

COMPANY Profile

TEDES specializing in **cooling, heating,** and **energy** services, we deliver reliable and eco-friendly systems for various industries.

TERMODINAMIKA E N E R G I S E L A R A S





"Optimizing Energy, Empowering Sustainability"

We are commited to deliver energy and thermodynamics solutions that are efficient, reliable and sustainable.

OUR VISION

We aim to provide efficient, reliable, and sustainable solutions in cooling, heating, and energy for a better tomorrow.

OUR MISSION

We provide eco-friendly cooling, heating, and energy efficiency solutions that promote environmental stewardship, led by TEDES's dedication to innovation.

01



Innovative Green Solutions

Our focus is providing the industry, commercial building, and food cold chain for innovative green cooling solutions.



Sustainable Heating/Cooling Project

Total solutions for your heating/cooling projects, from first ideas to working system.



Reliable Process Support

Our dedicated team will ensure reliable support for your businesscritical processes through eco-friendly solutions.





TEDES is part of ATW Group (ATW Group is solar photovoltaic complete system integration and energy storage solutions). Our team has extensive experience in HVAC, heating/cooling processes and project management you can **Trust**.

We provide heating, cooling and electrical energy solutions that are more efficient, practical, **environmentally** friendly, easy to monitor (IoT ready). By selecting the latest proven reliable technology and collaborating with experienced partners, we ensure **sustainability** ecosystem.

We are **confident** in being business solution partner for our customers, especially in the energy sector, and thermodynamics which are the core focus of our business

Our customers come from various industries, commercial buildings, food processing cold chains and partners seeking to undertake colaboration turnkey projects. We analyze each customer's specific needs and offer tailored solutions to meet their objectives

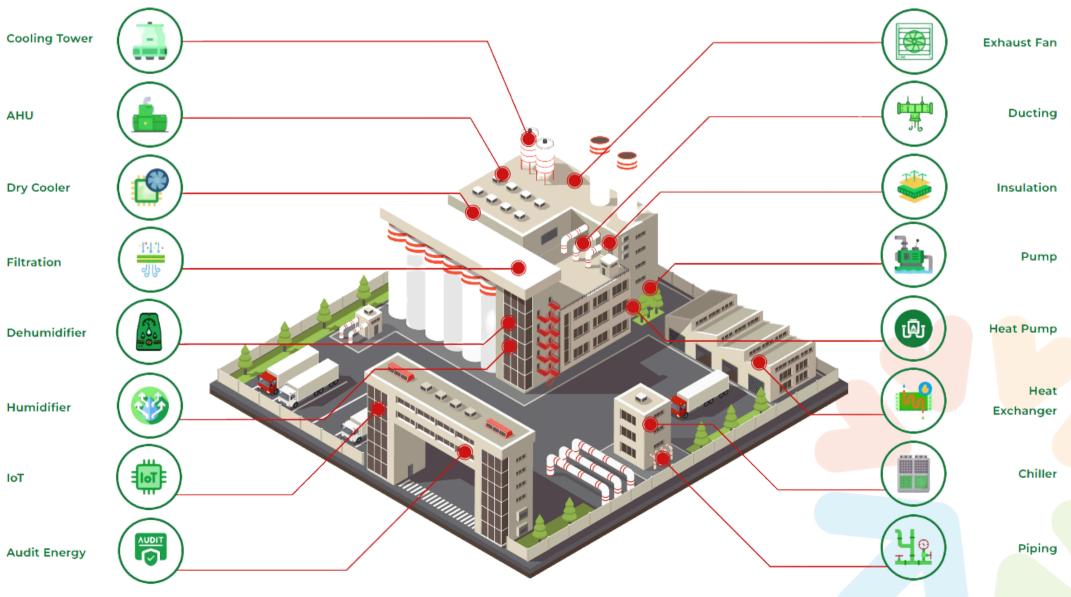
02



INDUSTRIAL SOLUTION

Innovative industrial heating and cooling systems tailored for your specific heating and cooling demand. We ensure our installation comply with all relevant local regulations, codes, and industry guidelines.

> Cutting-edge industrial heating and cooling systems with innovative solutions and tailored for your spesific demand to deliver efficient temperature control while ensuring full compliance with Filtration applicable local regulations, standards, and industry guidelines. These advanced solutions are designed to optimize performance, promoting sustainability and reliability in industrial environments.



Audit Energy

IoT

SUSTAINABLE HEATING AND COOLING SOLUTION

NOUSTRIAL SOLUTION

03



BUILDING SOLUTION

Energy-efficient heating and cooling systems for buildings, designed to maintain optimal indoor air quality and comfortable.

Our energy-efficient heating and cooling systems maintain building temperatures needs while reducing energy use, offering sustainable and cost-effective solutions for businesses and property owners.

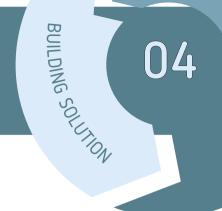
With advanced technology, these systems optimize energy during peak and off-peak hours, integrating smoothly with building management systems. Our specialists ensure a seamless setup, allowing for immediate and long-term savings.











COOLING INNOVATION FOR THE FUTURE



FOOD PRESERVATION

A food preservation system plays a crucial role in preserving perishable goods like vegetables, meat, and seafood by maintaining optimal temperature conditions.

SUSTAINABLE SOLAR FOOD PRESERVATION

Utilzing renewable energy sources, such as solar power in conjuction with sandwich panel housing, enhances sustainability while reducing reliance on fossil fuels. This approach ensures energy efficiency, makin cold storage operations more environmentally friendly and faster build up.



Lowest Electric consumption & base on economical aspects



Integrated air blast freezer, anteroom, cold room



Refrigerant Ultra Low Global Warming Potential (GWP) & Ozone Depletion Potential (ODP)



Super Insulation : -High density -Thickness -Anti bacterial -Environment friendly







SANDWICH PANEL

Sandwich Panels are used in a huge variety of building to meet the standards of architects.

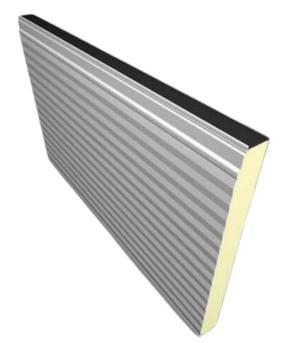
Our commercial & industrial wall and roof system offer designers a comprehensive range of building solutions for vertical and horizontal wall applications.

in multiple profiles, Available finishes and color options. trimless ends and cover widths, insulated panels provide customized building design and creative freedom

The panels are easily integrated traditional construction with methods and building systems.

Sandwich Panels

insulated wall systems offer superior R-values with unparalleled thermal performance during service life, all build-in to a single off-site factory assembled insulated panel.





ENERGY EFFICIENCY

Because it has an excellent insulation properties from sounds and temperature it can significantly reduces the energy used for electricity especially for air conditioning



Has knock down installation system. It can be twaken apart and reassembled with ease to meet the needs of designed/intended layout.

06



LOW COST

Efficiency, fast build time, does not require much man power build.



GOOD INSULATION

Making your wall(s) and roof(s) cooler which will also increase your productivity inside the building



ECO FRIENDLY

Safe for human and environment because it can reduce the usage of woods sugnificantly



NEAT & CLEAN Neat, clean and hygienic installation, making your building look elegant and modern.





CONSULTATION & DESIGN

We specialize in providing consultation and design services for HVAC systems and energy related matter ensuring each project is optimized for efficiency, cost savings, and system reliability. Our designs are crafted to meet your specific needs, from concept to implementation, with a focus on sustainable performance.

Expert

TEDES provides expert insights on HVAC system design optimization, energy efficiency strategies, qualification regulatory compliance, and maintenance best practices.

Guidance

We offer structured guidance to enhance HVAC skills and competencies among your team members.

Recommendation

TEDES delivers actionable recommendations aimed at improving overall system efficiency and reliability.







OPERATION, MAINTENANCE, AND TRAINING

We provide excellent HVAC System, Operation and Maintenance to ensure optimal performance and functionality at maximum efficiency. This will ensure longer lifetime of your utility facilities and related infrastructure.

OPTIMAL PERFOMANCE

Optimal performance reflects the system's ability to operate effectively in maintaining the set point

MAXIMUM EFFICIENCY

Maximum efficiency focuses on minimizing energy use while achieving optimal output

HVAC ENERGY AUDIT

We provide HVAC Energy Audit to identify opportunities for improving energy efficiency, reducing energy consumption, and optimizing comfort levels for occupants or cooling process.





