



Air Conditioning & Heating

THE FUTURE OF AIR CONDITIONING...
SMALLER IS SMARTER!



Thank goodness for Goodman®.

THE FUTURE BEGINS TODAY.

SMALLER IS SMARTER

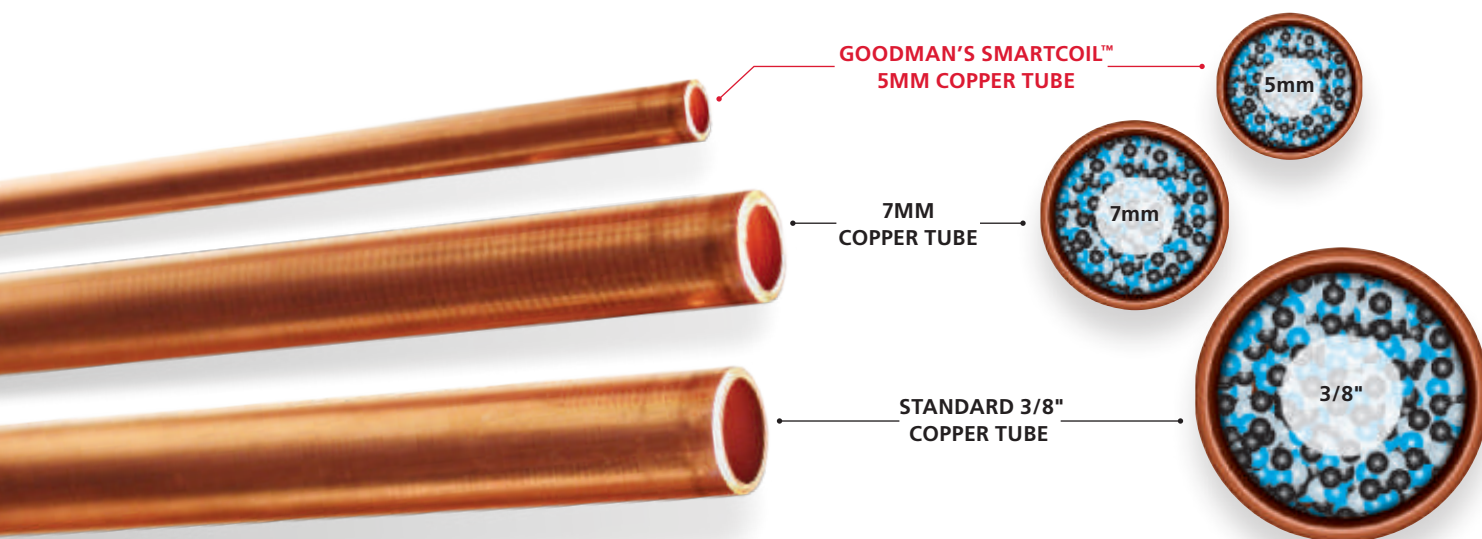
Long ago the HVAC industry determined that the combination of copper tubing and aluminum fins provided the most efficient transfer of thermal heat available. Today, the Goodman® brand has improved upon this industry standard by making the copper tubing smaller and smarter. The result is an air conditioner or heat pump unit that can offer high efficiency, use less refrigerant, and deliver money-saving and energy-saving comfort to homeowners for years and years. Goodman's **SmartCoil™** condenser coil is our most advanced and most efficient coil manufactured in North America. Two patents have been granted on the technology and processes for manufacturing the SmartCoil™.

Beyond the excellent thermal transfer properties of R-410A refrigerant when it's coupled with 5mm copper tubing, the smaller diameter tubing requires less refrigerant to achieve the same efficiency rating.

SIZE MATTERS

The smallest amount of heat transfer occurs in the center of the tubing. The larger the tubing size, the larger the area where minimal heat transfer increases.

Images enlarged to show detail.



