TRACE 700 Sample File

Location	**St Louis, Missouri**
Building owner	**Version 6**
Program user	
Company	
Comments	

By	**M.E. Dept., hku**
Dataset name	**C:\CDS\TRACE700\Projects\Trace700.trc**
Calculation time	**10:25 PM on 10/20/2009**
TRACE® 700 version	**6.0**

Location	**Hong Kong**	
Latitude	**22.3**	**deg**
Longitude	**-114.2**	**deg**
Time Zone	**-8**	
Elevation	**33**	**m**
Barometric pressure	**100.9**	**kPa**
Air density	**1.2133**	**kg/cu m**
Air specific heat	**1.0234**	**kJ/kg·°C**
Density-specific heat product	**1.2409**	**kJ/cu m·°C**
Latent heat factor	**3,036.6**	**kJ/cu m**
Enthalpy factor	**1,213**	**J·kg/cu m·kJ**
Summer design dry bulb	**33**	**°C**
Summer design wet bulb	**27**	**°C**
Winter design dry bulb	**9**	**°C**
Summer clearness number	**0.90**	
Winter clearness number	**0.90**	
Summer ground reflectance	**0.20**	
Winter ground reflectance	**0.20**	

Design simulation period	**January - December**
Cooling load methodology	**TETD-TA1**
Heating load methodology	**UATD**

Design Cooling Load Summary

By M.E. Dept., hku

TRACE 700 Sample File
St Louis, Missouri

System - VAV Reheat for Perimeter

Type - Variable Volume Reheat (30% Min Flow Default)

Coil Location - System

Coil Peak Calculation Time: June, hour 17
Ambient DB/WB/HR: 32 / 27 / 21

COOLING COIL LOAD INFORMATION

Load Component	Sensible kW	Latent kW	Total kW	Percent of Total
Solar Gain	139.58		139.58	18.7 %
Glass Transmission	25.14		25.14	3.4 %
Wall Transmission	12.02		12.02	1.6 %
Roof Transmission	0.00		0.00	0.0 %
Floor Transmission	0.00		0.00	0.0 %
Partition Transmission	0.00		0.00	0.0 %
Net Ceiling Load	0.00		0.00	0.0 %
Lighting	112.27		112.27	15.1 %
People	34.94	27.95	62.89	8.4 %
Misc. Equipment Loads	97.69	0.00	97.69	13.1 %
Cooling Infiltration	0.00	0.00	0.00	0.0 %
Sub-Total ==>	421.64	27.95	449.59	60.3 %
Ventilation Load	43.75	167.65	211.40	28.3 %
Exhaust Heat	-5.59	0.00	-5.59	-0.7 %
Supply Fan Load	33.91		33.91	4.5 %
Return Fan Load	0.00		0.00	0.0 %
Net Duct Heat Pickup	0.00		0.00	0.0 %
Wall Load to Plenum	6.24		6.24	0.8 %
Roof Load to Plenum	22.12		22.12	3.0 %
Lighting Load to Plenum	28.07		28.07	3.8 %
Misc. Equip. Load to Plenum	0.00	0.00	0.00	0.0 %
Glass Transmission to Plenum	0.00		0.00	0.0 %
Glass Solar to Plenum	0.00		0.00	0.0 %
Over/Under Sizing	0.00		0.00	0.0 %
Reheat at Design	0.00	0.00	0.00	0.0 %
Total Cooling Loads	550.14	195.60	745.74	100.0 %

COOLING COIL SELECTION

Coil Selection Parameters

Coil Entering Air (DB / WB)	25.7 / 18.3	°C
Coil Entering Humidity Ratio	10.13	g/kg
Coil Leaving Air (DB / WB)	13.7 / 12.3	°C
Coil Leaving Humidity Ratio	8.40	g/kg
Coil Sensible Load	550.14	kW
Coil Total Load	745.74	kW
Cooling Supply Air Temperature	14.44	°C
Total Cooling Airflow	36,871.45	L/s
Resulting Room Relative Humidity	46.41	%

General Engineering Checks

Total Cooling Load	745.7	kW
Area / Load	7.93	m²/kW
Total Floor Area	5,911	m²
Cooling Airflow	6.61	Lps/m²
Airflow / Load	52.38	Lps/kW
Percent Outdoor Air	11.5	%
Cooling Load Methodology	TETD-TA1	