 Data Collection & Analys Field Inspection and Measurement Perfomance Testing Analysis and Recommendations Reporting and Implemention



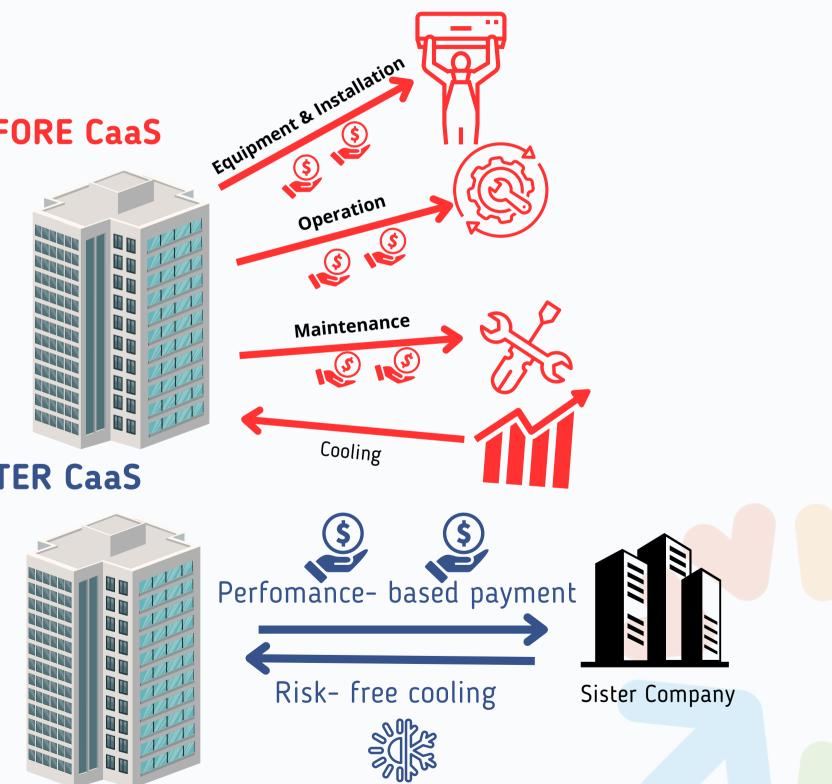
SERVICES Trusted Services For Continuous Growth

COOLING AS A SERVICE (CaaS)

Our 'sister company' will invest, install, operate, and maintain the cooling system for you fully tailored to your needs by our experts. This means you will benefit from an energy efficient cooling solution without risks.

Our monthly CaaS bills are based on the cooling energy we supply, guarantee lower overall cooling costs while you focus on growing your core business.

BEFORE CaaS







09



SERVICES Trusted Services For Continuous Growth

Our cooling as a service (CaaS) scheme enables client to save money on a high performing cooling system without any capital expenditure/upfront cost.

BENEFITS COOLING AS A SERVICE (CaaS)



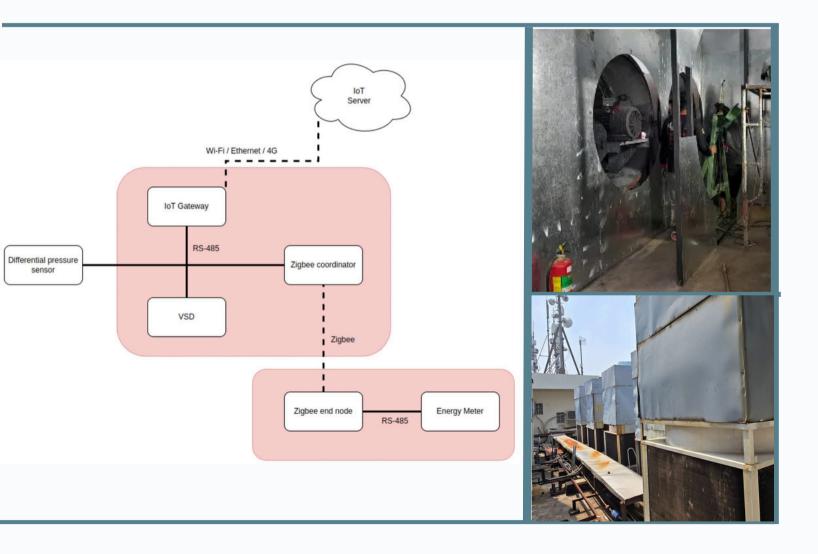
Emission Reduction



Cost Savings



Creating Eco - Friendly Solutions



FACTORY

TEDES and its partners is assisting a large textile factory in West Java to restore its HVAC plant after a fire disaster. By collaborating with HVAC component and sandwich panel manufacturers, TEDES helped the company recover the burned area within 14 days.

OFFICE HVAC RETROFIT WITH HYDROCARBON CHILLER - SOUTH JAKARTA We assisted One of the Leading Indonesian Oil and Gas Engineering Company to conduct Retrofit and Reengineering of the Company's Head Quarter Office HVAC.

VSD AND COOLING TOWER RETROFIT FOR ONE TEXTILE FACTORY - BOGOR. **WEST JAVA**

TEDES is assisting Textile Company to conduct Energy Efficiency in the chiller and production machines with the help Online Monitoring System and replacing Cooling Tower and install VSD in their machinery motors.

HVAC PLANT RECOVERY FROM FIRE DISASTER - WEST JAVA, TEXTILE



Creating Eco - Friendly Solutions

• CHILLER RETROFIT FOR PP FILM FACTORY - WEST JAVA, BEKASI

A large-scale PP Film factory with high cooling demands faced massive electricity costs and unstable temperature. TEDES assisted the 40+ year-old factory, in retrofitting and reengineering its chiller plant, and increase its production capacity throughput.

1. CHILLER PLANT AUDIT

=> TEDES conducted a field survey to audit the existing Chiller Plant and indentify problems.



2. ANALYZE & CALCULATE

=> TEDES conducted an analysis to find solutions related to the Chiller Plant problems found during the survey and performed design calculations according to the Chiller Plant requirements.

			Nomor										EFFICIEN	CY				
			Basin				Status	Ch	iller Efficien	αγ	CHWP E	fficiency	CWP E	ficiency	CT Effi	ciency	CHILLER PLANT EFFICIENCY	∆T eva
Chiller Plant	Label	Machine/ Load		Brand	TR Chiller	No. Chiller	(On/Off/Backup)	Total kW	TR	Kw/TR	kW Consum	kw/TR	kW Consum	kw/TR	kW Consum	kw/TR	Kw/TR	(°C)
	Extrusion 01	MHI 1	81				OFF											1
1	Extrusion 02	EGAN 1		HITACHI			OFF											
	Extrusion 03	EGAN 2	81				OFF											
		SML 1 &	BO	HITACHI	500	CHILLER 1	ON	181.87	269.79	0.67	48.83	0.18	44.35	0.16	7.94	0.03	1.05	3.00
2	Extrusion 04	EREMA 3	82	нітасні	120	CHILLER 4	OFF											
		SML 2		HITACHI	120	CHILLER 5a	ON	68.04	127.34	0.53			29.78	0.23	4.86	0.04	1.06	5.90
3	Extrusion 05	14 AHU 7 AHU Panel	83	HITACHI	120	CHILLER 5b	ON	91.44	127.34	0.72	32.76	0.26	26.52	0.21	1.84	0.01	0.94	5.90
	E-tomine of			COT A COL	400	CHILLED C	011						20.05					

UPPLY	PIPE GALVANIZE	D
Line	Keterangan	Heat
		m
1	MHI1	35
2	EGAN 2	60
3	1+2	
4	EGAN 1	60
5	3+4	
6	SML1	60
7	5+6	
8	SML 2	60
9	7+8	
10	MHI 2	55
11	9+10	
12	BTF 1	50
13	11+12	
14	TANGO	55
15	GULDEN	55
16	14+15	
17	RABIT K5000-3350	98

