



TermodDeck Retail



TermodDeck Air Ducts in Hollowcore Slabs



LuLu Hypermarket



TermodDeck's thermal energy storage (TES) HVAC system is the perfect solution to the excessive consumption of electricity by malls. The operating costs of electricity needed for a comfortably air-conditioned environment over 30 years at today's price twice exceeds the cost of building the mall itself.



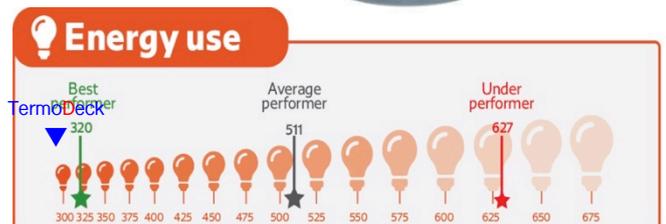
Typical Ducting

TermodDeck dematerializes HVAC, integrating the system into the concrete structure of a building. This smarter, efficient building design means 50% smaller chiller sizes, and also cuts installed capacity by 1/2. Total connected load requirements are reduced by approximately 1/3, lowering electricity-related upfront construction costs.

The integration of HVAC into the concrete structure also near eliminates bulky mechanical ductwork, false ceilings and plenums. Less material means less material to maintain and also lowers capital costs on construction. The reduction in electricity consumption by 25-35% and the elimination of frequent HVAC maintenance services produce lifetime savings that simply can't be beat.

Due to its lower capital cost, TermodDeck offers an excellent ROI as improving indoor environmental quality helps landlords retain tenants, increase worker productivity, and improve retail sales through more comfortable shopping experiences. TermodDeck creates passive and active cooling, providing year-round comfort via radiant cooling and ventilation, with no risk of condensation or water dripping from ceiling vents overhead. Your mall AC will operate noiselessly without any cold air blasts or drafts. The TermodDeck system is easily applied to hollowcore concrete slabs as well as in-situ slabs, in both or either floors or ceilings.

TermodDeck buildings are designed to stay cool, without compromising on features such as large windows, open spaces or increased fresh air and ventilation that otherwise put pressure on energy efficiency. TermodDeck's self-balancing system with individual area controls and cool airflows throughout, successfully resolves these tensions.



EUI (Energy Use Intensity)** of enclosed Dubai malls
EUI = kWh/m² x year

* UK Government Sponsored Report on GCC Projects

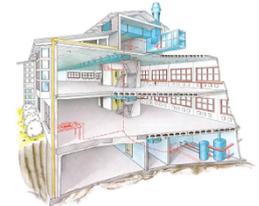
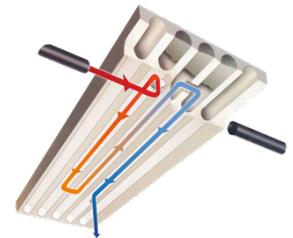
Case Study A: LuLu Hypermarket (Muscat, Oman)

The building comprises 20,000 m² of retail floor space on two levels. The system uses York chillers with a design capacity of 510 TR and the installation comprises three units of 170 TR and a further standby unit of 170 TR with a reported cost of OR 615,000 (US\$ 1.60 million). The standby unit has never been used. The equivalent AC system would comprise three units of 340 TR giving a total installed capacity of 1,020 TR with additional 340 TR standby unit at an estimated capital cost of OR 1,120,000 (US\$ 2.90 million). A conventional system costs are some 80% higher than this TermoDeck system.

TermoDeck In-Situ



Cores Store and Absorb Coolth Used for Services and Cables



Case Study B: Gulf Centre (Jeddah, Saudi)

This is a seven story commercial building with a floor plate of approx. 65m x 65m. As a result of building height restrictions, the original design for the building envisaged 6 floors comprising 26,400 m². When TermoDeck entered the project, the removal of false ceilings and flat slab design enabled a gain of 800 mm per floor, allowing the building to be redesigned as 7 floors comprising 30,700 m². The system has a chiller plant design capacity of 750 TR. The installation consists of three Carrier units of 250 TR with two standby units, each of 250 TR. The cost of the AC supply and installation contracts is reported to be SR 6 million (US\$1.60 million). The equivalent conventional AC system for the original 26,400 m² / 5 floor building design comprises 2,200 TR in total with an estimated capital cost including ducting of SR 10 million (US\$2.66 million). A conventional system costs are some 65% higher than this TermoDeck system.

TABLE 3.4.1.1 *

SAUDI ARABIA / OTHER GCC – SUMMARY COST COMPARISON FOR TES AC / CONVENTIONAL AC SYSTEMS - LARGE COMMERCIAL BUILDINGS (>10,000m2) #

Project, Location	Date	Total Building Floor Space (m2)	TES AC Installation as Installed			Alternative Conventional AC Installation			Notes:
			Type / Specification of TES AC System	Cost of TES AC System (SR)	Cost of Operation of TES AC System (SR/Year)	Type / Specification of Alternative Conventional AC System	Cost of Alternative Conventional AC System (SR)	Cost of Operation of Alternative Conventional AC System (SR/Year)	
LuLu Hypermarket, Muscat, Oman	2004	20,000	Hollow core BMTS (TermoDeck) / York 510 TR (3 units of 170 TR + 170 standby unit)	6,000,000	1,140,000	York 1,020 TR (3 units of 340 TR + 340 TR standby unit)	10,880,000	1,880,000	High tonnage installed
Gulf Centre Office Building, Jeddah	1999	30,700	Hollow Core BMTS / Carrier 750 TR (3 units of 250 TR + 2 standby units of 250 TR)	5,986,500	1,749,900	Carrier 2,200 TR (4 units of 550 TR + 1 standby unit of 550 TR)	9,977,500	2,885,800	BMTS enabled building redesign to cover 30,700m2 on 7 floors. (Previous design for 26,400m2 on 6 floors)

Source: ASA Consulting based on local enquiries

Note: Total Value of Chilled Water Storage, Ice Storage and BMTS Systems includes conventional AC and TES equipment for Chilled Water and Ice Storage Systems.

Indicative average cost range for alternative conventional AC and TES AC systems in Saudi Arabia is as follows:

- Conventional AC system (CAC/Packaged): SR 160-170/m2. Conventional AC system (CAC/Chiller+AHUs): SR 280-330/m2.
- Chilled Water Storage: SR 500-620/m2.
- Ice Storage: SR 500-620/m2.
- Hollow Core BMTS (CAC/Packaged): SR 105-135/m2.
- Hollow Core BMTS (CAC/Chiller+AHUs): SR 230-250/m2.

Indicative average cost of operation for buildings (electricity charge, staff and maintenance) assumed to be as follows:

- Conventional AC (Large buildings): SR 94/m2/year. Conventional AC (Small domestic/commercial buildings): SR66/m2/year
- Chilled Water Storage (Large buildings): SR 90/m2/year
- Ice Storage (Large buildings): SR100/m2/year
- Hollow Core BMTS (Large buildings): SR57/m2/year
- Hollow Core BMTS (Small domestic/commercial buildings): SR42/m2/year.