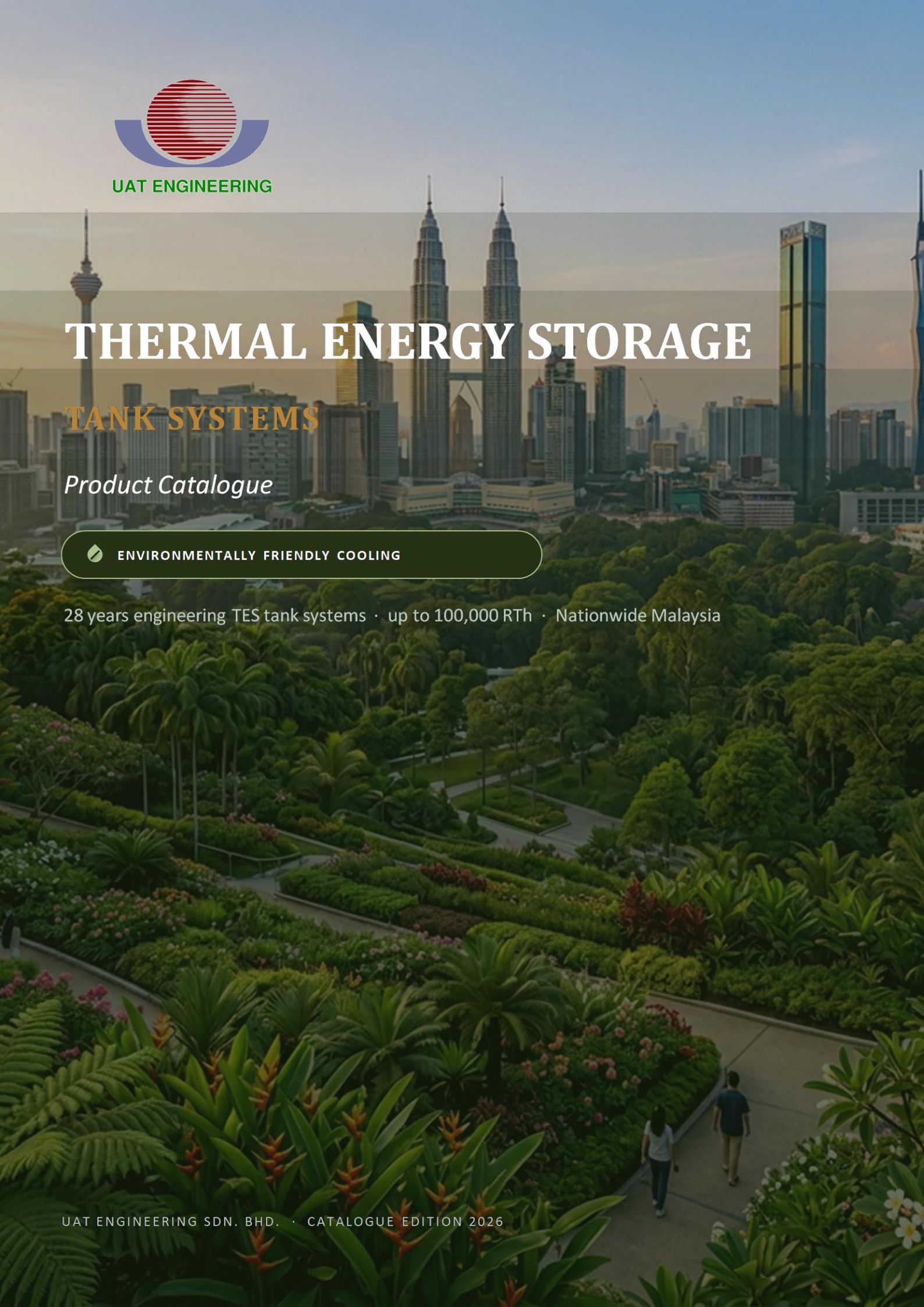


UAT ENGINEERING

THERMAL ENERGY STORAGE

TANK SYSTEMS

Product Catalogue

ENVIRONMENTALLY FRIENDLY COOLING

28 years engineering TES tank systems · up to 100,000 RTh · Nationwide Malaysia

UAT ENGINEERING SDN. BHD. · CATALOGUE EDITION 2026

TES Tank Systems

Two proven, energy-efficient thermal energy storage technologies that cut peak electrical demand and carbon footprint.

ICE THERMAL STORAGE

Encapsulated-ice system: coolant freezes water inside sealed capsules loaded into a tank. Lower pressure drop, no balancing issues, smaller tank volume required, no height limitation, no biological growth.

