



## **The Knauf KoolDuct System: Straight A's for School Construction**



## The Knauf Koolduct® System

### Kool in the School



Providing the right environment for learning is a vital part of education—and it's also big business for the construction industry. In 2005, more than \$21.6 billion was invested in school building projects across the United States, the highest annual total in U.S. history.

Most experts expect the boom to continue, economists predict that school construction will meet or surpass 2005's historic level. Looking ahead, population growth and government mandates limiting classroom size should fuel growth in school construction for the foreseeable future.



## School Profile

### Broward County Public Schools Ft. Lauderdale, Florida

**Size:** 264 schools with over 270,000 students in K-12  
6<sup>th</sup> largest school district in the nation

**KoolDuct Projects:** Renovation and new construction

### Duval County Public Schools Jacksonville, Florida

**Size:** 165 schools with over 133,000 students in K-12  
19<sup>th</sup> largest school district in the nation

**KoolDuct Projects:** Renovation and new construction

### Clay County Public Schools Jacksonville, Florida metropolitan area

**Size:** 35 schools with over 36,000 students in K-12  
22<sup>th</sup> largest school district in Florida

**KoolDuct Projects:** New construction



Walker Elementary School



Country Isles Elementary School



Miramar Elementary School



Oakleaf School in Clay County

It's a great opportunity. School buildings present construction challenges beyond the typical office complex. Architects, engineers and contractors must address the strict indoor air quality requirements, compressed construction schedules and budget constraints that are common in school projects. In the HVAC arena, many school districts are learning that one innovative duct

system passes every test with straight A's—the Knauf KoolDuct System.

### A Total Cost Solution

Construction budgets always seem to be tight—but taxpayer-funded school districts face a perpetual cash crunch. With the currently inflated cost of steel, the Knauf KoolDuct System is particularly cost competitive.

But the Knauf KoolDuct System keeps saving over the life of the ductwork. With its combination of strong thermal and low-leakage performance, the system clearly delivers superior energy efficiency resulting in lower operating costs.

**With The Knauf KoolDuct System**, fabrication at the work site or in the shop is quick and easy. The fabrication shown was done at the National Sheet Metal shop with the specialized tools the KoolDuct registered contractors are equipped with. The CFC-free closed cell phenolic foam board is manufactured into strong, tight ducts. The ducts are air tight once the epoxy that seals the joined edges is set.

**Right:** Once the ducts are fabricated, installation is done by connecting the sections with patented aluminum flanges. Shown is installation at Oakleaf School. Compared to their sheet metal counterparts, even very large KoolDuct ducts are easy to handle and install.

**Far Right:** Ducts fabricated with the Knauf KoolDuct System have a smooth, clean airstream because the boards are faced on both sides with reinforced aluminum foil. This duct, used in the Oakleaf School project has a diagonal of 3½ feet and is reinforced with aluminum rods.



### **Avoiding Tardiness**

Construction schedules are another area where school projects grade on a tough curve. Construction is often dictated by the school vacation schedule, and in renovation projects the pressure is on to minimize classroom disruptions.

Again, the Knauf KoolDuct System passes the test. A Knauf KoolDuct panel weighs just 15% as much as an equivalent piece of metal

duct; this lightweight construction enables ease of handling during installation. The Knauf KoolDuct System also uses 13 foot duct segments and 13 foot support centers, resulting in an installation substantially faster than metal ductwork. As a pre-insulated system, Knauf KoolDuct also eliminates the need for two trades on site—one to hang the metal ductwork, another to wrap the ducts with insulation—cutting labor time and expense.

The Knauf KoolDuct System also offers design flexibility. The ductwork is easily fabricated on-site, adapting to unforeseen obstructions in the ceiling cavity and avoiding delays.

### **Clearing the Air on IAQ**

Finally, indoor air quality (IAQ) is a particular concern for schools. Given the high occupancy loads of classrooms and the susceptibility of children to certain respiratory ailments, IAQ must be a top priority



for administrators, facility managers and specifiers. The Knauf KoolDuct System has no foam exposed in the finished product. The silicone contains an anti-microbial agent and the aluminum surface does not support mold growth. With a fully sealed, aluminum-faced airstream surface, the Knauf KoolDuct System is IAQ-friendly and easily cleaned—another “A+” for Knauf KoolDuct.



## Knauf KoolDuct 101

Knauf Insulation is a leading manufacturer of fiber glass insulation products and the North American distributor for KoolDuct, a high-performance pre-insulated duct system originally developed in Europe. The Knauf KoolDuct System features a CFC-free closed cell phenolic foam board faced on both sides with reinforced aluminum foil, using patented aluminum flanges to connect duct sections and assure a strong, air tight closure.