							4	3.3		100	0.3048	9.81			10	5	10				
d	Water	Flow	Diameter	Len	gth	Total I	ength.	Velocity	Head Loss	Pressure Drop	Pressure Drop	Pressure	Drop Unit	Pressure Drop Accumul ation	ELB	ow			TEE		
	M³/h	GPM	inch	m	ft	m	ft	ft/s	ft/100 ft	ft/100 ft	m	Кра	m	m	90	45	6"	8"	10"	12"	14"
	60	264	4"	35.50	116.47	85.50	280.51	6.65	3.896	10.93	3.33	343.35	35.00	18.31	5						
	81	356	5"	16.50	54.13	66.50	218.18	5.71	2.214	4.83	1.47	588.60	60.00	16.45	5						
_		620	6"	35.80	117.45	65.80	215.88	6.89	2.52	5.44	1.66	0.00	0.00		2		1				
	86	378	5*	5.60	18.37	45.60	149.61	6.06	2.478	3.71	1.13	588.60	60.00	14.45	4						
		999	8"	13.00	42.65	23.00	75.46	6.41	1.576	1.19	0.36	0.00	0.00					1			L
	90	396	5"	5.60	18.37	45.60	149.61	6.35	2.706	4.05	1.23	588.60	60.00	14.19	4						
		1395	8"	30.00	98.42	60.00	196.85	8.95	2.972	5.85	1.78	0.00	0.00		2			1			
	96	422	5"	5.50	18.04	45.50	149.28	6.77	3.051	4.55	1.39	588.60	60.00	12.56	4						
		1817	10"	14.00	45.93	24.00	78.74	7.39	1.571	1.24	0.38	0.00	0.00						1		
	122	537	6"	5.50	18.04	45.50	149.28	5.96	1.921	2.87	0.87	539.55	55.00	11.67	4						
		2354	10"	17.00	55.77	27.00	88.58	9.58	2.573	2.28	0.69	0.00	0.00						1		
	90	396	5"	5.50	18.04	45.50	149.28	6.35	2.706	4.04	1.23	490.50	50.00	11.33	4						
		2750	10"	85.00	278.87	105.00	344.49	11.19	3.467	11.94	3.64	0.00	0.00		1				1		
	54.9	242	4"	20.50	67.26	70.50	231.30	6.1	3.306	7.65	2.33	539.55	55.00	13.94	5						
	58.5	257	4"	6.15	20.18	56.15	184.22	6.48	3.703	6.82	2.08	539.55	55.00	13.69	5						
		499	6"	32.00	104.99	42.00	137.79	5.54	1.673	2.31	0.70	0.00	0.00				1				
	58.5	257	4"	6.15	20.18	56.15	184.22	6.48	3.703	6.82	2.08	961.38	98.00	12.99	5						

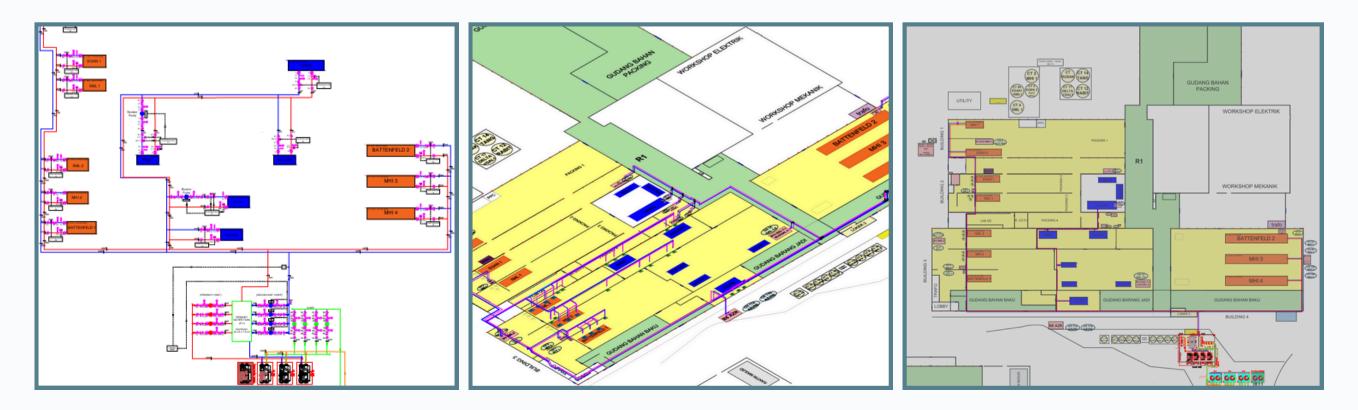


Creating Eco - Friendly Solutions

• CHILLER RETROFIT FOR PP FILM FACTORY - WEST JAVA, BEKASI A large-scale PP Film factory with high cooling demands faced massive electricity costs and unstable water temperature. TEDES assisted the 40+ year-old factory, in retrofitting and reengineering its chiller plant, and increase its production capacity throughput.

3. HVAC DESIGN & EQUIPMENT SELECTION

=> TEDES design New Centrallized Chiller Plant to replace existing chiller units and selected the most suitable chiller system for the customer and the new proposed system could **save more than 50%** energy usage compare to the old system.







Creating Eco - Friendly Solutions

• CHILLER RETROFIT FOR PP FILM FACTORY - WEST JAVA, BEKASI A large-scale PP Film factory with high cooling water demands faced massive electricity costs and unstable water temperature. TEDES assisted the 40+ year-old factory, in retrofitting and reengineering its chiller plant, and increase its production capacity throughput.

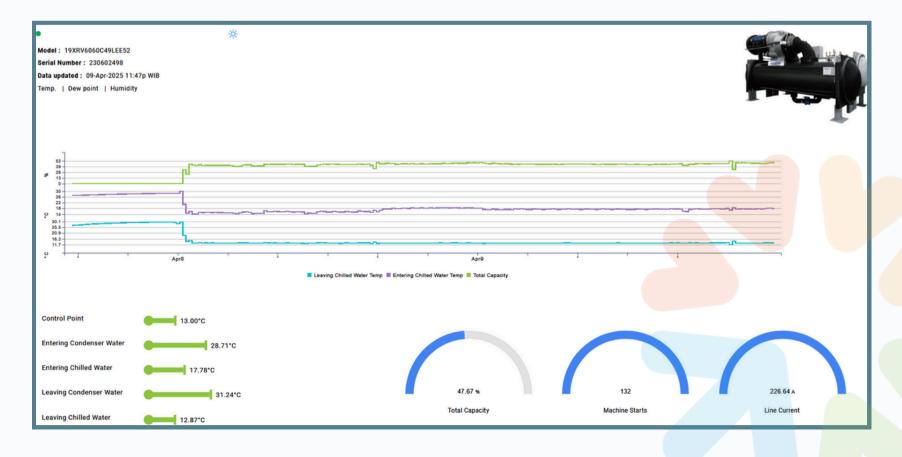
4. IMPLEMENTATION

=> Customer purchased the first chiller and proved that the projected 50% saving could be achieved.



5. MONITORING

=> TEDES monitor the chiller performance while discussing implementation of the completion of the new chiller plant.







Creating Eco - Friendly Solutions

- COMPLIANCE HVAC SYSTEM TO GOVERMENT REGULATORY FOR HERBAL MEDICINE INDUSTRY EAST JAKARTA TEDES is assisting One Herbal medicine factory to improve HVAC system to comply with Goverment Regulatory (BPOM)
 - 1. HVAC AUDIT
 - => TEDES conducted a field survey to audit the existing HVAC system and indentify problems.



2. ANALYZE & CALCULATE => TEDES conducted an analysis to find solutions related to the HVAC problems found during the survey and performed design calculations according to the HVAC requirements.