Design Cooling Load Summary

By M.E. Dept., hku

TRACE 700 Sample File
St Louis, Missouri

System - VAV for Interior

Type - VAV w/Baseboard Heating

Coil Location - System

Coil Peak Calculation Time: June, hour 17
Ambient DB/WB/HR: 32 / 27 / 21

COOLING COIL LOAD INFORMATION

Load Component	Sensible kW	Latent kW	Total kW	Percent of Total
Solar Gain	0.00		0.00	0.0 %
Glass Transmission	0.00		0.00	0.0 %
Wall Transmission	0.00		0.00	0.0 %
Roof Transmission	0.00		0.00	0.0 %
Floor Transmission	0.00		0.00	0.0 %
Partition Transmission	0.00		0.00	0.0 %
Net Ceiling Load	0.00		0.00	0.0 %
Lighting	101.98		101.98	18.6 %
People	40.99	32.79	73.78	13.5 %
Misc. Equipment Loads	96.94	0.00	96.94	17.7 %
Cooling Infiltration	0.00	0.00	0.00	0.0 %
Sub-Total ==>	239.91	32.79	272.70	49.8 %
Ventilation Load	51.33	185.35	236.68	43.2 %
Exhaust Heat	-4.94	0.00	-4.94	-0.9 %
Supply Fan Load	17.99		17.99	3.3 %
Return Fan Load	0.00		0.00	0.0 %
Net Duct Heat Pickup	0.00		0.00	0.0 %
Wall Load to Plenum	0.00		0.00	0.0 %
Roof Load to Plenum	0.00		0.00	0.0 %
Lighting Load to Plenum	25.50		25.50	4.7 %
Misc. Equip. Load to Plenum	0.00	0.00	0.00	0.0 %
Glass Transmission to Plenum	0.00		0.00	0.0 %
Glass Solar to Plenum	0.00		0.00	0.0 %
Over/Under Sizing	0.00		0.00	0.0 %
Reheat at Design	0.00	0.00	0.00	0.0 %
Total Cooling Loads	329.79	218.14	547.93	100.0 %

COOLING COIL SELECTION

Coil Selection Parameters

Coil Entering Air (DB / WB)	26.6 / 20.3	°C
Coil Entering Humidity Ratio	12.46	g/kg
Coil Leaving Air (DB / WB)	13.0 / 12.4	°C
Coil Leaving Humidity Ratio	8.84	g/kg
Coil Sensible Load	329.78	kW
Coil Total Load	547.91	kW
Cooling Supply Air Temperature	13.71	°C
Total Cooling Airflow	19,563.34	L/s
Resulting Room Relative Humidity	50.16	%

General Engineering Checks

Total Cooling Load	547.9	kW
Area / Load	9.68	m²/kW
Total Floor Area	5,307	m²
Cooling Airflow	3.69	Lps/m²
Airflow / Load	35.69	Lps/kW
Percent Outdoor Air	27.0	%
Cooling Load Methodology	TETD-TA1	

SYSTEM SUMMARY

DESIGN AIRFLOW QUANTITIES

By M.E. Dept., hku

		MAIN SYSTEM					Auxiliary System	Room
		Outside Airflow	Cooling Airflow	Heating Airflow	Return Airflow	Exhaust Airflow	Supply Airflow	Exhaust Airflow
System Description	System Type	L/s	L/s	L/s	L/s	L/s	L/s	L/s
VAV Reheat for Perimeter	Variable Volume Reheat (30% Min Flow Default)	4,502	39,072	15,530	41,775	39,072	0	0
VAV for Interior	VAV w/Baseboard Heating	5,282	19,563	0	21,990	19,563	0	0
Totals		**9,784**	**58,636**	**15,530**	**63,765**	**58,636**	**0**	**0**

Note: Airflows on this report are not additive because they are each taken at the time of their respective peaks. To view the balanced system design airflows, see the appropriate Checksums report (Airflows section).

SYSTEM SUMMARY

DESIGN COOLING CAPACITIES

By M.E. Dept., hku

Building Airside Systems and Plant Capacities

		Peak Plant Loads								Block Plant Loads								
Plant	System	Main Coil kW	Aux Coil kW	Opt Vent Coil kW	Misc Load kW	Stg 1 Desic Cond kW	Stg 2 Desic Cond kW	Base Utility kW	Peak Total kW	Time Of Peak mo/hr	Main Coil kW	Aux Coil kW	Opt Vent Coil kW	Misc Load kW	Stg 1 Desic Cond kW	Stg 2 Desic Cond kW	Base Utility kW	Block Total kW
Centrifugal Chillers		1,295.1	0.0	0.0	0.0	0.0	0.0	0.0	1,295.1	7/7	1,295.1	0.0	0.0	0.0	0.0	0.0	0.0	1,295.1
	VAV Reheat for Perimeter	746.6	0.0	0.0	0.0	0.0	0.0	0.0	746.6	7/7	746.6	0.0	0.0	0.0	0.0	0.0	0.0	746.6
	VAV for Interior	548.5	0.0	0.0	0.0	0.0	0.0	0.0	548.5	7/7	548.5	0.0	0.0	0.0	0.0	0.0	0.0	548.5
Building totals		1,295.1	0.0	0.0	0.0	0.0	0.0	0.0	1,295.1		1,295.1	0.0	0.0	0.0	0.0	0.0	0.0	1,295.1

Building peak load is 1,295.1 kW.

