Technical Assignment 2

A Report Investigating the Consumption and Compliances
of the Design Document Systems
LA Fitness, West Oaks
Houston,Texas

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Mechanical Option
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Table of Contents

Executive Summary

The purpose of this report is to analyze the West Oaks location of LA Fitness located in Houston, Texas. This report reviews the first cost of the mechanical system, the lost rentable space as a result of the system, the building compliance with ASHRAE Standard 90.1-2004, the building's LEED credit points, and energy consumption.

The building's air handling system is comprised of 13 packaged rooftop air handling units. The first cost of the entire mechanical system including these units is $551,000. That correlates to $11.98/sf for the 46,000 sf building. The lost rentable space due to this system turned out to be negligible due to the small duct sizes and rooftop location of the units.

The two sections of ASHRAE 90.1-2004 that were checked were Section 5 on building envelope compliance and Section 9 for lighting compliance. After comparing the design documents with the standards requirements, it was found that the building did meet the building envelope standard, but failed to meet the lighting standard. This building was designed to satisfy the 2001 version of this standard and did not comply with the 2004 revisions which were more stringent on lighting power densities.

LA Fitness, West Oaks was not designed to meet the LEED criteria as can be seen by the results of that assessment. The building received 8 out of a possible 69 points.

Trane's energy simulation program TRACE was used to find the as-designed systems in the building. The results of this energy analysis showed that the building would use 1,676,874 kWh of energy each year. These results provided the lbm/yr data of building emissions that will be generated as found in the report.

Mechanical System First Cost

The mechanical system first cost came out to be $551,000 in total. This correlates to $11.98/sf.

Equipment	$298,000.00
Fans & Grills	$40,000.00
Controls	$14,000.00
Ductwork	$135,000.00
T & B	$13,000.00
Sales Tax	$29,000.00
Misc	$22,000.00
Total	$551,000.00
Total/sf	$11.98

The first cost figures shown below represent the first cost of the mechanical system for the West Oaks location of LA Fitness. These are the figures presented to the owner for owner review document set. These numbers are subject to change because the building has not been constructed yet, and there may be design alterations as the project develops.

Lost Rentable Space

There was not a very significant loss of rentable space due to the mechanical systems. The mechanical equipment for this building is almost entirely located on the roof of the building. The air for this building is handled by 13 packaged rooftop units. However, there is an equipment room that is dedicated to serving the pool equipment. This room is approximately 290 sf. This correlates to 0.63% of the buildings rentable area.

Typically, in larger buildings there is a loss of rentable space due to large vertical mechanical shaft runs. This is not significant in this building as it is only a two story building, and the duct runs are not as cumbersome.

Standard 90.1

Section 5 Building Envelope

In order to satisfy this standard, this building would have to comply with Sections: 5.1 (General), 5.4 (Mandatory Provisions), 5.5 (Prescriptive Building Envelope Option), 5.7 (Submittals), and 5.8 (Product Information and Installation Requirements).

5.1 General

All of the spaces at this location are categorized to be conditioned spaces in accordance with section 5.1.2.2. The building's spaces are nonresidential conditioned space.

Figure B-1 in Appendix B of Standard 90.1 shows that Fort Bend County of Houston, TX falls under into category 2A.

5.4 Mandatory Revisions

5.5 Prescriptive Building Envelope Option:
Opaque Areas:

As this is a conditioned space, the exterior building envelope is to comply with the nonresidential requirements for climate section 2A. These requirements are:

Item	Description	Insulation Min.
		R-Value
Roofs	Insulation Entirely above Deck	R-15.0
Mass Walls	8" Tilt-wall construction with 2" insulation	Not Required
Floors	Steel Joist	R-19.0
Slab-On-Grade Floors	Unheated	-
Opaque Doors	Swinging	-

In the design documents, the architect calls for a roof assembly that ends up being R-24. This assembly far exceeds the R-15 criteria called for by the standard. The floor system has an R-value of 22 which will satisfy the R-19 requirement between the floors.

