

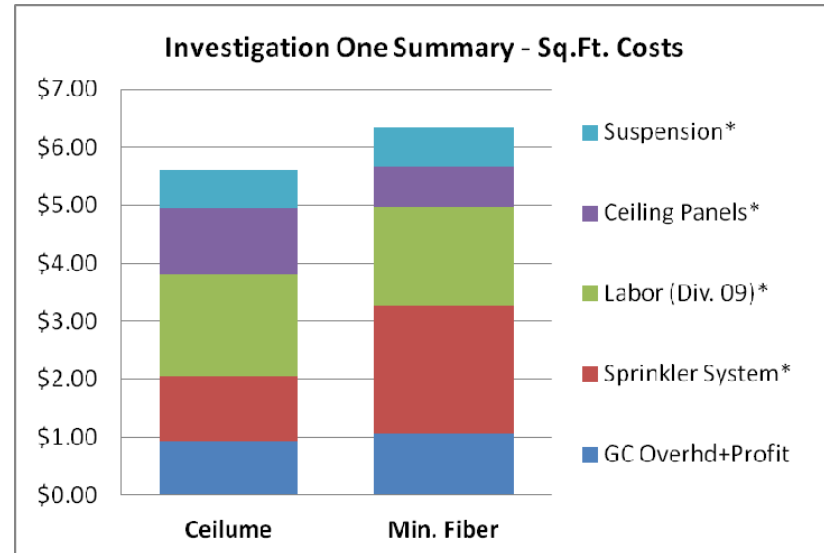
Cost of Ceilume Thermoformed Ceiling Panels Compared to Mineral Fiber Ceiling Panels in Fire-Sprinklered Office Building

By Bill Kneeland, PE and Michael Chusid, RA

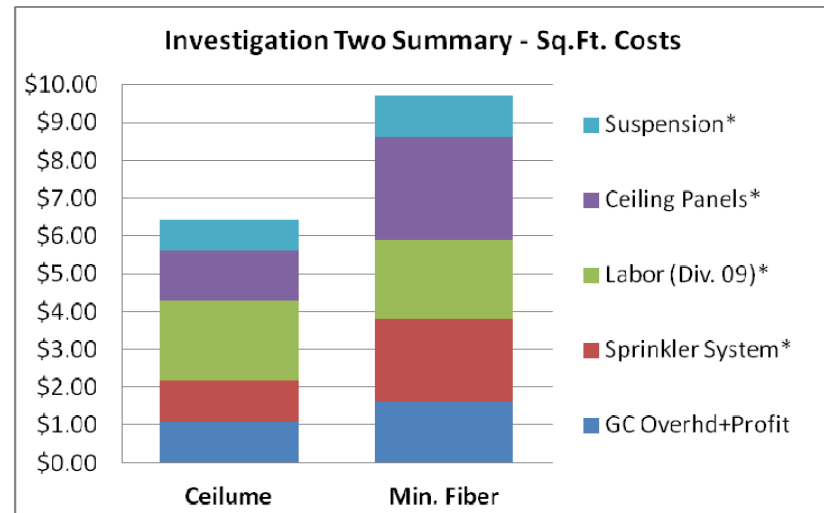
A thermoformed drop-out ceiling panel has recently been tested and approved for installation beneath fire sprinklers. Until now, drop-out ceiling products have had limited performance and visual appeal. In contrast, the thermoplastic panels, made by Ceilume, look great and meet performance requirements for commercial, institutional, residential, and other architectural projects.

Ceilume’s panels are made of rigid vinyl either 0.013 or 0.030 inches thick and can be installed in standard 15/16” T-bar ceiling grid. When exposed to fire, the thermoplastic softens, sags, and drops-out of the grid at a temperature below that required to activate sprinklers. Sprinklers can then operate unimpeded to extinguish fire. Drop-out ceiling panels are allowed under NFPA 13 – *Standard for the Installation of Sprinkler Systems*, and Ceilume’s panels have been approved by UL, FM, Certmark, IAPMO-UES, and other building product evaluation services.

