

Life Cycle Analysis

Wall-to-Wall Ceilings and the Open Plenum

*Energy Savings and Other Benefits of
Suspended Ceilings vs. Open Plenum*



Suspended Ceilings vs. Open Plenum:

Background

Design and product selection considerations for today's buildings include aesthetics, performance, sustainability and cost – not only for initial purchases but also for ongoing maintenance throughout the life cycle of buildings.

In the case of ceilings, the recent trend toward the aesthetic decision to have an open plenum environment has created questions about trade offs, especially performance and cost.

CISCA completed a Life Cycle Study comparing cost and performance considerations for continuous ceilings and open plenum environments. A description of that study and the results follow.

The CISCA Life Cycle Study is modeled on two different building types (office and retail) in five different markets, reflecting differences in energy costs, construction/installation costs and climate zones. Markets included Chicago, Charlotte, Oklahoma City, Orlando and Phoenix.



RETAIL SPECS

- ❖ One Story Masonry; Metal Deck & Concrete Floor
- ❖ 10,000 Square Feet
- ❖ 18' Ceiling Height
- ❖ Pendant Mounted HID's
- ❖ <10% Percent Glass
- ❖ 2'X4' Panels on 15/16" Grid

	CHARLOTTE	CHICAGO	OKLAHOMA CITY	ORLANDO	PHOENIX
ENERGY COST SAVINGS	17.0%	13.7%	12.7%	14.5%	14.0%
SIMPLE PAYBACK	0.6 YRS	1.1 YRS	0.7 YRS	0.7 YRS	1.2 YRS
LIFE CYCLE PAYBACK	0.9 YRS	1.7 YRS	1.0 YRS	1.1 YRS	1.7 YRS



Key Life Cycle Study Outcomes:



Initial construction costs are higher for suspended ceilings:

- ❖ First time construction costs were 15 to 22% higher for suspended ceilings vs. open plenums in offices.
- ❖ First time construction costs were 4 to 11% higher in retail spaces.

Suspended ceiling spaces use less energy than open plenum spaces due to:

- ❖ Use of a return air plenum with low static pressures and fan horsepower vs. ducted air returns with higher static pressures and fan horsepower.
- ❖ Return air plenums are more efficient at removing heat from lights, reducing the air conditioning load in the space.
- ❖ Higher light reflectance with a ceiling vs. open plenum (assumed 70% vs. 50%).

Maintenance costs are lower for suspended ceilings vs. open plenum:

- ❖ Periodic duct, pipes and raceway cleaning necessary.
- ❖ Open plenum assumed to be painted and periodically repainted.

Energy savings are significant for suspended ceilings:

- ❖ Total energy savings ranged from 9% to 10.3% for the office design and 12.7% to 17% for the retail design.
- ❖ Can contribute to LEED EA credit #1; 10.5% reduction in energy to earn 1 point, 14% reduction for 2 points.
- ❖ Considering both first-time and operating costs, suspended ceilings are extremely cost effective.

OFFICE SPECS

- ❖ Low Rise/Mid Rise; Open Plan
- ❖ 120,00 Square Feet Total
- ❖ 15,000 Square Feet Per Floor
- ❖ 9' Ceiling Height
- ❖ Recessed 2'X2' U-Tube Florescents
- ❖ 40-50% Percent Glass
- ❖ 2'X2' Tegular on 9/16" Grid

CHARLOTTE	CHICAGO	OKLAHOMA CITY	ORLANDO	PHOENIX
9.0%	10.0%	9.7%	10.3%	10.1%
3.4 YRS	7.0 YRS	5.0 YRS	4.1 YRS	6.5 YRS
5.0 YRS	>10 YRS	7.2 YRS	6.0 YRS	9.0 YRS

The costs implications included in this study are:

- ❖ Initial construction costs
(Source: R.S. Means)
- ❖ Annual operating costs
(Source: BOMA)
 - HVAC
 - Lighting
 - Maintenance

Assumptions

- ❖ **Suspended ceilings** installations included flexible ducts, cabletrays and recessed lighting.
- ❖ **Open plenum** environments included return fans, return air ductwork, conduit and pendant lighting.

* Building performance assumed to match minimum code criteria per ASHRAE Standard 90.1.





CORE PURPOSE

CISCA exists to provide a network of opportunities with all industry leaders through education and a forum to allow the interior construction industry to interact, evolve and prosper.

VISION

CISCA will be the acknowledged leader of participating decision-makers in the promotion and support of the interior construction industry.

MISSION

CISCA will solidify the membership by recruiting and retaining participating decision-makers.

- To provide effective education
- To provide and promote technical standards
- To provide a dynamic forum to promote relationships within the industry.

CISCA is the only trade association dedicated to serving the specialty ceilings and interior systems industry. We are specialty contractors, distributors, manufacturers and independent manufacturer reps. CISCA promotes and supports the industry by providing a forum for members to network, by publishing internationally-specified construction guidelines, and by providing industry information to members.

For more information, or to receive a complete copy of the Life Cycle Study, please contact us:

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