Building maximum block load of 1,295.1 kW occurs in July at hour 7 based on system simulation.

PEAK COOLING LOADS

MAIN SYSTEM

By M.E. Dept., hku

				SPACE							COIL						
					OA Condition		Room	Supply	Space	Space	Space		OA Condition				Coil	Coil
			Floor	Peak			Dry	Dry	Air	Sensible	Latent	Peak			Supply	Coil	Sensible	Latent
			Area	Time	DB	WB	Bulb	Bulb	Flow	Load	Load	Time	DB	WB	Dry Bulb	Airflow	Load	Load
System	Zone	Room		m²	Mo/Hr	°C	°C	°C	°C	L/s	kW	kW	Mo/Hr	°C	°C	°C	L/s	kW	kW
		Room 110 - South Exposure	Peak	244	12/14	22	15	23.9	14.4	2,689	31.53	1.08	10/14	30	21	14.4	2,375	32.22	2.69
		Room 120 - West Exposure	Peak	160	8/17	32	26	23.9	14.4	1,877	22.01	0.71	8/17	32	26	14.4	1,877	25.46	4.39
		Room 130 - North Exposure	Peak	244	6/17	32	27	23.9	14.4	1,505	17.64	1.08	6/17	32	27	14.4	1,505	21.51	7.53
		Room 140 - East Exposure	Peak	160	9/9	30	24	23.9	14.4	1,847	21.65	0.71	8/9	31	25	14.4	1,840	24.80	4.12
		Room 210 - South Exp Mid Flr	Peak	975	12/14	22	15	23.9	14.4	10,757	126.12	4.30	10/14	30	21	14.4	9,499	128.89	10.75
		Room 220 - West Exp Mid Flr	Peak	641	8/17	32	26	23.9	14.4	7,508	88.03	2.83	8/17	32	26	14.4	7,508	101.83	17.58
		Room 230 - North Exp Mid Flr	Peak	975	6/17	32	27	23.9	14.4	6,020	70.57	4.30	6/17	32	27	14.4	6,020	86.06	30.11
		Room 240 - East Exp Mid Flr	Peak	641	9/9	30	24	23.9	14.4	7,388	86.61	2.83	8/9	31	25	14.4	7,361	99.21	16.47
		Room 310 - South Exp Top Flr	Peak	244	12/14	22	15	23.9	14.4	2,689	31.53	1.08	10/14	30	21	14.4	2,375	33.72	2.69
		Room 320 - West Exp Top Flr	Peak	160	8/17	32	26	23.9	14.4	1,877	22.01	0.71	8/17	32	26	14.4	1,877	27.32	4.39
		Room 330 - North Exp Top Flr	Peak	244	6/17	32	27	23.9	14.4	1,505	17.64	1.08	6/17	32	27	14.4	1,505	24.40	7.53
		Room 340 - East Exp Top Flr	Peak	160	9/9	30	24	23.9	14.4	1,847	21.65	0.71	8/9	31	25	14.4	1,840	25.22	4.12
		Room 350 - Conf Area Top Flr	Peak	74	8/17	32	26	23.9	14.4	484	5.67	2.34	6/17	32	27	14.4	484	10.41	16.40
		Room 360 - Restroom Top Flr	Peak	111	8/17	32	26	23.9	14.4	413	4.84	0.35	6/17	32	27	14.4	413	7.42	2.46
		Room 370 - Office Eq Top Flr	Peak	46	8/17	32	26	23.9	14.4	360	4.22	0.20	6/17	32	27	14.4	360	5.52	1.43
		Room 380 - Int Offices Top Flr	Peak	829	8/17	32	26	23.9	14.4	3,001	35.18	3.66	6/17	32	27	14.4	2,999	55.16	25.60
VAV Reheat for Perimeter			**Peak**	**5,911**		**30**	**21**	**23.9**	**14.4**	**51,768**	**606.91**	**27.95**		**32**	**27**	**14.4**	**49,838**	**749.61**	**158.27**
VAV Reheat for Perimeter			**Block**	**5,911**	**10/15**	**30**	**21**	**23.9**	**14.4**	**39,072**	**458.07**	**27.95**	**6/17**	**32**	**27**	**14.4**	**36,871**	**550.14**	**195.60**
		Room 150 - Conference Area	Peak	74	7/14	33	26	23.9	13.7	446	5.64	2.34	6/17	32	27	13.7	446	9.62	15.59
		Room 160 - Restroom Area	Peak	111	7/14	33	26	23.9	13.7	379	4.79	0.35	6/17	32	27	13.7	379	6.09	2.34
		Room 170 - Office Equipment	Peak	46	7/14	33	26	23.9	13.7	332	4.20	0.20	6/17	32	27	13.7	332	4.95	1.36
		Room 180 - Interior Offices	Peak	829	6/11	31	26	23.9	13.7	2,755	34.79	3.66	6/17	32	27	13.7	2,755	45.30	24.33
		Room 250 - Conf Area Mid Flr	Peak	297	6/11	31	26	23.9	13.7	1,786	22.56	9.38	6/17	32	27	13.7	1,786	38.47	62.38
		Room 260 - Restroom Mid Flr	Peak	446	6/11	31	26	23.9	13.7	1,517	19.16	1.41	6/17	32	27	13.7	1,517	24.34	9.36
		Room 270 - Office Eq Mid Flr	Peak	186	7/15	33	27	23.9	13.7	1,330	16.80	0.82	6/17	32	27	13.7	1,330	19.81	5.45
		Room 280 - Int Offices Mid Flr	Peak	3,317	4/17	26	23	23.9	13.7	11,018	139.17	14.63	6/17	32	27	13.7	11,018	181.21	97.33
VAV for Interior			**Peak**	**5,307**		**31**	**26**	**23.9**	**13.7**	**19,563**	**247.10**	**32.79**		**32**	**27**	**13.7**	**19,563**	**329.78**	**218.14**
VAV for Interior			**Block**	**5,307**	**6/11**	**31**	**26**	**23.9**	**13.7**	**19,563**	**247.10**	**32.79**	**6/17**	**32**	**27**	**13.7**	**19,563**	**329.78**	**218.14**