Fenestration:

The second part of the prescriptive method deals with fenestration. One major factor is the vertical fenestration area. The standard requires the total vertical fenestration area to be less than 50% of the gross wall area. As for skylight fenestration, it is to be less than 5% of the gross roof area..

Two major factors used when evaluating fenestration are the Solar Heat Gain Coefficient and the fixed or operable window U-values.

This table shows the requirements for LA Fitness

Fenestration	Operable/Fixed	% Glazing	Assembly Max. U	SHGC
North	All Fixed	6.96	1.22	0.61
South	All Fixed	6.96	1.22	0.25
East	All Fixed	3.86	1.22	0.25
West	All Fixed	24.9	1.22	0.25

U-Values for the windows used were 0.95 Btu/h-ft^2-^{o}F. This values meets the 90.1 requirement for all of the orientations.

The SHGC was found to be 0.23 for these windows from the materials and information provided in the mechanical design documents. The solar coefficient is very close to the limit, so there will probably be a considerable heat load from solar radiation in spaces on the west elevation.

*Values for SHGC and U-Values were obtained from ASHRAE 2005 Fundamentals Handbook

5.7 Submittals

The submittals section essentially states that an authority with jurisdiction may require compliance documentation. This section of the standard has been met by the designers.

5.8 Product Information and Installation Requirements

The primary reason for this requirement is to ensure that insulation products are labeled clearly, labeled accurately, and reasonably protected. The standard requires clear identity of rated R-values. This part of the standard also requires that the installation of the insulation materials is done in such a way as to meet the listed values. Another requirement of this section is that the installation of recessed equipment (i.e. lighting fixtures, ductwork, etc.) does not adversely affect the thickness or performance of insulation. Exterior insulation is to be covered to protect it from prevailing outdoor weather conditions. Equipment is to be covered

This section of the standard can not be verified until after construction is complete due to the requirements that can only be inspected and evaluated at that point.

Envelope Conclusion:

This building meets all of the requirements necessary for passing the ASHRAE 90.1 2004 standard pending the post construction requirements being met. The windows were very close to the limits and it will be important in the commissioning phase to ensure that the listed glazing materials are not substituted during construction.

Standard 90.1

Section 9 Lighting

In order to pass this section of the standard, the building must satisfy: 9.1 (General), 9.4 (Mandatory Provisions), and either 9.5 (Building Area Method) or 9.6 (Space-by-Space Method)

The major design sections for this part of the standard are 9.5 or 9.6.

While the building area method is a more simplified approach to determine the power densities, a greater flexibility arises from the space-by-space method. Here are the results of an analysis from both methods.

Building Area Method

Building Area Type: Exercise Center

Allowed Lighting Power Density: 1.0 W/ft^2

Gross Lighted Floor Area: 46,000 ft^2

Lighting Watts Used in Spaces: 84480 W

Actual Lighting Power Density: 1.84 W/ft^2

The lighting designer for this project stated that the code that the building was designed to was ASHRAE Standard 90.1 2001. This could possibly explain the higher power density. The 2004 revision to the standard was much more stringent with power densities. Tightening up the power densities was a major goal of this revision.

Space-by-Space Method

Space	Area (ft^2)	90.1 Category	90.1 Density (W/ft^2)	90.1 Watts Allowed
Aerobics	3083	Exercise Area	0.9	2774.7
Raquetball	835	Court Sports Area	2.3	1920.5
Raquetball	835	Court Sports Area	2.3	1920.5
Raquetball	835	Court Sports Area	2.3	1920.5
Raquetball	835	Court Sports Area	2.3	1920.5
Raquetball	835	Court Sports Area	2.3	1920.5
Restrooms	148	Restrooms	0.9	133.2
Storage	228	Active Storage	0.8	182.4
Kid's Club	1840	Playing Area	1.4	2576
Free Weights	2974	Exercise Area	0.9	2676.6
Basketball	3810	Court Sports Area	2.3	8763