									Room	Dimension					Ceiling	Jam Operatio	nal Jur	nlah	How			HVAC re	quirement		
NOMOR UANGAN	N	NAMA RUANGAN		Zonin	8 Classifica		W (m)	A (m	2)	BTU		смн	H (m)	Hours	т	itik mpu	many Person	Tempera ture	%RH	Pressure	Air Change	can be Monitor/ Control	Ed		
1102	Rua	ing Antara Bara	ing		SEKUND	ER 1,85	2,34	4,3	3	4329,00		64,94	3			0	0	25	55	+	5				
1103		Loker Wanita			SEKUND	ER 3,37	1,85	6,2	3	6234,50		93,52	3			0	10	25	55		5				
1104		Koridor			PRIME	R 11,8	1,85	23,5	3	23928,00		358,92	3			4	0	25	55	++	5		T		
1105		Ruang Proses			PRIME	R 10.8	7,35	75,3	15	75345,00		1130,18	3			8	5	25	55	++	5	OK	Г		
1106	Rua	ing Antara Bara	ing		SEKUND	ER 2,34	1,85	4,3	3	4329,00		64,94	3			1	0	25	55		5		Т		
1107		Ruang Proses			PRIME	R 29,8	4,86	149,	00	149001,00		2235,02	3			20	5	25	55	++	5	OK	Т		
1108	Ruang	Ruahan Cair (a	irea 1)		PRIME	R 15,8	4,34	68,7	15	68745,60		1031,18	3			3	1	25	55	++	5	ОК	Т		
1108	Ruang	Ruahan Cair (a	irea 2)		PRIME	R 7,49	4,86	36,4	10	36401,40		546.02	3			0	1	25	55	++	5	OK	t		
1109		Ruang SPV			SEKUND			6.6		6692.40		100.39	3			1	2	25	55	++	5		t		
1110	Ruane Stagin	ng Bahan Penge	mas Primer		PRIME			14,3		14328,90		214.93	3			0	6	25	55	++	5	ОК	t		
1111		Ruang Panel			PRIME			14,3		14328,90		214,93	3	_		0	0	25	55		5		t		
1112	0	luang Pengisian			PRIME			53,0		53007,20	_	795,11	3	_		3	14	25	55	++	5	ОК	t		
1113		Ruang Ruahan			PRIME			50,5		50936,60		764.05	3	24		6	1	25	55	++	5	OK	+		
1114		luang Pengisian			PRIME			44,3		44330,00		664,95	3	_		5	18	25	55	++	5	OK	t		
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1115					SEKUND			19,3		19342,80	-	290,14	3	_		2	15	25	55	+	5	OK	+		
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1116		Tangga			SEKUND		1,85	8,9		8991,00		134,87	3	_		0	0	25	55		5		┝		
1117		Ruang Adm.			SEKUND		4,86	28,4		28479,60		427,19	3	_		0	3	25	55		5		+		
1118		Ruang Ruahan			PRIME			20,1		20192,40	_	302,89	3	_		2	1	25	55	++	5	OK	ł		
													3			1	1								
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R FLOW SAG	LUAS PENAMPANG	JUMLAH PER	AIR FLOW SAG PER	SAG PER	LUAS	CD 8.00			LUAS	JUMLAH PER	RAG PER		IG PER UNIT	lize RAG eck (mm)			;	flow	Luas Penampa	(mm lebar	si Ducting	Dimensi Da	kai		
R FLOW SAG m^3/s	LUAS PENAMPANG DIBUTUHKAN m*2	JUMLAH PER RUANGAN unit	AIR FLOW SAG PER UNIT CMH	SAG PER UNIT m^3/s	LUAS PENAMPANG PER UNIT m*2	DIMENSI SJ	KG PER UNIT	Size SAG	LUAS PENAMPANG DIBUTUHKAN m*2	JUMLAH PER RUANGAN unit	RAG PER UNIT CMH	DIMENSI RA	IG PER UNIT	eck (mm)			Ar		Luas	(mm lebar	il Ducting rumus	Dimensi Di (mm) pa	kai		
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n*3/s 0.25 0.09	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03	JUMLAH PER RUANGAN unit 1.00 1.00	AIR FLOW SAG PER UNIT CMH 887 315	SAG PER UNIT m*3/s 0,25 0,09	ELUAS PENAMPANG PER UNIT m*2 0.10 0.03	0.31 0.19	G PER UNIT m 0.31 0.19	300 s Size SAG neck (mm) 300 x 300 200 x 200	ELUAS PENAMPANG DIBUTUHKAN m*2 0.09 0.03	JUMLAH PER RUANGAN unit 1.00 1.00	RAG PER UNIT CMH 756 283	DIMENSI R/ m 0.25 0.25	KG PER UNIT	eck (mm) 150 x 350 150 x 150			Ar CMH AHU 1 673	flow m*3/s 0,19	Luas Penampa m*2	ng lebar	si Ducting) rumus x tinggi x 193	Dimensi Du (mm) pa lebar x	tin		
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n*3/s 0.25 0.09 0.14 0.00	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03 0,06 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00	АІЯ FLOW SAG PER UNIT СМІН 887 315 511 0	SAG PER UNIT m*3/s 0.25 0.09 0.14 0.00	LUAS PENAMANG PENUNIT m*2 0.10 0.03 0.06 0.00	0.31 0.24 0.00	MG PER UNIT M 0.31 0.19 0.24 #DW0!	300 s Size SAG neck (mm) 300 x 300 200 x 200	ELIAS PENAMAANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00	RAG PER UNIT CMH 796 283 459 0	0.25 0.25 0.25	AG PER UNIT	eck (mm) 150 x 350 150 x 150			Ale CMH AHU 1 673 673 1346	flow m*35 0,19 0,19 0,37	Luas Penampa m*2	(mm lebar 0.04 194 0.04 194 0.07 274	si Ducting rumus x tinggi x 193 x 193 x 193 x 273	Dimensi Dı (mm) pa lebar x 200 x 2 200 x 2 280 x 2	tin		
1.00 SAG 0.25 0.00 0.14 0.00 0.00	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03 0,06 0,00 0,00	JUMLAH PER RUANGAN UNIX 1.00 1.00 1.00 1.00 1.00	AIR FLOW SAG PER UNIT CMH 887 315 511 0 0	SAG PER UNIT 0.25 0.09 0.14 0.00 0.00	LUAS PENAMPANG PER UNIT m*2 0,10 0,03 0,06 0,00 0,00	m 0.31 0.24 0.00 0.00	6 PER UNIT m 0.31 0.19 0.24 sDW01 sDW01	Size SAG neck (mm) 300 x 300 200 x 200 250 x 250	LUAS PENAMPANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00 0,00	UMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00	RAG PER UNIT CMH 798 283 459 0 0	m 0.25 0.25 0.25 0.25 0.25	AS PER UNIT	eck (mm) 150 x 350 150 x 150 150 x 200			AH CMH AHU 1 673 673 1346 712	m*3/s 0,19 0,27 0,20	Luas Penampa m*2	(mm lebar 0.04 194 0.04 194 0.07 274 0.04 199	si Ducting numus x tinggi x 193 x 193 x 273 x 199	Dimensi D: (mm) pa lebar x 200 × 2 200 × 2 200 × 2	tin 100		
1.20 R FLOW SAG 0.25 0.00 0.00 0.14 0.00 0.00 0.17	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03 0,06 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00	АІЯ FLOW SAG PER UNIT СМІН 887 315 511 0	SAG PER UNIT m*3/s 0.25 0.09 0.14 0.00	LUAS PENAMANG PENUNIT m*2 0.10 0.03 0.06 0.00	0.31 0.24 0.00	MG PER UNIT M 0.31 0.19 0.24 #DW0!	300 s Size SAG neck (mm) 300 x 300 200 x 200	ELIAS PENAMAANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00	RAG PER UNIT CMH 796 283 459 0	0.25 0.25 0.25	G PER UNIT m n 0.35 : 0.20 : 0.00 0.00 0.00 0.24 :	eck (mm) 150 x 350 150 x 150			Ale CMH AHU 1 673 673 1346	m*3/s 0,19 0,37 0,20 0,17	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm lebar 0.04 194 0.04 194 0.07 274 0.04 199 0.00 182	si Ducting rumus x tinggi x 193 x 193 x 193 x 273	Dimensi Du (mm) pa lebar x 200 x 2 200 x 2 280 x 2			