When drop-out ceiling panels were proposed for an 110,000 sq.ft. office building in Oklahoma City, we were asked to prepare a detailed construction cost estimate comparing thermoformed and mineral-fiber ceiling panels. In particular, our client wanted to know how Ceilume’s panels affect total project costs including sprinkler design and installation. We found that Ceilume panels installed beneath sprinklers are significantly less expensive than mineral fiber panels with penetrating sprinklers.



Investigation One: Ceilume panels are 0.013” thick Polyline style installed beneath concealed sprinklers. Mineral fiber panels are 5/8” thick square-edge, fissured panels equal to Armstrong 755 installed with recessed sprinklers. Both are 2x4 ft. and white.



Investigation Two: Ceilume panels are 0.013” thick Polyline style installed beneath concealed sprinklers. Mineral fiber panels are 3/4” thick tegular panels equal to Armstrong 577 Cirrus installed with recessed sprinklers. Both are 2x2 ft. and white.

Cost Savings

We investigated two scenarios and found that the Ceilume approach generated savings ranging from \$3.29 to \$0.72 per sq.ft. The first value represents 2 x 2 ft. panels and compares Ceilume to ¾" thick tegular mineral fiber panels; the second value represents 2 x 4 ft. panels and compares Ceilume to standard ½" thick mineral fiber panels.

The affordability of any installation depends on project conditions, products, and performance levels required. Thermoplastic panels, for example, are more affordable than tegular and decorative mineral fiber panels and competitively priced with ordinary mineral fiber products.



Top: Concealing sprinklers above Ceilume panels creates cleaner appearance and simplifies layout and installation of sprinklers. Bottom: Penetrating sprinklers must be aligned with panel layout, adding to cost and coordination. Holes must be cut for penetrations, and appearance-grade sprinklers and trim used.

While labor to install panels is similar regardless of material, cutting individual thermoformed panels for perimeter units may cost slightly more than scoring and breaking square-edged mineral fiber tiles and about the same as trimming tegular panels. Thermoformed panels, however, nest compactly and several panels can be cut simultaneously with aviation snips. Our estimate is based on open-shop wages and savings are likely to be even greater in areas with prevailing wage rates.

Concealing sprinklers above ceilings reduces cost of sprinklers. For example, drop-out ceilings eliminate need to extend pipes from sprinkler mains (usually located just under floor or roof structure) to ceiling elevation, and the piping used to position sprinklers at panel centers. This enables layout of sprinklers to be optimized and eliminates need for installation drawings to coordinate sprinklers with ceiling installers. Non-appearance grade sprinklers can be used and finishing rings and escutcheons can be eliminated. Ceiling installers do not have to cut holes for sprinklers. And sprinkler installers do not have to return to project to adjust sprinkler locations after ceiling installation.

Other Cost Implications

Other factors, not included in estimate, also impact affordability of thermoformed drop-out ceilings. For example, simplifying ceiling and sprinkler coordination can save valuable time when scrambling to complete ceiling before project completion deadline. More, thermoformed panels are not affected by moisture and can be installed before humidity in building has stabilized.

Life cycle considerations for thermoplastic panels are better than for mineral fiber panels: Thermoplastic

panels are washable and easily cleaned and will not require replacement due to sagging or mold caused by moisture or humidity. Thermoplastic panels will not stain or discolor, and can simply be wiped clean if roof or plumbing leaks occur or sprinklers discharge. And replacement panels can be installed without cutting openings for sprinklers.

Thermoformed panels reduce cost of shipping and storage because they are lightweight, thin, and nest for compact packaging. Light weight also makes panels easier to handle, increases productivity, and reduces lifting-related injuries. Handling is also simplified because thermoplastic panel installation does not require the ventilation, dust respirators, and skin protection required when working with mineral fiber.

Unlike mineral fiber, thermoplastic panels are robust and not easily damaged. Edges and corners, for example, resist breakage during installation and when panels are removed for above-ceiling access.

Installing sprinklers above ceiling also provides protection against accidental impact or tampering that could discharge sprinklers and cause water damage. It also reduces potential that drywall compound or paint will get on sprinklers and require call backs.