The Knauf KoolDuct System is designed for the commercial and light industrial sectors of the market place, handling up to 4" w.g. of pressure for performance at the top end of the medium pressure class. The system offers significant advantages over other duct systems in terms of weight, space, installation time, installed costs, air leakage and energy performance. Knauf KoolDuct is a UL 181 Class 1 rated system and easily meets SMACNA Leakage Class 6 while providing thermal performance of R-6.7 at  $\frac{7}{8}$ " thick (R-8.5 at  $1\frac{3}{32}$ ").

This unique, pre-insulated system helps address key challenges typically found in school construction and renovation projects.



## The Knauf KoolDuct System

### Earning High Marks in the Sunshine State



These benefits have been proven in the field, especially in Florida—home to several of the nation’s fastest-growing school districts with a hot, humid climate that taxes any HVAC system.

#### **Broward County Schools**

Broward County, in South Florida, is home to the sixth largest school district in the nation by student population, with an incredible 275+ schools, plus administrative sites, within its jurisdiction. With such a broad portfolio, the district’s Facilities and Construction Management staff has to take a more creative approach—an approach that includes the use of innovative products like the Knauf KoolDuct System.

“Broward School District has always been known as an adopter of new building products and techniques,” said Ed Cordero-Montanez, P.E., of



Broward County Public Schools Facilities and Construction Management Department. “So when one of our contractor partners [Thermal Concepts of Davie, Florida] came to us to suggest KoolDuct, we decided to check it out—especially with steel prices going through the roof!”

Cordero-Montanez and Bob Frey of their Building Department were favorably impressed. “The first thing that stood out was the lightweight construction of the system,” said Cordero-Montanez. “We saw one person carrying a 13-foot section by himself with ease—that image was worth a thousand words. It means fast installation, a key for our projects.”

Cordero-Montanez and Claudia Munroe, Executive Director of the Facilities and Construction Management

Design Services Division, solicited several of Broward School district’s consulting engineering firms; one of which was Spillis Candela, for more insight on the Knauf KoolDuct system. Igor Gonzalez, currently a principal of ESI Consulting Engineers, worked with Spillis Candella as the Chief Mechanical Engineer at the time and gave the Knauf KoolDuct system a solid recommendation.

“We were pleased to include the Knauf KoolDuct System in the design specifications for Broward County Schools—we see great advantages for the system in school applications,” said Gonzalez. “First, of course, there’s the cost issue. With sheet metal prices up significantly, KoolDuct is very competitive with wrapped metal ductwork in terms of initial cost.”

“But the real savings comes in installed performance—you get a higher, more consistent R-value with KoolDuct. Combine that with its air leakage performance, which creates a tighter, more energy-efficient system and results in heating and cooling cost savings over the life of the ductwork.”

The Knauf KoolDuct System has been used in several Broward County Public Schools projects, both in renovation and new construction, and according to Cordero-Montanez, it has exceeded expectations.



## The Retrofit Solution: The Knauf KoolDuct System

Florida’s hot, humid climate is hard on any HVAC system. But installing a new air handling ducts in an existing building provides challenges that installers do not have to deal with in new construction. Such was the case with First Coast and Mandarin High Schools in Duval and Clay County. The Knauf KoolDuct System provided the perfect answer.

- **Lightweight**—easy to handle in tight, enclosed spaces.
- **Flexibility**—sections can fit flat against existing ceiling grids and pieces can be re-fabricated to avoid obstructions, on site, if necessary.
- **Installed performance**—higher, more consistent R-value is the real savings.
- **Energy efficient**—superior air leakage performance.
- **Tight deadlines**—installed quickly and prevents delays in renovations.





"The growth in our area plus the classroom size reduction law passed recently by the legislature keeps the pressure on with regard to building new facilities," said Munroe. "We're building modular school buildings across the district with very tight construction schedules. The Knauf KoolDuct System has been specified as an alternate product, and has been successful in helping us keep timelines on track while meeting our performance standards."

"The Knauf KoolDuct System can be installed quickly in new construction, but it can really prevent delays in renovations," added Cordero-Montanez. "In older buildings, you can have tight ceiling cavities, and there are always unexpected issues—pipes or wiring that aren't in the plans. KoolDuct is flexible—you can fabricate and re-fabricate pieces to avoid obstructions, on site if necessary. There's no way you could do that with metal."

Cordero-Montanez also stresses a proactive approach to mold and indoor air quality issues.

"With the humid conditions here, you always have to be aware of mold. Wrapped ductwork can be susceptible, especially if the insulation gets compressed against chilled metal. Even bare metal can grow mold with a little dirt and enough condensation."

"The KoolDuct system resists condensation, and the airstream surface is easily cleaned," Cordero-Montanez stated. "It minimizes the mold issue, and it's fully-sealed, fully encapsulated for good all-around indoor air quality performance."