1.20 x FLOW sAG 0.25 0.00 0.14 0.00 0.00 0.06 0.05	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03 0,06 0,00 0,00 0,07	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00 1.00	АІВ FLOW SAG PER UNIT СМН 887 315 511 0 0 611	SAG PER UNIT 0.25 0.09 0.14 0.00 0.00 0.17 0.06 0.05	LUAS PENAMPANG PER UNIT m*2 0,10 0,03 0,06 0,00 0,00 0,07	m 0.31 0.24 0.00 0.00 0.26 0.15 0.14	G PER UNIT m 0.31 0.19 0.24 #DW01 0.26 0.14	Size SAG neck (mm) 300 x 300 200 x 200 250 x 250 250 x 250	LUAS PENAMANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00 0,00 0,00 0,00 0,00 0,00	20.000.00 RUARGAN 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00	RAG PER UNIT CMH 796 283 459 0 0 550	DIMENSI RJ m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	MG PER UNIT m n 0.35 0.13 0.20 0.00 0.00 0.24 0.14	eck (mm) 50 x 350 50 x 150 50 x 200 50 x 250			CMH AHU 1 673 673 1346 712 595 595 1307 22533	m*3/s 0,19 0,20 0,27 0,20 0,17 0,26 0,74	Luas Penampa 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm lebar 0.04 194 0.04 194 0.04 194 0.04 194 0.04 199 0.03 182 0.03 182 0.07 270 0.03 384	si Ducting i numus x tinggi x 193 x 193 x 193 x 199 x 199 x 199	Dimensi Du (mm) pa lebar x 200 × 2 200 × 2 200 × 2 200 × 2 200 × 2	tin 200 200 200 200 200		
R FLOW SAG 0.25 0.09 0.14 0.00 0.17 0.06 0.05 0.00	LUAS PENAMPANG OBUTUHKAN m*2 0,10 0,03 0,06 0,00 0,00 0,00 0,00 0,00 0,0	JUMLAH PER RUANGAN Unit 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 887 315 511 0 0 611 209 175 0	SAG PER UNIT 0.25 0.09 0.14 0.00 0.10 0.00 0.17 0.06 0.05 0.00	LUAS PENAMPANG PER UNIT m*2 0,10 0,00 0,00 0,00 0,00 0,00 0,00 0,0	DIMENSI S	6.04 G PER UNIT m 0.31 0.19 0.24 #DW0! 4DW0! 0.26 0.15 0.14 #DW0!	Size SAG neck (mm) 300 x 300 200 x 200 250 x 250 150 x 150 150 x 150	LUAS PENAAMANA DIBUTUHKAN m*2 0,009 0,003 0,005 0,000 0,000 0,000 0,000 0,000	20.000.00 JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	RAG PER UNIT CMH 283 459 0 0 0 0 550 188 158 0	m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	AG PER UNIT m n 0.35 : 0.13 : 0.00 : 0.00 : 0.00 : 0.24 : 0.14 : 0.12 : 0.00 :	eck (mm) 50 × 150 50 × 150 50 × 250 50 × 250 50 × 150 50 × 125			Ale CMH AHU1 673 1345 712 595 712 595 1307 12533 6522	m*3/s 0.19 0.77 0.20 0.77 0.76	Luas Penampa m*2	(mm lebar 0.04 194 0.07 274 0.04 199 0.03 182 0.07 270 0.07 270 0.07 270 0.07 270 0.07 270 0.07 270 0.07 270 0.07 270	x 193 x 193 x 193 x 193 x 193 x 193 x 193 x 193 x 193 x 195 x 195	Dimensi Dr. (mm) pa lebar x 200 × 2 200 × 2	tin 100 100 190 190		
**************************************	LUAS PENAMPANG DBUTUHKAN m*2 0,10 0,00 0,00 0,00 0,00 0,00 0,00 0,0	JUMLAH PER RUANGAN unit 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,0	AIR FLOW SAG PER UNIT CMPH 687 315 511 0 0 0 611 209 175 0 439	SAG PER UNIT m*3/s 0,25 0,09 0,14 0,00 0,17 0,06 0,05 0,00 0,14	LUAS PENAMPANG PER UNIT m*2 0.30 0.06 0.00 0.00 0.00 0.00 0.00 0.00	0.31 0.31 0.24 0.00 0.26 0.15 0.14 0.02	G PER UNIT m 0.31 0.19 0.24 PDW01 #DW01 #DW01 0.26 0.15 0.14 #DW01 0.26 0.14	50 x 546 520 x 546 neck (mm) 300 x 300 200 x 200 250 x 250 150 x 150 150 x 150 250 x 250	LUAS PERAAMPANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00 0,00 0,00 0,00 0,00 0,00	20.000.00 20.000.00 20.000 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	RAG PER UNIT CMH 756 283 459 0 0 550 188 156 158 158 0 897	0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.15 0.15 0.15 0.25	AG PER UNIT M n 0.35 : 0.00	eck (mm) 50 x 350 50 x 250 50 x 250 50 x 250 50 x 125 50 x 125 50 x 400		•	Ale CMH AHU 1 673 673 1346 712 5955 1307 2553 6522 6522	m*3s 0,19 0,20 0,77 0,26 0,74 0,18 0,18 0,18	Euas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 0,04 1544 0,04 1544 0,04 1544 0,04 154 0,07 274 0,04 159 0,03 182 0,07 270 0,15 384 0,04 159 0,04 159	x 193 x 195 x 195	Dimensi Do (mm) pa lebar x 200 x 2 200 x 2 200 x 2 200 x 2 200 x 2 200 x 3 200 x 2 200			
R FLOW SAG 0.25 0.09 0.14 0.00 0.17 0.06 0.05 0.00 0.28	LUNS PENAMPANG DIBUTUHGAN m*2 0,10 0,00 0,00 0,00 0,00 0,00 0,00 0,0	JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 687 315 511 0 0 611 209 0 611 209 0 175 0 489	SAG PER UNIT m*3/s 0.25 0.09 0.14 0.00 0.17 0.06 0.05 0.05 0.00 0.14 0.14 0.14	EULAS PERAMMANG PERUMIT m*2 0.10 0.036 0.006 0.007 0.02 0.00 0.00 0.00 0.00	0.31 0.31 0.24 0.00 0.26 0.13 0.14 0.00 0.26 0.14 0.00 0.24	6 92 6 927 UNIT m 0.31 0.19 0.24 #DW01 0.26 0.14 #DW01 0.24 0.24 0.24 0.24	58 540 58 540 neck (mm) 300 x 300 200 x 200 250 x 250 150 x 150 150 x 150 150 x 150 250 x 250 250 x 250	LUAS PENAMANANG DIBUTUHKAN m*2 0.09 0.03 0.00 0	20.300.00 JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	And PER UNIT CMH 283 283 459 0 0 550 188 158 0 897 897	0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	G PER UNIT m n 0.35 : 0.13 : 0.00 0.00 0.00 0.24 : 0.14 0.12 0.14 0.14 0.00 0.00 0.00 0.00 0.00 0.00 0.24 : 0.15 : 0.15 : 0.15 : 0.00	sok (smm) 50 x 350 50 x 150 50 x 250 50 x 250 50 x 150 50 x 150 50 x 125 50 x 400		•	Arr Arr Arr 673 673 673 1346 712 595 712 595 1307 2653 652 532 1304	m*3/s 0,19 0,20 0,77 0,26 0,77 0,36 0,74 0,18 0,18 0,18 0,18	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 1944 1945 1	x 190 x 193 x 195 x 195	Dimensi Dr. (mm) pai lebar x 200 × 2 200 ×	tin 200 200 200 200 200 200 200 200 200 20		
R FEOW SAG 0.25 0.09 0.14 0.00 0.14 0.00 0.14 0.00 0.16 0.05 0.06 0.06 0.08 0.08 0.08 0.28 0.51	ELAS ELAS EMAMPING DIPUTUREAN m*2 0.10 0.0	JUMLAH PER RUANGAN 100 100 100 100 100 100 100 100 100 10	AIR FLOW SAG PER UNIT CMH 687 315 315 0 0 0 0 175 0 0 0 175 0 0 4999 4999 924	SAG PER UNIT m*3/s 0.25 0.09 0.14 0.00 0.17 0.06 0.05 0.00 0.14 0.14 0.26	LUAS PERAMMANG PERAMMANG PERAMMANG PERAMMANG 0.03 0.05 0.00 0.00 0.00 0.00 0.00 0.00	0.31 0.31 0.24 0.00 0.24 0.26 0.15 0.15 0.14 0.00 0.24 0.24 0.24 0.24 0.24 0.24	G PER UNIT m 0.31 0.19 0.24 #DW0! 0.24 #DW0! 0.24 #DW0! 0.24 0.15 0.15 0.15 0.14 #DW0! 0.24 #DV0! 1.25 #DV0! #DV0! #DV0! #DV0! #DV0! #DV0! #DV0! #DV0! #DV0! #D	50 - 50 - 50 - 50 - 50 - 50 - 50 - 50 -	LUAS PEAAMPANG DIBUTUHKAN m*2 0,09 0,03 0,05 0,00 0,00 0,00 0,00 0,00 0,00	20.300.00 JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	And PER UNIT CMH 283 459 0 550 158 0 897 1663	DIMENSI RU m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	IS PER UNIT IS PE	ek (mm) 50 x 350 50 x 200 50 x 220 50 x 220 50 x 120 50 x 125 50 x 400 50 x 400 50 x 500		•	Ale AHU 1 673 673 673 673 673 595 595 595 595 595 595 595 595 595 59	m*3/s 0,19 0,19 0,37 0,20 0,77 0,36 0,74 0,18 0,36 0,74 0,18 0,36 0,19 1,10	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 10.04 194 0.04 194 0.04 194 0.04 199 0.05 220 0.07 220 0.07 220 0.07 220 0.04 191 0.04 191 0.04 191 0.04 191 0.04 191 0.05 220 0.07 200 0.07 200	x tinggi x tinggi x 190 x 199 x 199	Dimensi Dx (mm) pa lebar x 200 x 2 200	tin 200 200 200 200 200 200 200 200 200 20		
