
AAON®
Case Study
BOK Center

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The BOK Center, or Bank of Oklahoma Center, is a 19,199 seat sports and entertainment arena in Tulsa, Oklahoma. The BOK Center was the flagship project of the Tulsa County Vision 2025 initiative for regional economic development and long-term capital improvements. The city of Tulsa asked architect Cesar Pelli to design an architectural icon. The resulting 565,000 square foot building contains 350,000 square feet of exterior metal panels, 75,000 square feet of glass, 30,000 cubic yards of concrete and 4,000 tons of structural steel.

The first event held in the new BOK center was a sold out performance given by The Eagles on September, 6 2008. The Bank of Oklahoma Center has hosted concerts by many big name performers including Billy Joel and Elton John, Bruce Springsteen, ACDC, Paul McCartney, Carrie Underwood, and The Jonas Brothers. It is also the home of the Tulsa Shock of the Women's National Basketball Association, the Tulsa Oilers of the Central Hockey League, and the Tulsa Talons of The Arena Football League.

The range of events and the scale of the building required an HVAC system that was both large enough to heat, cool, and ventilate the large arena and quiet enough to not interfere with the acoustics during concerts and events while also being energy efficient. AAON supplied the BOK center with four 90,000 cfm rooftop air handling units and one 60,000 cfm rooftop air handling unit containing chilled and hot water coils. These rooftop units were delivered in multiple sections to be field assembled for easier job site maneuverability. AAON also supplied twelve modular indoor air handling units, adding an additional 85,175 cfm of airflow to the building.

Noise Reduction

Radiated sound from the HVAC units was significantly reduced by quality engineering and manufacturing. All of the BOK center units are constructed

with double-wall, polyurethane foam insulated walls, doors, ceilings, and floors.

The bowl and lobby rooftop units contain rectangular dissipative silencers that reduce the sound the HVAC unit releases into the indoor environment. The dissipative silencers use acoustic grade glass fibers to absorb a portion of the sound as it passes through the attenuator. The spacing of the fibers determines what frequency of sound the silencer absorbs. The BOK center sound attenuators are chosen to match the HVAC unit so that more sound is absorbed in the frequencies that the unit produces. The sound after attenuation is perceived by the human ear as almost 5 times quieter than the sound before attenuation.

The smaller indoor air handling units each contain a 2'' perforated liner which provides additional sound dampening in the supply air plenum for additional building sound attenuation.

The bowl and lobby rooftop units are mounted on a spring isolated curb to prevent the unit vibrations from transferring sound to the building. This reduces the amount of unit noise during normal usage, as well as, during strong Oklahoma winds. The rooftop units also use direct driven, backward curved plenum fans which are both quiet and energy efficient because no energy is lost through belt vibration and backward curved impellors operate at some of the highest efficiencies amongst commercial fans.

Another aspect considered when choosing the HVAC units for the BOK Center was the use of on stage pyrotechnics. The HVAC unit had to have the air flow capacity to be able to cycle the air through the air handler fast enough so that the smoke from the concert pyrotechnics doesn't linger in the air and bother the concert attendees.

Sustainability

Because the BOK Center is funded by city taxes, facility sustainability was a major consideration in choosing an HVAC system. The BOK Center actively seeks to reduce, reuse, and recycle daily through practices such as using biodegradable food and beverage containers and low-flow toilets as well as serving locally grown produce to minimize gasoline usage. The BOK Center energy efficient HVAC units from AAON are part of their initiative to maintain a sustainable facility.

The BOK Center HVAC units were custom designed to match the unique needs of the large arena. AAON was able to provide custom HVAC equipment that is quiet enough to not interfere with concerts and events, has the air flow capacity to quickly cycle the air after the use of pyrotechnics, and energy efficient to help with the BOK Center sustainability initiative.

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AAON • 2425 South Yukon Avenue • Tulsa, Oklahoma 74107 • (918) 583-2266 • Fax (918) 583-6094 • www.aaon.com