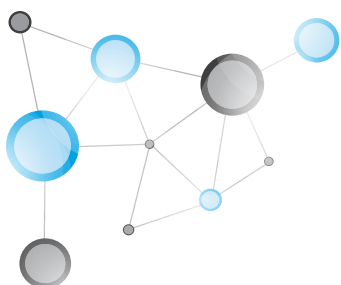
SMARTCOIL™ GENERATES GREATER PERFORMANCE.

Thermal transfer is a major component in the operation and performance of an air conditioning or heat pump product. One simple job of the refrigerant in an air conditioning or heat pump system is to transfer heat, and, in the process, humidity, from the air. Because the majority of thermal transfer occurs in the condenser and evaporator coils, the Goodman engineers readily accepted the challenge of optimizing thermal transfer in the condenser coils for products that use R-410A refrigerant. After all, the heritage of the Goodman® brand involves energy-saving, money-saving,

and resource-saving heating and cooling systems. So the introduction of R-410A refrigerant offered the perfect opportunity to optimize the heat transfer efficiency properties of R-410A refrigerant. In their quest, Goodman's engineers quickly resolved that the thermo-physical properties of R-410A refrigerant are a great match for the heat transfer characteristics of 5mm diameter copper tubing. Scientific theory aside, it's easy to see why smaller tubing in the condenser coil optimizes heat transfer.

THE HEAT TRANSFER PROCESS

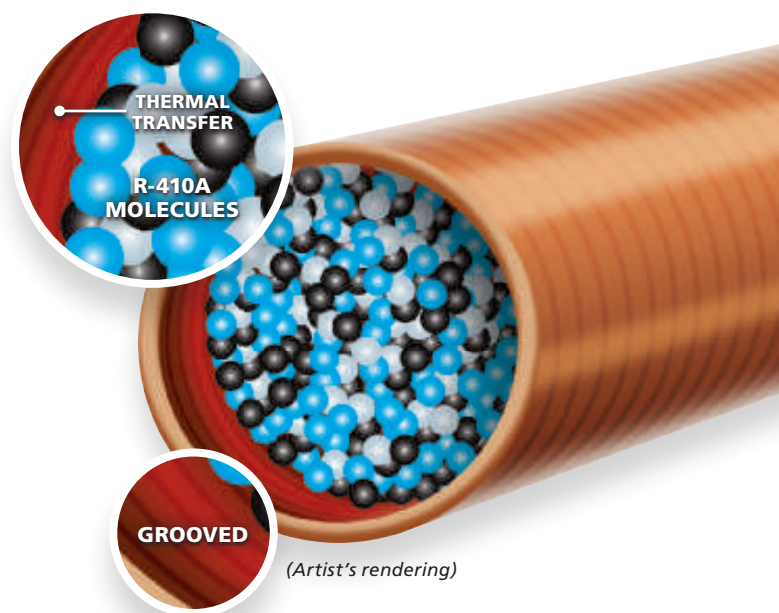
- Maximum heat transfer between the refrigerant molecules occurs highest at the outside edge of the tubing.
- Through osmosis, additional heat transfer occurs when the molecules in the center of the tubing touch the molecules at the outer edge of the tubing, releasing heat and becoming cooler.
- The smallest amount of heat transfer occurs in the center region of the tubing. The larger the tubing size, the area where minimal heat transfer occurs increases in size.
- Using the Second Law of Thermodynamics, heat can be transferred into cold during the transfer of energy such as the R-410A refrigerant molecules touching the side of the 5mm copper tubing.
- The physical size of the area that comes into contact and the length of time the contact occurs helps optimize the heat transfer. And that's specifically what makes the R-410A refrigerant and the 5mm copper tube combination work so well together.



Maximum heat transfer between the chlorine-free R-410A refrigerant molecules occurs highest at the outside edge of the tubing.

GROOVED COPPER TUBING

- Grooves increase thermal transfer of R-410A refrigerant in conjunction with 5mm copper tubing.
- The refrigerant molecules swirl inside the grooved copper tubing, increasing the time the refrigerant molecule comes into contact with the inside of the tubing.
- 'Slots' increase the total surface area of the tubing and increase the amount of space available for the refrigerant molecules to touch the inside of the tubing, optimizing heat transfer.