8. FLOW SAG 0.25 0.09 0.14 0.00 0.17 0.06 0.06 0.00 0.28 0.28 0.23 0.11	LUAS PENAMPANG DIJUTUHKAN m*2 0,10 0,00 0,	JUMLAH PR RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 687 315 511 0 0 611 209 0 0 611 175 0 0 499 9 924 499 999238	SAG PER UNIT 0.25 0.09 0.14 0.00 0.05 0.05 0.05 0.05 0.05 0.14 0.14 0.14 0.14 0.11	ELIAS PERAMPANG PERAMPINAG PERUNIT m*2 0.10 0.00	DIMENSI S 0.31 0.31 0.24 0.00 0.26 0.14 0.00 0.26 0.14 0.24 0	6.02 G PER UNIT m 0.31 0.14 #DW0! 0.24 #DW0! 0.24 #DW0! 0.24 0.26 0.14 #DW0! 0.24 0.24 0.24 0.24 0.24 0.24	588 546 588 546 neck (mm) 300 + 300 200 + 200 250 + 250 150 + 150 150 + 150 150 + 150 250 + 250 260 + 250 250	LUAS PENAMPANG DIBUTUHKAN m*2 0.09 0.03 0.05 0.00 0.00 0.00 0.00 0.00 0.00	30.300.00 JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AAG PER UNIT CMH 796 283 459 0 550 0 557 887 897 156 358	m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.15 0.25 0.25 0.25 0.25 0.25 0.25 0.25	M PER UNIT M P 0.35 : 0.20 : 0.13 : 0.20 : 0.14 : 0.14 : 0.12 : 0.00 : 0.04 : 0.49	eck (mm) 50 x 350 50 x 350 50 x 200 50 x 200 50 x 150 50 x 150 50 x 400 50 x 50 50 x		•	Arr Arr Arr 673 673 673 1346 712 595 712 595 1307 2653 652 532 1304	m*3/s 0,19 0,20 0,77 0,26 0,77 0,36 0,74 0,18 0,18 0,18 0,18	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 1944) 1944 1945 1947	x 190 x 269 x 190 x 269	Dimensi Dr. (mm) pai lebar x 200 × 2 200 ×	tin 200 200 200 200 200 200 200 200 200 20		
R FLOW SAG 0.25 0.29 0.14 0.00 0.14 0.00 0.17 0.06 0.05 0.00 0.28 0.28 0.28 0.28 0.28 0.29 0.17 0.06 0.09 0.14 0.00 0.09 0.14 0.00 0.17 0.06 0.09 0.17 0.06 0.09 0.14 0.00 0.09 0.14 0.00 0.09 0.14 0.00 0.00 0.17 0.00	ELIAS ELIAS PENAMPANG DIBUTUHKAN m*2 0,10 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 887 315 511 0 0 0 611 209 175 0 0 611 209 175 0 9 24 99 9 924 335	SAG PER UNIT 0.25 0.09 0.14 0.00 0.17 0.06 0.00 0.14 0.06 0.00 0.14 0.26 0.14 0.26 0.14	ELUAS PERAMPINE PERAMPINE PERUNIT m*2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	0.31 0.31 0.24 0.00 0.26 0.15 0.14 0.00 0.26 0.15 0.15 0.14 0.00 0.24 0.24 0.24 0.22 0.21 0.21	G PER UNIT m 0.31 0.19 0.24 #DW0! 0.24 #DW0! 0.24 0.014 #DW0! 0.24 0.32 0.24 0.32 0.24	500 - 500 500 - 500 500 - 500 200 - 200 200 -	LUAS PEAAMPANG DIBUTUHKAN m*2 0,009 0,001 0,005 0,000 0,005 0,000 0,005 0,000000	20.300.00 IUMLAH PER RUANGAN UNIR 1.00	AG PER UNIT CMH 283 450 0 0 0 550 0 0 550 0 0 550 0 1888 158 0 7 887 1863 358 283	DUMENSI RJ m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	A PER UNIT M n 0.35 : 0.20 : 0.21 : 0.20 : 0.20 : 0.20 : 0.21 : 0.20 : 0.21 : 0.20 : 0.21 : 0.23 : 0.33 : 0.13 : 0.14 : 0.15	50 x 350 50 x 150 50 x 250 50 x 250 50 x 250 50 x 250 50 x 125 50 x 400 50 x 400 50 x 550 50 x 155 50 x 150		•	CMH AHU 1 673 673 1346 1307 2553 652 1304 93956 668	m*34 m*34 0,19 0,27 0,22 0,17 0,26 0,74 0,18 0,18 0,19 0,19	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm lebar 0,04 1944 0,04 1944 0,04 1994 0,00 182 0,00 182 0,00 182 0,00 182 0,00 182 0,00 182 0,00 182 0,00 194 195 195 195 195 195 195 195 195	x tinggi x tinggi x tinggi x 193 x 193 x 193 x 193 x 193 x 193 x 193 x 194 x 195 x 1	Dimensi Dx (mm) pa lebar x 200 x 2 200	tin 200 200 200 200 200 200 200 200 200 20		
R FLOW SAG m*3/s 0,25 0,09 0,14 0,00 0,17 0,06 0,00 0,03 0,00 0,17 0,06 0,00 0,28 0,51 0,11 0,01	LUAS PENAMPANG DIBUTUHKAN m*2 0,10 0,03 0,00 0,00 0,00 0,00 0,00 0,00	JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 887 315 511 0 0 611 200 611 175 0 0 611 175 0 99 999 999 9395 315 403	SAG PER UNIT 0.25 0.00 0.14 0.00 0.00 0.00 0.00 0.00 0.00	ELMAS PERAMPANG PERAMPANG PERAMPANG PERAMPANG PERAMPANG 0,10 0,03 0,06 0,07 0,02 0,06 0,06 0,07 0,02 0,06 0,05 0,05 0,05 0,05 0,06 0,05 0,06 0,06 0,06 0,06 0,06 0,07 0,02 0,06 0,05 0,06 0,06 0,07 0,02 0,06 0,05 0,04	0,31 0,31 0,24 0,00 0,26 0,15 0,14 0,00 0,26 0,14 0,24 0,24 0,24 0,24 0,24 0,24 0,24 0,2	6.02 G PER UNIT m 0.31 0.19 0.24 eDW0! 0.28 0.14 eDW0! 0.28 0.14 eDW0! 0.24 0.221 0.24	5ke 5AG neck (mm) 300 + 300 200 + 200 200 + 220 200 + 200 200 + 200 20	ELIAS FERAAM/ANG DIBUTUHKAN m*2 0,09 0,00	30.300.00 JUMLAH PER RUANGAN 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	And FER UNIT CMH	m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	G PER UNIT m n 0.35 : 0.20 : 0.13 : 0.20 : 0.14 : 0.24 : 0.12 : 0.24 : 0.12 : 0.24 : 0.12 : 0.12 : 0.13 : 0.24 : 0.12 : 0.12 : 0.13 : 0.24 : 0.12 : 0.13 : 0.14 : 0.12 : 0.14 : 0.15 : 0.15 : 0.15 : 0.15 : 0.15 : 0.15 : 0.12 : 0.12 : 0.12 : 0.15	eck (mm) 10 x 350 50 x 350 50 x 320 50 x 250 50 x 400 50 x 400 50 x 400 50 x 400 50 x 175 50 x 175 50 x 175 50 x 175		•	CMH AHU1 673 673 1346 712 5955 1307 2553 652 652 652 652 652 652 652 652 652 652	m*3/s 0,19 0,20 0,72 0,26 0,72 0,18 0,38 0,38 0,38 0,38 0,38 0,39 0,19 0,20 0,19 0,20	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 16bar 1004 1944 0.04 1944 0.04 1944 0.05 1274 0.04 1949 0.03 162 0.07 270 0.04 191 0.04 191 0.05 191 0.04 193 0.04 193 0.00 193	x tinggi x tinggi x tinggi x 190 x 193 x 190 x 1	Dimensi Dc (mm) pa lebar x 200 × 2 200 × 2	tin 200 200 200 200 200 200 200 200 200		