Storage	460	Active Storage	0.8	368
Sp. Exercise	1366	Exercise Area	0.9	1229.4
Equipment Room	147	Exercise Area	0.9	132.3
Cardiovascular	10520	Exercise Area	0.9	9468
Mezzanine	3000	Exercise Area	0.9	2700
Trainer's Office	217	Office-Open Plan	1.1	238.7
Spinning	1141	Exercise Area	0.9	1026.9
Pool Equipment	290	Equipment Room	1.2	348
Pool & Spa	4112	Exercise Area	0.9	3700.8
Locker Rooms	4125	Locker/Fitting Room	0.6	2475
Reception	1420	Lobby	1.3	1846
Membership Sales	687	Office-Open Plan	1.1	755.7
Juice Bar	280	Leisure Dining	1.4	392
Stairs	1977	Stairs-Active	0.6	1186.2

Interior Power Lighting Allowance	52575.4
Actual Lighting Used	84480

To meet the lighting requirements of Standard 90.1 the building must pass either the Building Area Method or the Space-by-Space Method. This building failed to meet either method and therefore does not pass Standard 90.1 for lighting.

Design Load Estimation:

Trane's energy simulation program TRACE was used to evaluate the systems as they appear in the design documents. No existing data for yearly consumption exists for comparison with these simulated loads because this is a new building. The simulation used actual data from design documents for inputs as opposed to "rule of thumb" measures. Lighting loads were input on a W/ft^2 basis and are not as space specific. The lights are very evenly distributed with throughout the building with few exceptions (i.e. more powerful display lighting in reception area).

Weather Conditions:

The program TRACE has preset conditions for many U.S. cities. For the purpose of the computer simulation, Houston was selected. From this point, data overrides for dry and wet bulb temperatures were established. The data used for these overrides come from the ASHRAE 2005 Fundamentals Handbook. These are the values for the 0.4% condition.

	Cooling		Heating
	Dry Bulb	Wet Bulb	Dry Bulb
Fort Bend County, Houston, TX	96.9	80.1	27.7

Rooms:

All of the spaces in the building were input to TRACE with their appropriate design occupants, square footages, exterior orientations, glazing ratios, and other miscellaneous equipment loads.

Air-side Sytems:

The initial decision made was to use multizone rooftop units for the air-side systems in the buildings. The building uses packaged rooftop units that serve one or more zone, so this choice seemed to be a perfect fit. However, due to the way in which TRACE models that piece of equipment, there would need to be a chiller that serves the coils. As there is no chiller on site, new modeling techniques had to be implemented.

The units at the site are natural gas fired units that use R-22 as the refrigerant. All of the units are air cooled. With this in mind, a decision was made to model these units as "variable refrigerant volume" handlers. This eliminated the use of chillers from TRACE's calculation.

Assignments:

Every conditioned space in the building was assigned to its listed air-handler. Each of these air-side systems was assigned a cooling and heating mechanism to run the calculation s from. The cooing mechanism chosen was an air-cooled unitary unit consuming

Energy Rates:

To finish the energy consumption analysis, a power company with rates for Houston, TX had to be established. A sample company with the rates listed below was created and utilized during the simulation.

As of July 2005, natural gas was valued at \$8.43/1000 ft^3 in Texas.
Electricity was selling at an average of \$0.078/kilowatt-hour in 2004.

Spark Gap Calculation:

Natural Gas:	\$8.43/1000 ft^3 =	\$8.03/MMBtu
Electricity:	\$0.078/kilowatt-hour =	\$22.86/MMBtu

Spark Gap = \$22.86 - \$8.03 = **\$14.83**

Demand used in simulation: \$8/kW

*Natural gas data obtained from the Energy Information Administration
http://www.eia.doe.gov/emeu/states/main_tx.html

*Electricity data obtained from Public Policy Institute
http://www.ppinys.org/reports/jtf2004/electricprice.htm

Schedules:

There were three schedules set up for modeling this building. The schedules set up were set up based on an exercise center's most usable hours. A weekend schedule showed more use from 8 A.M. to 7 P.M.. The weekday schedule had higher load before and after work hours until night. The third schedule was for a high energy days in the summer in Texas when the coils would be seeing their highest design loads.