Delivered across 20+ installations · 1,000-35,000 RTh

CHILLED WATER STORAGE

Stratified chilled water stored directly in a large tank using thermocline diffusers. Simpler system, larger footprint required; scales efficiently to very large capacities for major developments.

Delivered up to 100,000 RTh in a single tank

TANK CONSTRUCTION OPTIONS

- Cylindrical Steel
- RC Rectangular
- FRP Tank
- Pressurised (Closed)
- Atmospheric (Open)
- Above-Ground
- Below-Ground

DESIGN & FABRICATION STANDARDS

Every TES tank is designed and fabricated in accordance with API 650 and ASME standards.

BUILT FOR SUSTAINABILITY

Shifting cooling load off-peak lowers grid carbon intensity, cuts chiller capacity and refrigerant charge, and reduces a building's operational footprint.

Diffuser Design & Efficiency

Buffer tanks are available in horizontal or vertical steel configurations to suit available plant room space and headroom.



Horizontal Configuration



Vertical Configuration

TANK EFFICIENCY BY DESIGN

A buffer tank's usable capacity depends heavily on what happens inside it. Without a properly engineered diffuser, incoming and outgoing water mixes turbulently and destroys the thermocline, wasting a large share of the tank's rated volume — forcing a much larger, costlier vessel to deliver the same usable cooling.

Empty Tank (no diffuser) — 18%

Gross tank size needed: 5.5× larger than an ideal (100%) tank

Baffle Plate Tank — 47%

Gross tank size needed: 2.2× larger than an ideal (100%) tank

Engineered Diffuser Design — 89%

Gross tank size needed: 1.1× larger than an ideal (100%) tank

✓ **Our diffuser design delivers 89% usable efficiency**

-- keeping the tank close to its ideal size instead of a significantly larger, costlier vessel.

Built for Factories & Data Centers

Two of the most energy-intensive facility types gain the most from thermal energy storage.

FACTORIES & INDUSTRIAL PROCESS COOLING



Manufacturing plants with continuous or batch process cooling loads gain from decoupling chiller capacity from peak-hour tariffs. A TES tank charges overnight at low ambient temperature and off-peak rates, then discharges to absorb daytime process spikes — shrinking maximum-demand (MD) charges, protecting production continuity through short power interruptions, and allowing a smaller, more efficient chiller plant.

- Buffers batch and process-load swings without oversizing chillers
- Cuts maximum demand (MD) charges under industrial tariff structures
- Provides ride-through cooling capacity during brief power interruptions
- Smaller chiller plant frees valuable factory floor and roof space

DATA CENTERS & MISSION-CRITICAL COOLING



Data halls demand cooling continuity around the clock. A TES tank supplies instant, chiller-independent cooling during the critical gap between utility loss and generator or standby-chiller start — a proven ride-through strategy in N+1 and 2N cooling designs. Charging the tank off-peak also lowers a facility's Power Usage Effectiveness (PUE), and tanks can be added tank-by-tank as IT load and POD count grow.

- Ride-through cooling during power transfer / genset start-up
- Supports N+1 and 2N cooling redundancy strategies
- Lowers PUE and energy cost per kW of IT load
- Scales tank-by-tank alongside modular POD / hall build-out

Built for District Cooling & Mixed Developments

Large-scale developments and utility-run networks rely on TES to serve diverse, shifting cooling loads efficiently.

DISTRICT COOLING PLANTS (DCP)

A centralised district cooling plant combines the air-conditioning load of an entire township, campus or business district into one efficient utility. A TES tank lets the operator charge overnight when ambient temperature and tariffs are lowest, then discharge during the daytime demand peak — reducing the number and size of chillers needed and smoothing the plant's load profile.

- Smooths the campus / district-wide cooling load profile
- Reduces installed chiller capacity and standby plant requirement
- Improves plant efficiency through steadier, full-load chiller operation
- Enables phased connection of new buildings without new chiller capex

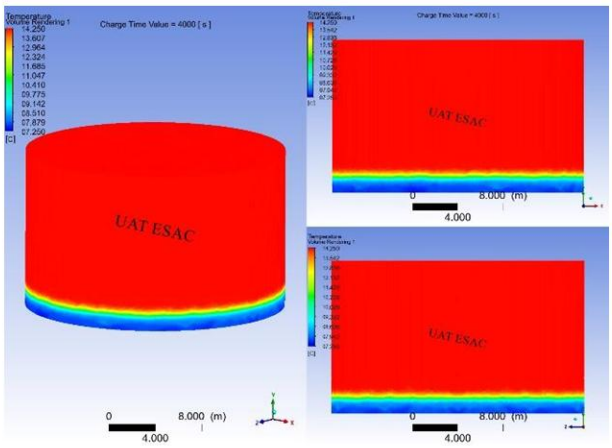
MIXED-USE DEVELOPMENTS

Mixed-use developments combine residential, retail and office towers whose cooling demand peaks at different times of day. A shared TES tank lets one central plant serve every component efficiently — charging off-peak overnight for the whole development and discharging to match each block's own demand curve, avoiding oversized chiller plant in every individual tower.