R FLOW SAG 0.25 0.09 0.14 0.00 0.14 0.00 0.17 0.06 0.05 0.03 0.28 0.28 0.28 0.28 0.28 0.28 0.23 0.11 0.09 0.11 0.09 0.11 0.01 0.12	ELIAS ELIAS PENAMPANG DIBUTUHKAN m*2 0,10 0,00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CAMH CAMH 887 315 511 0 0 0 611 2009 175 6 0 0 611 2009 209 924 409 924 409 924 8315 315 5 315 6 6 7 8 8 7 8 8 7 8 8 7 8 8 7 8 8 8 8 7 8 8 8 8 7 8 8 8 8 7 8	SAG PER UNIT 0.25 0.09 0.14 0.00 0.17 0.06 0.00 0.14 0.06 0.00 0.14 0.26 0.14 0.26 0.14	ELUAS PERAMPINE PERAMPINE PERUNIT m*2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	0.31 0.31 0.24 0.00 0.26 0.15 0.14 0.00 0.26 0.15 0.15 0.14 0.00 0.24 0.24 0.24 0.22 0.21 0.21	G PER UNIT m 60.31 0.19 0.24 0.24 0.24 0.24 0.24 0.24 0.22 0.21 0.19 0.24	500 + 500 500 + 500 200 + 200 200 + 200	LUAS PEAAMPANG DIBUTUHKAN m*2 0,009 0,001 0,005 0,000 0,005 0,000 0,005 0,000000	20.300.00 IUMLAH PER RUANGAN UNIR 1.00	RAG FER UNIT CMH 283 283 459 0 0 550 188 0 897 1663 358 283 459 459 459 158 158 158 158 283 358 283 368 368 283 364 202	00MENSI # 0.25 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0	G PER UNIT m n 0.35 : 0.20 : 0.13 : 0.20 : 0.14 : 0.24 : 0.12 : 0.24 : 0.12 : 0.24 : 0.12 : 0.12 : 0.13 : 0.24 : 0.12 : 0.12 : 0.13 : 0.24 : 0.12 : 0.13 : 0.14 : 0.12 : 0.14 : 0.15 : 0.15 : 0.15 : 0.15 : 0.15 : 0.15 : 0.12 : 0.12 : 0.12 : 0.15	50 x 350 50 x 150 50 x 250 50 x 250 50 x 250 50 x 250 50 x 125 50 x 400 50 x 400 50 x 550 50 x 155 50 x 150		•	Ale CMH AHU 1 673 673 1346 7712 595 595 595 595 595 595 595 59	m*3/s m*3/s 0,19 0,37 0,20 0,74 0,18 0,38 0,18 0,19	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 1ebar 0.04 1944 0.04 1944 0.04 1944 0.04 1944 0.05 1944 0.05 1942 0.05 1942 0.05 1942 0.04 1911 0.04 1911 0.04 1911 0.04 1913 0.04 1913 0.04 1933 0.04 1934 0.05 1934	x 193 x 193 x 193 x 193 x 193 x 193 x 199 x 199 x 182 x 384 x 190 x 268 x 469 x 190 x 190	Dimensi Dx (mm) pa lebar x 200 x 2 200	tin 200 200 200 200 200 200 200 200 200 20		
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R FLOW SAG 0.25 0.09 0.04 0.00 0.00 0.00 0.00 0.00 0.00	LUAS PENAAPANG DBUTUHGAN m*2 0.10 0.00	JUMLAH PER RUANGAN unit 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 687 315 515 515 0 0 0 611 209 611 209 409 924 409 924 409 924 403 403 403 403 403	SAG PER UNIT m*3/s 0.25 0.09 0.14 0.26 0.00 0.00 0.00 0.16 0.00 0.00 0.14 0.14 0.14 0.14 0.14 0.14 0.26 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.09 0.14 0.09 0.09 0.14 0.09 0.09 0.14 0.09 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.15 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.14 0.16 0.09 0.15 0.09 0.14 0.16 0.09 0.14 0.16 0.09 0.14 0.16 0.09 0.15 0.09 0.14 0.09 0.14 0.09 0.14 0.09 0.15 0.09 0.15 0.09 0.15 0.09 0.14 0.09 0.15 0.09 0.15 0.09 0.15 0.09 0.15 0.09 0.00 0.00 0.00 0.17 0.19 0.19 0.19 0.00 0.00 0.00 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.19 0.00 0.00 0.01 0.00 0.01 0.01 0.00 0.01 0.00 0.01 0.01 0.01 0.01 0.00 0.01 0.0	2000/000000000000000000000000000000000	COMENSIS M 0.31 0.31 0.24 0.00 0.24 0.00 0.24 0.21	G PER UNIT m 0.33 0.19 0.24 #DW0! #DW0! 0.25 0.14 #DW0! 0.24 0.15 0.14 #DW0! 0.24	5 25 5 5 6 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2000 PERAAM/ANG DEBUTUHKAN m*2 0,09 0,000 0,00	20.000.00 RUANGAN PER RUANGAN UNIK UNIK UNIK UNIK UNIK UNIK UNIK UNI	AAG PER UNIT CMH 796 283 459 0 0 550 550 550 550 550 550 550 550 550 358 358 283 363 402 #DW/01	CIMENSI R/ m 0.25 0.25 0.25 0.25 0.25 0.25 0.25 0.25	IG PER UNIT IM IN 0.35 1 0.00 0.00 0.00 0.00 0.24 1 0.12 0.12 0.40 1.12 0.40 1.12 0.40 1.12 0.40 1.12 0.40 1.12 0.40 1.12 0.40 1.12 0.15 0.15 0.16 0.18 * FOMOR 0.16	sck (mm) 10 × 350 50 × 200 50 × 200 50 × 200 50 × 125 50 × 400 50 × 105 50 × 1			CMH AHU 1 673 673 1346 712 595 505 1307 2553 652 652 652 652 652 652 652 652 652 652	m*3/s 0.19 0.77 0.20 0.77 0.36 0.74 0.88 0.38 0.19 0.19 0.19 0.19 0.37 0.37 0.37 0.38 0.38 0.19 0.19 0.37 0.36 0.38 0.19 0.37 0.36 0.38 0.39 0.38 0.38 0.38 0.38 0.37 0.38 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.38 0.37 0.38 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.38 0.38 0.38 0.38 0.38 0.38 0.38 0.37 0.37 0.38 0.38 0.38 0.37 0.37 0.38 0.38 0.37 0.38 0.38 0.37 0.37 0.38 0.38 0.37 0.37 0.37 0.38 0.38 0.37	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 9,04 194 0,04 194 0,04 194 0,04 194 0,05 194 0,07 270 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,05 200 0,07 270 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,04 191 0,07 270 0,04 191 0,04 191 0,04 191 0,07 270 0,04 193 0,04 191 0,04 193 0,04 193 0,06 193 0,07 270 0,04 193 0,06 193 0,07 273 0,06 193 0,07 270 0,06 194 0,07 270 0,06 194 0,07 270 0,06 194 0,07 270 0,06 194 0,07 270 0,06 194 0,06 194 0,06 194 0,07 270 0,06 194 0,06 194 0,06 194 0,07 270 0,06 194 0,06 194 0,07 270 0,06 194 0,06 194 0	x tingg) x tingg) x tingg) x tingg) x tingg) x tingg) x tingg x tingg) x tingg x tingg) x tingg x tingg) x tingg x tingg) x tingg x ti	Dimensi Dr. (mm) pai lebar x 200 × 2 200 × 2	tin 100 100 100 100 100 100 100 10		
R FLOW SAG 0.25 0.09 0.14	LUMS PENAMPANG DIJUTUHGAN m*2 0.10 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.02 0.02 0.02 0.03 0.04	JUMLAH PER RUANGAN UNIX 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	AIR FLOW SAG PER UNIT CMH 687 315 511 0 0 0 611 601 601 601 601 601 601 899 924 924 9315 924 9315 9315 9315 934	SAG PER UNIT m^3/s 0.25 0.09 0.14 0.00 0.00 0.17 0.00 0.00 0.14 0.05 0.00 0.05 0.05 0.05 0.05 0.05 0.0	ELUAS PERAAMPANG PERUNIT m ¹ 2 0,10 0,00 0,00 0,00 0,00 0,00 0,00 0,0	CO DIMENSI SU DIMENSI SU 0.31 0.19 0.24 0.20 0.00 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.24 0.25 0.22 0.2	G PER UNIT m 0.31 0.19 0.24 0.24 0.24 0.24 0.24 0.24 0.22 0.19 0.24 0.24 0.22 0.2	5 20 25 225 225 225 225 225 225 225 225	2000 2000 2000 2000 2000 2000 2000 200	20.302.00 JUMLAH PER RUANGAN unit 1.00	RAG FER UNIT CMH CMH 7%8 283 459 0 0 550 158 0 897 188 935 358 283 369 283 369 283 369 283 369 283 369 283 369 283 369 283 369 402 #DV20	CIMENSI R 0.25 0.5 0.5 0.5 0.5	ad PER UNIT m n 0.35 1.3 0.20 0.00 0.21 0.00 0.22 0.00 0.24 0.12 0.00 0.44 0.12 0.00 0.40 0.12 0.15 0.16 0.16 0.16 0.16 0.12	50 x 350 50 x 150 50 x 250 50 x 250 50 x 250 50 x 250 50 x 150 50 x 150 50 x 150 50 x 125 50 x 125 50 x 120 50 x 150 50 x 150 50 x 175 50 x 175 50 x 175			Arr CMH AHU 673 673 1336 712 595 1307 2653 652 652 652 653 668 668 668 668 668 668 668	m*3/s 0,19 0,17 0,20 0,17 0,26 0,17 0,26 0,17 0,26 0,17 0,26 0,17 0,26 0,17 0,26 0,17 0,26 0,19 0,27 0,20 0,19 0,27 0,20 0,19 0,20 0,19 0,20 0,19 0,20 0,19 0,20 0,20 0,19 0,20	Luas Penampa m*2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(mm 1.04 1944 0.04 1944 0.04 1944 0.04 1944 0.04 194 0.05 194 0.07 274 0.04 191 0.07 270 0.07 270 0.04 191 0.07 270 0.04 191 0.07 270 0.04 191 0.04 191 0.05 270 0.04 191 0.05 270 0.04 191 0.05 270 0.05 27	x 193 x 193 x 193 x 199 x 199x	Dimensi Dr. (mm) pai lebar x 200 × 2 200 ×	tin 100 100 100 100 100 100 100 10		