ENGINEERING CHECKS

By M.E. Dept., hku

System	Zone Room	Type	Floor Area m²	COOLING % OA	COOLING Lps/m²	COOLING Lps/kW	COOLING m²/kW	COOLING W/m²	HEATING % OA	HEATING Lps/m²	HEATING W/m²
	Room 110 - South Exposure	Zone	244	6.44	11.03	77.0	7.0	143.09	21.48	3.31	-45.89
	Room 120 - West Exposure	Zone	160	6.07	11.71	62.9	5.4	186.19	20.22	3.51	-47.78
	Room 130 - North Exposure	Zone	244	11.51	6.17	51.8	8.4	119.04	38.38	1.85	-32.50
	Room 140 - East Exposure	Zone	160	6.17	11.52	63.8	5.5	180.39	20.55	3.46	-47.27
	Room 210 - South Exp Mid Flr	Zone	975	6.44	11.03	77.0	7.0	143.09	21.48	3.31	-45.89
	Room 220 - West Exp Mid Flr	Zone	641	6.07	11.71	62.9	5.4	186.19	20.22	3.51	-47.78
	Room 230 - North Exp Mid Flr	Zone	975	11.51	6.17	51.8	8.4	119.04	38.38	1.85	-32.50
	Room 240 - East Exp Mid Flr	Zone	641	6.17	11.52	63.8	5.5	180.39	20.55	3.46	-47.27
	Room 310 - South Exp Top Flr	Zone	244	6.44	11.03	73.8	6.7	149.24	21.48	3.31	-45.89
	Room 320 - West Exp Top Flr	Zone	160	6.07	11.71	59.2	5.1	197.82	20.22	3.51	-47.78
	Room 330 - North Exp Top Flr	Zone	244	11.51	6.17	47.1	7.6	130.87	38.38	1.85	-32.50
	Room 340 - East Exp Top Flr	Zone	160	6.17	11.52	62.9	5.5	182.98	20.55	3.46	-47.27
	Room 350 - Conf Area Top Flr	Zone	74	78.02	6.51	18.0	2.8	360.70	100.00	1.95	-49.12
	Room 360 - Restroom Top Flr	Zone	111	13.71	3.71	41.8	11.3	88.58	45.70	1.11	-14.07
	Room 370 - Office Eq Top Flr	Zone	46	9.17	7.75	51.8	6.7	149.57	30.56	2.33	-26.43
	Room 380 - Int Offices Top Flr	Zone	829	19.63	3.62	37.2	10.3	97.35	65.44	1.09	-15.04
VAV Reheat for Perimeter		**System - Variable Volume Reheat (30% Min Flow Default)**	**5,911**	**11.52**	**6.61**	**52.4**	**7.9**	**126.11**	**27.49**	**2.63**	**-38.07**
	Room 150 - Conference Area	Zone	74	84.58	6.01	17.7	2.9	339.06	0.00	1.80	-43.94
	Room 160 - Restroom Area	Zone	111	14.93	3.40	45.0	13.2	75.54	0.00	1.02	-12.88
	Room 170 - Office Equipment	Zone	46	9.93	7.16	52.6	7.4	135.89	0.00	2.15	-25.28
	Room 180 - Interior Offices	Zone	829	21.39	3.32	39.5	11.9	83.94	0.00	1.00	-13.66
	Room 250 - Conf Area Mid Flr	Zone	297	84.58	6.01	17.7	2.9	339.06	0.00	1.80	-43.94
	Room 260 - Restroom Mid Flr	Zone	446	14.93	3.40	45.0	13.2	75.54	0.00	1.02	-12.88
	Room 270 - Office Eq Mid Flr	Zone	186	9.93	7.16	52.6	7.4	135.89	0.00	2.15	-25.28
	Room 280 - Int Offices Mid Flr	Zone	3,317	21.39	3.32	39.5	11.9	83.94	0.00	1.00	-13.66
VAV for Interior		**System - VAV w/Baseboard Heating**	**5,307**	**27.00**	**3.69**	**35.7**	**9.7**	**103.20**	**0.00**	**1.11**	**-16.21**