### **Duval & Clay County Schools**

Duval and Clay County Public Schools in northern Florida (Jacksonville and the surrounding areas) are hours away from Broward County, but deal with many of the same challenges—and are also facing them with the help of the Knauf KoolDuct System.

Jorge Gutierrez is a Senior Mechanical Engineer with Skanska, one of the top five construction companies in the world, with 5,500 employees in the U.S. In Florida, school construction is one of the company's top priorities, working with most of the major school districts. Gutierrez had been favorably impressed with the Knauf KoolDuct System on other projects, and believed the system would be an excellent fit in school construction. Finally, Duval County Public Schools presented an opportunity.

"I believe that KoolDuct is the Cadillac of ductwork, and I was anxious to get it specified for a major school project," said Gutierrez. "In Duval County, we found the perfect situation."



## The Knauf KoolDuct System In a Class by Itself—“The Cadillac of Ductwork”

Two schools in Jacksonville, First Coast High School and Mandarin High, were slated for a major overhaul of their HVAC systems—with aging equipment and IAQ concerns, the project was a priority for the district.

“The HVAC equipment at First Coast and Mandarin was installed back in the 70’s, during the energy crisis when air requirements were much less demanding than they are today,” said Gutierrez. “The system was old and just couldn’t keep up with the humidity—performance was suffering and you could see mold and corrosion.”

The decision was made to install new air handling units in each classroom, with new ductwork for more efficient air delivery. The project was to be accomplished in phases, with eight classrooms being renovated at a time. The emphasis on speed and minimizing classroom disruption led Gutierrez to introduce the Knauf KoolDuct System to Gary Stengl, P.E., Project Manager for the Facilities, Design and Construction division of Duval County Public Schools.

“I admit, my first reaction was, ‘Well, we’ve never used this before,’” said Stengl. “But I was intrigued by what I heard from Jorge, so we investigated further. Knauf sent product samples, and I liked what I saw—it met SREF [the Florida building code governing educational facilities], so we sent a couple of our code inspectors to a demonstration session—they came back and said ‘Have at it.’” Stengl has been pleased with his decision, with the first benefits of the Knauf KoolDuct System showing up in the construction timeline. “Time is an issue, and KoolDuct has definitely been faster,” he said.

In addition to the Knauf KoolDuct System’s quick installation, Stengl appreciated the system’s thermal performance. “You always have to watch operating costs, and energy efficiency has become a priority—the district has even created a new ‘energy czar’ position to keep an eye on it,” Stengl said. “With this in mind, I liked KoolDuct’s higher R-value and low air leakage.”



**Left: A view from the top**, looking down at Knauf KoolDuct installation, classroom is directly below ceiling.

**Above: Knauf KoolDuct is simple to install and re-install** in tight spaces such as existing grid ceilings.

As the project progresses, Gutierrez is pleased with the Knauf KoolDuct System's performance as well. "We're seeing the installers able to rough in four classrooms in about a day and a half," he said. "It took at least double the time with wrapped metal. The ability to fabricate KoolDuct on-site has also gotten us out of some tricky situations. Since we're installing ductwork where there wasn't any before, you always run into space problems—the flexibility of the KoolDuct system has been a real plus."

Lance Herlong is Vice-President of National Sheet Metal, the contractor involved in the First Coast and Mandarin High School projects and a major new high school construction project in adjacent Clay County. Herlong has used the system in a variety of projects and sees the benefits in installer productivity and fabrication flexibility.

"Of course, KoolDuct is lightweight, and that's a big advantage for our installers," said Herlong. "I've seen one guy lift a section of KoolDuct that two people couldn't lift if it was metal...generally, our crew can hang KoolDuct 50% faster than sheet metal ductwork."

That's led to projects that are on-schedule and within budget.

In Florida, the Knauf KoolDuct System has met tight timelines and strict energy-efficiency and IAQ requirements for several of the largest and fastest-growing school districts in the nation. And it has done so in the kind of hot, humid climate that puts HVAC systems to the test and demands superior ductwork performance.

As the school construction boom continues, make sure that the Knauf KoolDuct System is specified on your next school project—this high-performance system is destined for the honor roll.



## What makes the Knauf KoolDuct System such a good solution for Schools?

The Knauf KoolDuct System was designed from the start to be used in the commercial and light industrial sectors of the market, and it makes a particularly compelling solution for schools. Schools generally have a very specific set of requirements that include high IAQ performance and a fast track installation at the top of the list. At the same time, school districts are constantly searching for savings, both installed and operational. The Knauf KoolDuct System absolutely delivers on all of those counts, and more.

For more information call (800) 825-4434, ext. 8283

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#### LEED Eligible Product

Use of this product may help building projects meet green building standards as set by the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.