Energy Use:

	Elect Cons. (kWh)	Energy		(kBtu/yr)
Primary heating		0.00	%	0.00
Cooling Compressor	633,873.56	37.80	%	64,908.80
Tower/Cond Fans	52,352.87	3.12	%	5,360.95
Condenser Pump		0.00	%	0.00
Other CLG Accessories	414,385.12	24.71	%	42,433.14
Cooling Subtotal....	1,100,611.50	65.63	%	112,702.88
Supply Fans	33,394.59	1.99	%	3,419.61
Circ Pumps		0.00	%	0.00
Base Utilities		0.00	%	0.00
Aux Subtotal....	33,394.59	1.99	%	3,419.61
Lighting	542,872.94	32.37	%	55,590.32
Receptacles		0.00	%	0.00
Base Utilities		0.00	%	0.00
Cogeneration		0.00	%	0.00
Totals**	1,676,879.00	100.00	%	171,712.80

Emissions:

	Texas Grid lbm/year				Building Emissions lbm/year			
Fuel	**Particulates**	**SO_2/kWh**	**NO_x/kWh**	**CO_2/kWh**	**Particulates**	**SO_2/kWh**	**NO_x/kWh**	**CO_2/kWh**
Coal	4.51E-04	5.24E-03	3.04E-03	8.82E-01	7.56E+02	8.79E+03	5.10E+03	1.48E+06
Natural Gas	0	6.21E-06	1.17E-03	6.17E-01	0.00E+00	1.04E+01	1.96E+03	1.03E+06
Totals	4.51E-04	5.25E-03	4.21E-03	1.50E+00	7.56E+02	8.80E+03	7.06E+03	2.51E+06

LEED Green Building Certification Rating System

The LEED (Leadership in Energy and Environmental Design) Green Building Certification Rating System is a set of checks and measures provided by the U.S. Green Building Council. The purpose of this system is to be a design guideline for determining whether a building is "green" or not. There are six major categories that are evaluated, and within those categories, points are awarded for energy efficient design techniques. When a building has been thoroughly examined and the points have been tallied, the building is labeled inadequate, certified, silver, gold, or platinum with platinum being the highest LEED honor.

After analyzing the criteria for LEED certification it became clear that the West Oaks location of LA Fitness was not going to meet the requirements necessary. The designers of this location were not given the budget or design flexibility to consider many of the methods and decisions necessary. This building received 8 out of the 69 possible credit points.

A number of the design points were quite close to suitable and could easily be reworked to achieve credit, however it would take considerable redesign to obtain enough points necessary for the lowest level of certification (26 points).

The first major change that would have to occur would be for the building to meet all of the section prerequisites. This site is currently not meeting ASHRAE Standard 62 requirements. The building is meeting locally governed ventilation requirements, but they are less stringent, and not accepted for LEED. Also, R-22 is being used in the packaged rooftop units that serve the air in the building. This is another prerequisite violation that occurs. The other instance of prerequisite violation is a commissioning requirement that could be fixed by simply sending out an inspection crew that did not work on the major design.

While there is much room for improvement in terms of energy savings on this project, it would first be necessary to bring all of the prerequisites up to par to make this building eligible for certification.

