's fair to ask the question, if the homeowner is spending x amount of dollars to upgrade a specific area of the home, isn't it wise to take that opportunity to ensure the long-term investment is further protected from electrical arcing conditions that may spark a fire.

## **References**

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