Practical Considerations

While installing thermoformed ceilings is easy enough for homeowner do-it-yourself projects, commercial contractors are often wary of unfamiliar products. Ceilume provides sample panels to subcontractors so they could get feel of product prior to submitting bids. Using drop-out panels has important life-safety implications and installers must understand and observe

requirements stated in product evaluation reports and as acceptable to authorities having jurisdiction.



The thinness and light weight of Ceilume panels reduce handling costs and simplifies installation. Several panels can be cut at a time using aviation shears.

Ceilume panels can also be used for projects without sprinklers or with penetrating (non-concealed) sprinklers. The product has a good environmental profile since they are GreenGuard Gold certified for indoor air quality and recyclable as Type 3 plastic. They have modest acoustical properties and the manufacturer offers special backer pans that boost noise reduction coefficients. In addition to a variety of colors and faux wood and metal finishes, panels are also available in translucent and transparent material that can be used for back-lit luminous ceilings. Their smooth and cleanable surface complies with FDA requirements for food handling areas and FEMA requirements for flood-prone areas. Finally, the panels are available in dozens of patterns ranging from shallow relief to deeply molded surfaces in a variety of historic and contemporary styles. See www.ceilume.com to learn more.

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An article based upon this manuscript is scheduled for publication in *Walls & Ceilings* with during Fall 2014. © 2014 by Ceilume.

Investigation One

CEILUME 2x4 ft. Thermoformed Panels with Concealed Sprinklers

Item	Quantity	Unit	Unit Cost	Cost	Per SqFt
Gross area of lay-in ceiling per building	91740	sf			
Main beam white Prelude 15/16", 10% waste	3,850	ea	\$6.7560	\$26,011	
Cross tees white Prelude XL 15/16", 4 ft, 10% waste	5,830	ea	\$2.0808	\$12,131	
Hemmed wall angle white, 7/8"x7/8", 10% waste	2,750	ea	\$4.6824	\$12,877	
Screws 1 1/4" , 1 per 2 lf, 15% waste	17,250	ea	\$0.0132	\$228	
12 ga hanger wire, (1 hank 100 pcs x12 lf = 1200 lf)	10	hk	\$54.12	\$541	
Suspension				\$51,787	\$0.56
CEILUME 2x4 ft 0.013" white Polyline ceiling panels	11,600	ea			
Minus 2x2 ft supply air grilles	(310.00)	ea			
Minus 2x2 ft return air registers	(45.00)	ea			
Minus 2x4 ft recessed light fixtures	(1,235.00)	ea			
Adjusted 2x4 ft clg. panels, 12% waste, FOB OKC	11,211	ea	\$7.33	\$82,177	
Border panels (included in above)					
5% extra panels for Owner	560	ea	\$7.33	\$4,105	
Signage, 1 per floor	5	ea	\$150.00	\$750	
Ceiling Panels				\$87,031	\$0.95
Layout and install suspension	91,740	sf	\$0.83	\$76,144	
Install ceiling panels (including border panels)	88,630	sf	\$0.65	\$57,610	
Cut-outs for sprinklers	0				
Labor				\$133,754	\$1.46
Division 09 subtotal (suspension, ceiling panels, labor)				\$272,572	
Division 09 with subcontr. overhead & profit			20%	\$327,087	3.57
Concealed sprinklers at 170 sqft, piping, etc.	540	ea	\$151.00	\$81,540	
Division 21 with subcontr. overhead & profit			25%	\$101,925	1.11
Total direct cost (vendors, subs, etc.)				\$429,012	\$4.68
Total with Gen. Contractor Overhead & Profit			TOTAL 20%	\$514,814	\$5.61