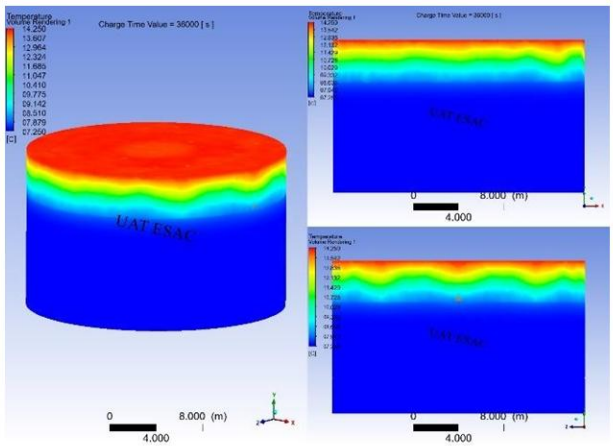
- Serves diverse load profiles — residential, retail, office — from one plant
- Avoids oversizing chiller plant in every individual tower or block
- Central plant simplifies operation, metering and maintenance
- Supports future expansion phases without re-engineering the cooling plant

CFD Simulation & Design Verification

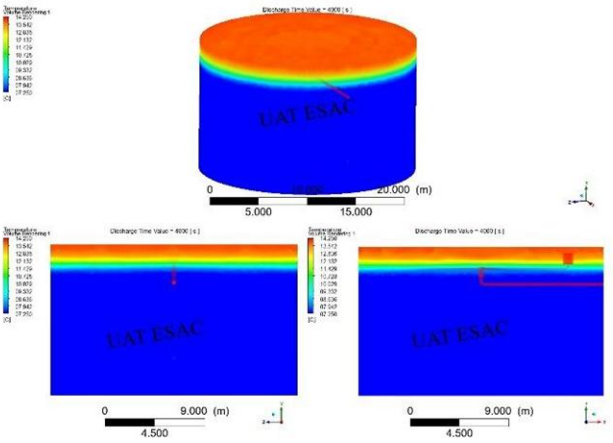
Every large-diameter TES tank is validated with computational fluid dynamics (CFD) simulation before fabrication — confirming stable thermal stratification, balanced multi-ring diffuser hydraulics, and predictable charge/discharge performance to ASHRAE Cool Thermal Storage and Carrier design guidance.



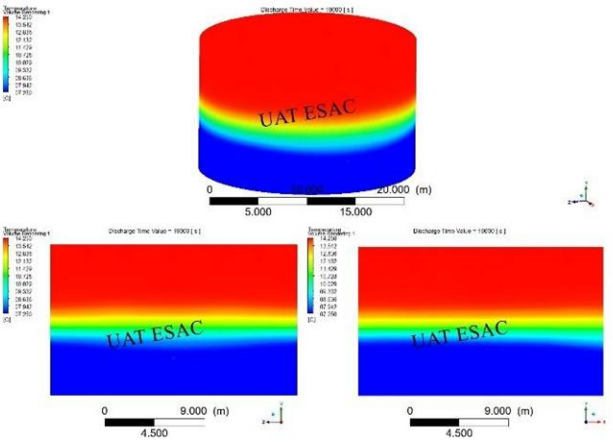
Charging — t = 1,000 s (initial state)



Charging — t = 40,000 s (near fully charged)



Discharging — t = 0 s (fully charged)



Discharging — t = 31,000 s (near fully discharged)

KEY VALIDATION PARAMETERS

Figure of Merit (FOM)

The share of a tank's rated capacity that is actually usable, after accounting for mixing losses between the warm and cold water layers.

Discharge Capacity / Storage %

The proportion of stored cooling energy that can be delivered to the building load before return water temperature exceeds the design set-point.

Laminar vs. Turbulent Flow

Diffuser inlet flow is checked against Froude and Reynolds number limits to confirm smooth, low-momentum entry — turbulence would mix and destroy the thermocline the tank depends on.

Installations, 1997-2007

16 of 31 TES tank systems delivered across Malaysia.