Sustainable Sites			
	Description	Possible	Earned
Prereq 1	Erosion & Sedimentation Control	Req'd	Yes
Credit 1	Site Selection	1	1
Credit 2	Urban Redevelopment	1	1
Credit 3	Brownfield Redevelopment	1	0
Credit 4.1	Alternative Transportation, Public	1	0
Credit 4.2	Alternative Transportation, Bicycle	1	0
Credit 4.3	Alternative Transportation, Fuel	1	0

Credit 4.4	Alternative Transportation, Parking	1	0
Credit 5.1	Reduced Site Disturbance, Open Space	1	0
Credit 5.2	Reduced Site Disturbance, Footprint	1	0
Credit 6.1	Stormwater Management, Rate & Quantity	1	0
Credit 6.2	Stormwater Management, Treatment	1	0
Credit 7.1	Heat Island Effect, Non-Roof	1	0
Credit 7.2	Heat Island Effect, Roof	1	0
Credit 8	Light Pollution Reduction	1	0
Water Efficiency			
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1	0
Credit 1.2	Water Efficient Landscaping, No Potable/Irrigation	1	1
Credit 2	Innovative Wastewater Technologies	1	0
Credit 3.1	Water Use Reduction, 20%	1	0
Credit 3.2	Water Use Reduction, 30%	1	0
Energy & Atmosphere			
Prereq 1	Fundamental Building Systems Commissioning	Req'd	No
Prereq 2	Minimum Energy Performance	Req'd	Yes
Prereq 3	CFC Reduction in HVAC&R Equipment	Req'd	No
Credit 1	Optimize Energy Performance	1-10	0
Credit 2.1	Renewable Energy, 5%	1	0
Credit 2.2	Renewable Energy, 10%	1	0
Credit 2.3	Renewable Energy, 20%	1	0
Credit 3	Additional Commissioning	1	0
Credit 4	Ozone Depletion	1	0
Credit 5	Measurement & Verification	1	0
Credit 6	Green Power	1	0
Materials & Resources			
Prereq 1	Storage & Collection of Recyclables	Req'd	Yes
Credit 1.1	Building Reuse, Maintain 75% of existing shell	1	0
Credit	Building Reuse, Maintain 100% of shell	1	0

1.2			
Credit 1.3	Building Reuse, Maintain 100% shell and 50% Non	1	0
Credit 2.1	Construction Waste Management, Divert 50%	1	0
Credit 2.2	Construction Waste Management, Divert 75%	1	0
Credid 3.1	Resource Reuse, Specify 5%	1	0
Credid 3.2	Resource Reuse, Specify 10%	1	0
Credit 4.1	Recycled Content, Specify 5% (p.c. +1/2 p.i.)	1	0
Credit 4.2	Recycled Content, Specify 10% (p.c. +1/2 p.i.)	1	0
Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1	1
Credit 5.2	Local/Regional Materials, 20% of Above Harvested Locally	1	0
Credit 6	Rapidly Renewable Materials	1	0
Credit 7	Certified Wood	1	0
Indoor Environmental Quality			
Prereq 1	Minimum IAQ Performance	Req'd	No
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Req'd	Yes
Credit 1	Carbon Dioxide (CO2) Monitoring	1	0
Credit 2	Ventilation Effectiveness	1	0
Credit 3.1	Construction IAQ Management Plan	1	1
Credit 3.2	Construction IAQ Management Plan	1	0
Credit 4.1	Low-Emitting Materials	1	0
Credit 4.2	Low-Emitting Materials	1	1
Credit 4.3	Low-Emitting Materials	1	1
Credit 4.4	Low-Emitting Materials	1	0
Credit 5	Indoor Chemical & Pollutant Source Control	1	0
Credit 6.1	Controllability of Systems	1	0
Credit 6.2	Controllability of Systems	1	0
Credit 7.1	Thermal Comfort	1	0
Credit 7.2	Thermal Comfort	1	0
Credit 8.1	Daylight & Views	1	0

Credit 8.2	Daylight & Views	1	0
Innovation & Design Process			
Credit 1.1	Innovation in Design	1	0
Credit 1.2	Innovation in Design	1	0
Credit 1.3	Innovation in Design	1	0
Credit 1.4	Innovation in Design	1	0
Credit 2	LEED Accreditied Professional	1	1
Project Totals			
Points		**69**	**8**