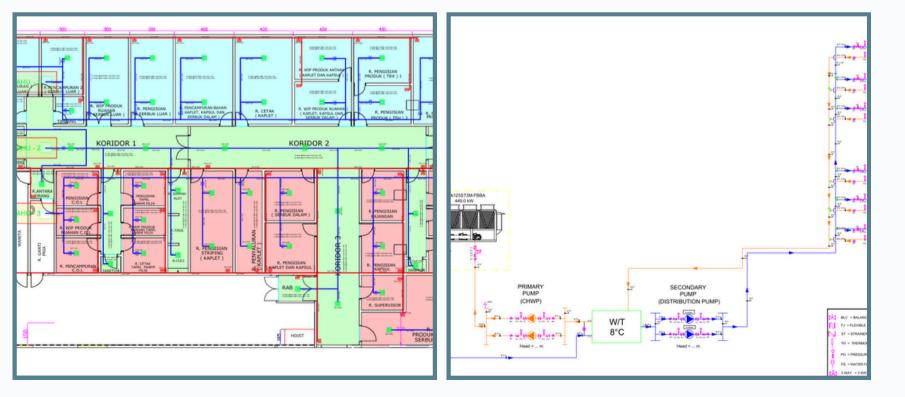


Creating Eco - Friendly Solutions

 COMPLIANCE HVAC SYSTEM TO GOVERMENT REGULATORY FOR HERBAL MEDICINE INDUSTRY – EAST JAKARTA TEDES is assisting One Herbal medicine factory to improve HVAC system to comply with Goverment Regulatory (BPOM)

3. HVAC DESIGN & EQUIPMENT SELECTION

=> TEDES created HVAC design drawings dan selected the most suitable HVAC system for the customer to comply with government regulation.



- 4. **IMPLEMENTATION**
- 5. OPERATION & MAINTENANCE

=> TEDES will do the procurement, construction up to testing and commissioning of the system. Based on customer's request we also will help them on the civil works and lighting as one package.

=> As an option TEDES could provide operation and maintenance the whole system, so customer could focus on their main core business.



Creating Eco - Friendly Solutions

• HVAC AND CHILLER RETROFIT SUPERMALL IN BEKASI AREA

TEDES is supporting a Supermall in Bekasi area doing retrofing 30 years old Air Conditioning System to have better perfomance for cooling the common area and at the same time reducing electricity cost.

1. HVAC AUDIT

=> TEDES conducted an audit of the existing HVAC system and carried out an identification and condition check of the mall.



2. ANALYZE & CALCULATE

=> TEDES identified the existing units and performed calculations to estimate energy savings based on the current usage, as well as conducted piping calculations.

Exis	ting	Proposed		Saving	kWh/Day	kWh/Year		Rupiah/Year		Rupiah/kWh
TOTAL Watt	2.916.588	1808,48	Kw	886,49 Load Factor 0,8	10.638 Operating hours (10.00-22.00)	3.829.637 Operating Days/year (360)	Rp	3.966.661.526,87	Rp	1.035,7
	3,412									
COP (total btuh/3,412)/kW total	2,908									
	3,516	•								
	Existing AC Efficiency	Proposed Chiller								
KW/ TR (3,516/ COP)	1,209	0,75								

SUPPLY					1			4	3,3			100	0,3048		0,1
		LANTAI	TOTAL LOAD	AIR FLOW	WATER FLOW	CONN ECTION	Diameter	Ler	igth	Total	Length	Pressur e Drop	Pressure Drop	Press	ure Drop Unit
			kW	CMH	GPM	INCH	inch	m	ft	m	ft	ft/100 ft	m	Kpa	m
163	Koridor Timur 1		43,23	10.827	45,49	11/4"	2 1/2"	19,33	63,42	39,33	129,04	2,10	0,64	58,60	5,98
164	Koridor Timur 2		43,23	10.827	45,49	11/4"	2 1/2"	3,56	11,68	23,56	77,30	1,26	0,38	58,60	5,98
AA	K. Tim 1+ K.Tim 2				90,97		3"	6,55	21,49	16,55	54,30	0,60	0,18	26,00	2,65
150	Food Court		178,10	29.750	134,31	21/2"	4"	13,28	43,57	43,28	141,99	1,56	0,47	58,60	5,98
AB	AA+Foodcourt				225,28		4"	17,73	58,17	27,73	90,98	1,00	0,30	58,60	5,98
159	Koridor atrium utama 1		43,23	10.827	45,49	11/4"	2 1/2"	3,09	10,14	23,09	75,76	1,23	0,38	58,60	5,98
AC	AB+K.ATRIUM UTAMA 1				270,77		5"	6,37	20,90	16,37	53,71	0,71	0,22	58,60	5,98
X-8	WCP ATRIUM UTAMA		43,23	10.827	45,49	11/4"	21/2*	2,90	9,51	22,90	75,13	1,22	0,37	58,60	5,98
AD	AC+ X-8				316,26		5"	5,86	19,23	15,86	52,03	0,92	0,28	58,60	5,98
160	Koridor atrium utama 2		43,23	10.827	45,49	11/4"	2 1/2"	3,78	12,40	23,78	78,02	1,27	0,39	46,50	4,74
X-5	WCP KORIDOR BARAT 1		43,23	10.827	45,49	11/4"	21/2"	4,83	15,85	24,83	81,46	1,33	0,40	88,18	8,99
AE	K.ATRI UTAMA 2 + X-5				90,97		3"	6,55	21,49	16,55	54,30	1,09	0,33	35,58	3,63
AF	AD+AE				407,23		5"	15,79	51,80	25,79	84,61	2,41	0,73	58,60	5,98
4.64	Konidon banat 1		43.33	10,927	45.40	4.4.74*	2.1./2*	3.76	12.24	22.26	77.05	1.37	0.20	00.10	9.00



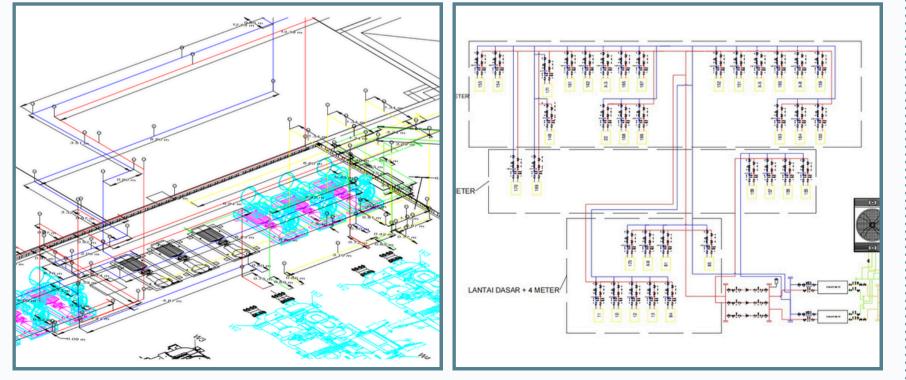
Creating Eco - Friendly Solutions

HVAC AND CHILLER RETROFIT SUPERMALL IN BEKASI AREA

TEDES is supporting a Supermall in Bekasi area doing retrofing 30 years old Air Conditioning System to have better perfomance for cooling the common area and at the same time reducing electricity cost.

3. HVAC DESIGN & EQUIPMENT SELECTION

=> The new system will be able to achieve approximately 35% power saving compare to the existing system. The new system also will require less maintenance and easier operation.



4. **IMPLEMENTATION**

=> TEDES will do the procurement, construction up to testing and commissioning of the system.

5. OPERATION & MAINTENANCE

=> As an option TEDES could provide operation and maintenance the whole system, so customer could focus on their mall operation.



OUR PARTNERS

























THANK You

PT. TERMODINAMIKA ENERGI SELARAS

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