MINERAL FIBER 2x4 ft. Square-Edge Panels with Recessed Sprinklers

Item	Quantity	Unit	Unit Cost	Cost	Per SqFt
Gross area of lay-in ceiling per building	91740	sf			
Main beam white Prelude 15/16", 10% waste	3,850	ea	\$6.7560	\$26,011	
Cross tees white Prelude XL 15/16", 4 ft, 10% waste	5,830	ea	\$2.0808	\$12,131	
Hemmed wall angle white, 7/8"x7/8", 10% waste	2,750	ea	\$4.6824	\$12,877	
Screws 1 1/4" , 1 per 2 lf, 15% waste	17,250	ea	\$0.0132	\$228	
12 ga hanger wire, (1 hank 100 pcs x12 lf = 1200 lf)	10	hk	\$54.12	\$541	
Suspension				\$51,787	0.56
ARMSTRONG 755 2x4 ft 5/8" fissured ceiling panel	11,600	ea			
Minus 2x2 ft supply air grilles	(310.00)	ea			
Minus 2x2 ft return air registers	(45.00)	ea			
Minus 2x4 ft recessed light fixtures	(1,235.00)	ea			
Adjusted 2x4 ft clg. panels, 12% waste, FOB OKC	11,211	ea	\$4.51	\$50,562	
Border panels (included in above)					
5% extra panels for Owner	560	ea	\$4.51	\$2,526	
Signage, 1 per floor	0				
Ceiling Panels				\$53,087	\$0.58
Layout and install suspension	91,740	sf	\$0.83	\$76,144	
Install ceiling panels (including border panels)	88,630	sf	\$0.60	\$53,178	
Cut-outs for sprinklers	850	ea	\$1.25	\$1,063	
Labor				\$130,385	\$1.42
Division 09 subtotal (suspension, ceiling panels, labor)				\$235,259	
Division 09 with subcontr. overhead & profit			20%	\$282,311	3.08
Concealed sprinklers at 108 sqft, piping, etc.	850	ea	\$190.00	\$161,500	
Division 21 with subcontr. overhead & profit			25%	\$201,875	2.20
Total direct cost (vendors, subs, etc.)				\$484,185.9	\$5.28
Total with Gen. Contractor Overhead & Profit			20%	\$581,023	\$6.33

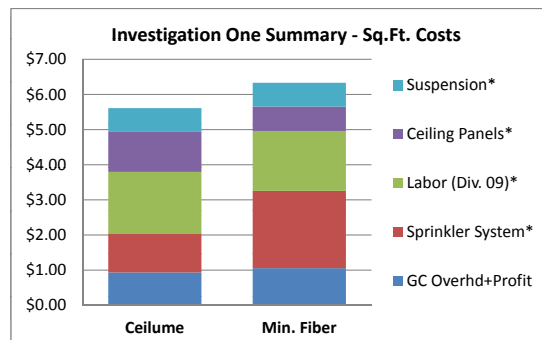
ESTIMATED COST SAVINGS WITH CEILUME - Investigation One

	(\$514,814)	(\$5.61)
	\$66,209	\$0.72

Investigation One Summary - Sq.Ft. Costs

	Ceilume	Min. Fiber
GC Overhd+Profit	\$0.94	\$1.06
Sprinkler System*	\$1.11	\$2.20
Labor (Div. 09)*	\$1.75	\$1.71
Ceiling Panels*	\$1.14	\$0.69
Suspension*	\$0.68	\$0.68
Total	\$5.61	\$6.33