Energy Calculation Appendix:

Energy Consumed:

	Elect Cons. (kWh)	Energy		(kBtu/yr)
Primary heating		0.00	%	0.00
Cooling Compressor	633,873.56	37.80	%	64,908.80
Tower/Cond Fans	52,352.87	3.12	%	5,360.95
Condenser Pump		0.00	%	0.00
Other CLG Accessories	414,385.12	24.71	%	42,433.14
Cooling Subtotal....	1,100,611.50	65.63	%	112,702.88
Supply Fans	33,394.59	1.99	%	3,419.61
Circ Pumps		0.00	%	0.00
Base Utilities		0.00	%	0.00
Aux Subtotal....	33,394.59	1.99	%	3,419.61
Lighting	542,872.94	32.37	%	55,590.32
Receptacles		0.00	%	0.00
Base Utilities		0.00	%	0.00
Cogeneration		0.00	%	0.00
Totals**	1,676,879.00	100.00	%	171,712.80

Emissions Results:

	Texas Grid lbm/year				Building Emissions lbm/year			
Fuel	**Particulates**	**SO_2/kWh**	**NO_x/kWh**	**CO_2/kWh**	**Particulates**	**SO_2/kWh**	**NO_x/kWh**	**CO_2/kWh**
Coal	4.51E-04	5.24E-03	3.04E-03	8.82E-01	7.56E+02	8.79E+03	5.10E+03	1.48E+06
Natural Gas	0	6.21E-06	1.17E-03	6.17E-01	0.00E+00	1.04E+01	1.96E+03	1.03E+06
Totals	4.51E-04	5.25E-03	4.21E-03	1.50E+00	7.56E+02	8.80E+03	7.06E+03	2.51E+06

Design Airflow Quantities:

System Description	System Type	cfm	cfm	cfm	cfm	cfm	cfm	cfm
RTU-1	Variable Refrigerant Volume	500	5,000	5,000	5,000	500	0	0
RTU-2	Variable Refrigerant Volume	700	5,000	5,000	5,000	700	0	0
RTU-3	Variable Refrigerant Volume	3,500	10,500	10,500	10,500	3,500	0	0
RTU-4	Variable Refrigerant Volume	3,350	8,300	8,300	8,300	3,350	0	0
RTU-5	Variable Refrigerant Volume	750	7,500	7,500	7,500	750	0	0
RTU-6	Variable Refrigerant Volume	750	6,000	6,000	6,000	750	0	0
RTU-7	Variable Refrigerant Volume	1,000	10,000	10,000	10,000	1,000	0	0
RTU-8	Variable Refrigerant Volume	500	4,000	4,000	4,000	500	0	0
RTU-9	Variable Refrigerant Volume	1,675	6,600	6,600	6,600	1,675	0	0
RTU-10	Variable Refrigerant Volume	1,675	6,600	6,600	6,600	1,675	0	0
RTU-11	Variable Refrigerant Volume	748	5,500	5,500	5,500	748	0	0
RTU-12	Variable Refrigerant Volume	500	3,500	3,500	3,500	500	0	0
RTU-13	Variable Refrigerant Volume	750	5,900	5,900	5,900	750	0	0