SYSTEM PSYCHROMETRIC STATE POINTS

By M.E. Dept., hku

VAV Reheat for Perimeter **Variable Volume Reheat (30% Min Flow Default)**

	Dry Bulb °C	Wet Bulb °C	Relative Humidity %	Humidity Ratio g/kg	Enthalpy kJ/kg	Temperature Difference °C
Space	23.9	16.4	46.4	8.6	46.0	
Main System						
Return Fan						0.0
Return Air	24.7	16.7	44.3	8.6	46.8	
Return Air Heat Pickup						0.8
Outdoor Air	29.7	21.0	46.4	12.2	61.0	
Entering OA preconditioning	29.7	21.0	46.4	12.2	61.0	
Leaving OA preconditioning	29.7	21.0	46.4	12.2	61.0	
Return/Outdoor Air Mix	25.3	17.2	44.8	9.0	48.4	
Blow Through Fan						0.0
Entering Coil	25.3	17.2	44.8	9.0	48.4	
Leaving Coil	13.7	12.4	86.0	8.5	35.1	
Draw Through Fan						0.2
Fan Frictional Heat						0.5
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	14.4	12.7	82.0	8.5	35.9	
Supply Air	14.4	12.7	82.0	8.5	35.9	

Percent Outside Air	11.52	%
Sensible Heat Ratio (SHR)	0.94	
Coil Airflow	39,072	L/s

Warning: The psychrometric loop was unable to close to within an acceptable range. It is recommended that constraints be placed on the maximum/minimum supply air temperature on the 'Create Systems -- Temperatures' tab.

SYSTEM PSYCHROMETRIC STATE POINTS

By M.E. Dept., hku

VAV for Interior **VAV w/Baseboard Heating**

	Dry Bulb °C	Wet Bulb °C	Relative Humidity %	Humidity Ratio g/kg	Enthalpy kJ/kg	Temperature Difference °C
Space	23.9	17.0	50.2	9.3	47.8	
Main System						
Return Fan						0.0
Return Air	24.6	17.3	47.9	9.3	48.5	
Return Air Heat Pickup						0.8
Outdoor Air	31.1	26.1	67.8	19.5	81.1	
Entering OA preconditioning	31.1	26.1	67.8	19.5	81.1	
Leaving OA preconditioning	31.1	26.1	67.8	19.5	81.1	
Return/Outdoor Air Mix	26.4	20.0	55.7	12.1	57.3	
Blow Through Fan						0.0
Entering Coil	26.4	20.0	55.7	12.1	57.3	
Leaving Coil	13.0	12.5	94.5	8.9	35.4	
Draw Through Fan						0.2
Fan Frictional Heat						0.5
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	13.7	12.8	90.0	8.9	36.2	
Supply Air	13.7	12.8	90.0	8.9	36.2	

Percent Outside Air	27.00	%
Sensible Heat Ratio (SHR)	0.88	
Coil Airflow	19,563	L/s