Year	Installation	Capacity	Type
1997	TNB Office Building, Bangi	1,000 RTh	Ice Thermal
1998	TNB R&D Centre, Bangi	3,300 RTh	Ice Thermal
1999	Tenaga National University, Bangi	10,000 RTh	Chilled Water
1999	Multimedia University, Phase 1	11,000 RTh	Ice Thermal
2000	Multimedia University, Melaka	5,800 RTh	Ice Thermal
2001	Cyberjaya DCP, Phase 1	7,500 RTh	Ice Thermal
2002	Cyberjaya DCP, Phase 2	100,000 RTh	Ice Thermal
2003	Sungai Buloh Hospital	9,400 RTh	Ice Thermal
2004	Universiti Malaysia Sarawak	7,600 RTh	Ice Thermal
2004	Asian Institute of Medicine (AIMST)	9,300 RTh	Ice Thermal
2005	Multimedia University, Phase 2	11,000 RTh	Ice Thermal
2005	Kolej Universiti Islam Malaysia	1,500 RTh	Ice Thermal
2006	Hospital UKM, Cheras	12,950 RTh	Ice Thermal
2006	Bandar Nusajaya, Johor	35,000 RTh	Ice Thermal
2007	Universiti Teknologi MARA (UiTM)	28,000 RTh	Chilled Water
2007	German-Malaysian Institute, Bangi	17,000 RTh	Chilled Water

Installations, 2008-2025

15 of 31 TES tank systems delivered across Malaysia.

Year	Installation	Capacity	Type
2008	Cyberjaya DCP, Phase 2/2 (Ice Conversion)	31,200 RTh	Ice Thermal
2009	EPCC Putrajaya (Plots 4G7-4G11)	DCS Supply	District Cooling
2010	Universiti Sains Islam Malaysia (USIM)	13,200 RTh	Ice Thermal
2010	Cyberjaya DCP Plant 1, Phase 1-3	49,600 RTh	Chilled Water
2011	Cyberjaya DCP Plant 2	30,000 RTh	Ice Thermal
2011	UTAR, Kampar (Phase 2)	10,000 RTh	Chilled Water
2012	KL Sentral, Phase 2	37,000 RTh	Ice Thermal
2013	Bandar Nusajaya, Phase 2	10,000 RTh	Chilled Water
2013	IOI City Mall, Putrajaya	76,000 RTh	Chilled Water
2014	CX5 Data Center	430 RTh ×2 + 145 RTh ×2	Chilled Water
2015	Megajana DCP 1 (Upgrade)	19,500 RTh	Chilled Water
2017	I-City Mall, Shah Alam	10,900 RTh	Chilled Water
2019	Hospital UTAR, Kampar	15,000 RTh	Chilled Water
2022	USIM, Phase 2, Nilai	10,500 RTh	Ice Thermal
2025	Taylor's University, Lakeside Campus	10,945 RTh	Chilled Water

TES Tanks We've Delivered

A selection of TES tanks engineered, fabricated and commissioned by our team across Malaysia.



Taylor's University (2025)



Cyberjaya DCP Phase 2 (2002)



TNB Office Building (1997)



USIM, Nilai (2010)



German-Malaysian Institute (2007)



UiTM Puncak Alam (2007)



Multimedia University Ph 2 (2005)



Cyberjaya DCP Plant 1 (2011)



Cyberjaya DCP Plant 1 (2011)



KL Sentral Phase 2 (2012)



IOI City Mall (2013)



CX5 Data Center (2014)



CX5 Data Center (2014)



Bandar Nusajaya, Johor (2006)



Cyberjaya DCP Phase 1 (2001)



Sungai Buloh Hospital (2003)



Universiti Malaysia Sarawak (2004)



AIMST (2004)



Megajana DCP 1 Upgrade (2015)



Hospital UTAR, Kampar (2019)



USIM Phase 2, Nilai (2022)



UNITEN, Bangi (1999)



Hospital UKM, Cheras (2006)



Universiti Malaysia Sarawak (2004)



AIMST (2004)

Trusted By

Thermal energy storage (TES) tank systems delivered for:

- ✓ TNB
- ✓ UNITEN
- ✓ Multimedia University (MMU)
- ✓ Pendinginan Megajana Sdn Bhd
- ✓ Hospital Sg Buloh
- ✓ AIMST
- ✓ Jana DCS Sdn Bhd
- ✓ UiTM
- ✓ German Malaysian Institute (GMI)
- ✓ UTAR
- ✓ Malakoff Utilities
- ✓ USIM
- ✓ Taylor's University
- ✓ Central I-City Sdn Bhd
- ✓ IOI Group
- ✓ UNIMAS
- ✓ Hospital UKM

UAT ENGINEERING

CERTIFICATIONS

Registered & Compliant

CIDB Gred G5

Category B (B04), CE (CE21), ME (M15)

MOF Registered

Ministry of Finance Malaysia - valid to 21 Jul 2029

Co. No. 200701009804 (767807-K)

Incorporated 30 March 2007

Tank Design Standard

Designed and fabricated to API 650 and ASME standards

GET IN TOUCH

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