* Subcontractor Overhead and Profit Included



Investigation Two

CEILUME 2x2 ft. Thermoformed Panels with Concealed Sprinklers

Item	Quantity	Unit	Unit Cost	Cost	Per SqFt
Gross area of lay-in ceiling per building	91740	sf			
Main beam white Prelude 15/16", 10% waste	3,850	ea	\$6.7560	\$26,011	
Cross tees white Prelude XL 15/16", 2ft, 10% waste	23,320	ea	\$0.9949	\$23,201	
Hemmed wall angle white, 7/8"x7/8", 10% waste	2,750	ea	\$4.6824	\$12,877	
Screws 1 1/4" , 1 per 2 lf, 15% waste	17,250	ea	\$0.0132	\$228	
12 ga hanger wire, (1 hank 100 pcs x12 lf = 1200 lf)	10	hk	\$54.12	\$541	
Suspension				\$62,857	\$0.69
CEILUME 2x2 ft 0.013" white Polyline ceiling panels	23,200	ea			
Minus 2x2 ft supply air grilles	-310	ea			
Minus 2x2 ft return air registers	-45	ea			
Minus 2x4 ft recessed light fixtures	-1235	ea			
Adjusted 2x4 ft clg. panels, 12% waste, FOB OKC	24,203	ea	\$3.90	\$94,392	
Border panels (included in above)					
5% extra panels for Owner	1,210	ea	\$3.90	\$4,719	
Signage, 1 per floor	5	ea	\$150.00	\$750	
Ceiling Panels				\$99,861	\$1.09
Layout and install suspension	91,740	sf	\$0.95	\$87,153	
Install ceiling panels (including border panels)	88,630	sf	\$0.84	\$74,449	
Cut-outs for sprinklers	0				
Labor				\$161,602	\$1.76
Division 09 subtotal (suspension, ceiling panels, labor)				\$324,320	
Division 09 with Subcontr. Overhead & Profit			20%	\$389,184	\$4.24
Concealed sprinklers at 170 sqft, piping, etc.	540	ea	\$151.00	\$81,540	
Division 21 with Subcontr. Overhead & Profit			25%	\$101,925	1.11
Total direct cost (vendors, subs, etc.)				\$491,109	\$5.35
Total with Gen. Contractor Overhead & Profit			20%	\$589,331	\$6.42

MINERAL FIBER 2x2 ft. Tegular Panels with Recessed Sprinklers

Item	Quantity	Unit	Unit Cost	Cost	Per SqFt
Gross area of lay-in ceiling per building	91740	sf			
Main beam Suprafine, 9/16", white, 10% waste	3,850	ea	\$9.5592	\$36,803	
Cross tees white Prelude FG 9/16", 2ft, 10% waste	23,320	ea	\$1.4522	\$33,865	
Hemmed wall angle white, 7/8"x7/8", 10% waste	2,750	ea	\$4.6824	\$12,877	
Screws 1 1/4" , 1 per 2 lf, 15% waste	17,250	ea	\$0.0132	\$228	
12 ga hanger wire, (1 hank 100 pcs x12 lf = 1200 lf)	10	hk	\$54.12	\$541	
Suspension				\$84,314	0.92
ARMSTRONG 577 2x2 ft 3/4" Cirrus ceiling panel	23,200	ea			
Minus 2x2 ft supply air grilles	-310	ea			
Minus 2x2 ft return air registers	-45	ea			
Minus 2x4 ft recessed light fixtures	-1235	ea			
Adjusted 2x4 ft clg. panels, 12% waste, FOB OKC	24,203	ea	\$8.19	\$198,223	
Border panels (included in above)					
5% extra panels for Owner	1,210	ea	\$8.19	\$9,910	
Signage, 1 per floor	0	ea			
Ceiling Panels				\$208,132	\$2.27
Layout and install suspension	91,740	sf	\$0.95	\$87,153	
Install ceiling panels (including border panels)	88,630	sf	\$0.79	\$70,018	
Cut-outs for sprinklers	850	ea	\$1.25	\$1,063	
Labor				\$158,233	\$1.72
Division 09 subtotal (suspension, ceiling panels, labor)				\$450,679	
Division 09 with Subcontr. Overhead & Profit			20%	\$540,815	5.90
Concealed sprinklers at 108 sqft, piping, etc.	850	ea	\$190.00	\$161,500	\$1.76
Division 21 with Subcontr. Overhead & Profit			25%	\$201,875	2.20
Total direct cost (vendors, subs, etc.)				\$742,690	\$8.10
Total with Gen. Contractor Overhead & Profit			20%	\$891,228	\$9.71

(\$589,331) (\$6.42)

COST SAVINGS WITH CEILUME - Investigation Two

\$301,897 **\$3.29**

Investigation Two Summary - Sq.Ft. Costs

	Ceilume	Min. Fiber
GC Overhd+Profit	\$1.07	\$1.62
Sprinkler System*	\$1.11	\$2.20
Labor (Div. 09)*	\$2.11	\$2.07
Ceiling Panels*	\$1.31	\$2.72
Suspension*	\$0.82	\$1.10
Total	\$6.42	\$9.71

* Subcontractor Overhead and Profit Included