SAVE SPACE.
SAVE ENERGY.
MAXIMIZE
PERFORMANCE.



SAVING SPACE

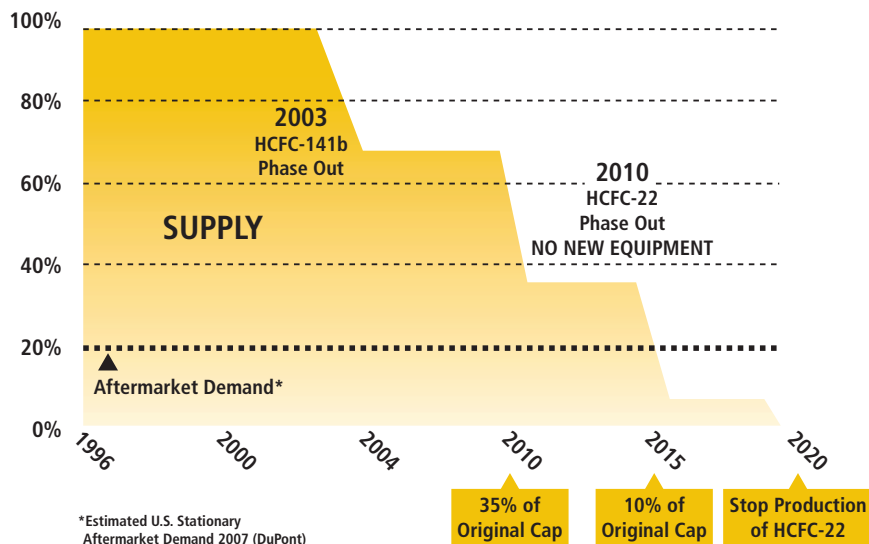
Goodman units with **SmartCoil™** and **R-410A** refrigerant use up to 25% less refrigerant and the overall unit requires up to 15% less volume compared to Goodman units without SmartCoil™ technology.

R-410A is the chlorine-free refrigerant used in air conditioners and heat pumps. Introduced in 1995, R-410A refrigerant has helped increase the durability and reliability of air conditioner and heat pump compressors.



SMALLER IS SMARTER

U.S. CLEAN AIR ACT PHASE-OUT SCHEDULE FOR HCFC-22



Proudly Assembled in Texas and Tennessee

ADDITIONAL INFORMATION

Before purchasing this appliance, read important information about its estimated annual energy consumption, yearly operating cost, or energy efficiency rating that is available from your retailer.

GOOD NEIGHBOR MANUFACTURING



The **SmartCoil™** copper tube, aluminum fin condenser coil is designed from two metals widely known for their ability to be recycled. It's just one more example of good neighbor manufacturing endorsed by Goodman. Our assembly lines, all located in the United States, constantly strive to implement procedures and processes that help to reinforce our environmental stewardship. Here are just a few examples of manufacturing procedures that we have used to make the manufacture of our products "greener:"

The painting process at our manufacturing plants does not emit any volatile organic compounds (VOC's). This has been achieved by employing powder paint and a baking process for all painted components of our heating and cooling products. Manufacturing processes that utilize oil as a lubricant or coating have been improved so that our consumption of these chemicals has been reduced. These are just a few of the manufacturing initiatives and processes that demonstrate Goodman's environmental stewardship.

Many of the components used in the manufacturing process are recyclable, such as steel, aluminum, copper and oil.

GOODMAN – A MEMBER OF DAIKIN GROUP



Daikin Industries, Ltd. (DIL) is a global Fortune 1000 company with more than 50,000 employees worldwide, making it the number one residential and commercial HVAC manufacturer in the world. DIL is engaged primarily in the development, manufacture, sale and aftermarket support of heating, ventilation, air conditioning and refrigeration equipment, refrigerants and other chemicals, as well as oil

hydraulic products. DIL is headquartered in Osaka, Japan, has manufacturing operations in 18 countries and a sales presence in more than 90 countries.

The company provides innovative, premium quality indoor climate management solutions to meet the changing needs of residential, commercial and industrial customers.