ENGINEERING CHECKS

By PSU

Description	Type	COOLING % OA	COOLING cfm/ft²	COOLING cfm/ton	COOLING ft²/ton	COOLING Btu/hr·ft²	HEATING % OA	HEATING cfm/ft²	HEATING Btu/hr·ft²	Floor Area ft²
Reception	Zone	10.00	3.59	449.9	125.2	95.86	10.00	3.59	-29.99	1,391
RTU-1	System - Variable Refrigerant Volume	10.00	3.59	449.9	125.2	95.86	10.00	3.59	-29.99	1,391
Child Restrooms	Zone	14.00	0.34	291.8	863.0	13.90	14.00	0.34	-4.16	148
Membership Sales	Zone	14.00	1.09	367.7	336.6	35.65	14.00	1.09	-8.13	686
Storage	Zone	14.00	0.95	374.5	393.2	30.52	14.00	0.95	-7.13	210
Juice Bar	Zone	14.00	1.54	385.9	250.8	47.85	14.00	1.54	-11.33	260
Kids Club	Zone	14.00	1.97	197.1	100.1	119.85	14.00	1.97	-41.71	1,829
RTU-2	System - Variable Refrigerant Volume	14.00	1.60	227.1	142.3	84.33	14.00	1.60	-27.74	3,133
Pool	Zone	33.33	2.55	277.2	108.6	110.55	33.33	2.55	-45.67	4,112
RTU-3	System - Variable Refrigerant Volume	33.33	2.55	277.2	108.6	110.55	33.33	2.55	-45.67	4,112
Lockers	Zone	40.36	2.16	271.5	125.7	95.46	40.36	2.16	-41.42	3,843
RTU-4	System - Variable Refrigerant Volume	40.36	2.16	271.5	125.7	95.46	40.36	2.16	-41.42	3,843
Basketball	Zone	10.00	1.97	439.6	223.3	53.74	10.00	1.97	-12.90	3,810
RTU-5	System - Variable Refrigerant Volume	10.00	1.97	439.6	223.3	53.74	10.00	1.97	-12.90	3,810
Free Weights	Zone	12.50	2.02	344.5	170.8	70.28	12.50	2.02	-14.08	2,974
RTU-6	System - Variable Refrigerant Volume	12.50	2.02	344.5	170.8	70.28	12.50	2.02	-14.08	2,974
Aerobics	Zone	10.00	3.24	397.6	122.6	97.89	10.00	3.24	-18.13	3,083
RTU-7	System - Variable Refrigerant Volume	10.00	3.24	397.6	122.6	97.89	10.00	3.24	-18.13	3,083
Raquetball	Zone	12.50	0.96	379.0	395.6	30.34	12.50	0.96	-9.16	4,175
RTU-8	System - Variable Refrigerant Volume	12.50	0.96	379.0	395.6	30.34	12.50	0.96	-9.16	4,175
Cardio	Zone	25.38	1.25	316.2	252.0	47.61	25.38	1.25	-15.70	5,260
RTU-9	System - Variable Refrigerant Volume	25.38	1.25	316.2	252.0	47.61	25.38	1.25	-15.70	5,260
Cardio2	Zone	25.38	1.25	316.2	252.0	47.61	25.38	1.25	-15.70	5,260
RTU-10	System - Variable Refrigerant Volume	25.38	1.25	316.2	252.0	47.61	25.38	1.25	-15.70	5,260
Special Exercise	Zone	13.60	2.38	414.6	174.3	68.86	13.60	2.38	-15.57	1,366
Lower Stairs	Zone	13.60	1.33	440.0	330.0	36.37	13.60	1.33	-8.78	1,500
Trainers Office	Zone	13.60	1.15	390.6	339.0	35.40	13.60	1.15	-7.61	217
RTU-11	System - Variable Refrigerant Volume	13.60	1.78	422.3	236.7	50.70	13.60	1.78	-11.71	3,083
Spinning	Zone	14.29	3.07	417.0	136.0	88.26	14.29	3.07	-21.23	1,141
RTU-12	System - Variable Refrigerant Volume	14.29	3.07	417.0	136.0	88.26	14.29	3.07	-21.23	1,141
Mezzanine	Zone	12.71	1.97	415.5	211.3	56.80	12.71	1.97	-12.82	3,000

ENGINEERING CHECKS

By PSU

Description	Type	COOLING % OA	COOLING cfm/ft²	COOLING cfm/ton	COOLING ft²/ton	COOLING Btu/hr·ft²	HEATING % OA	HEATING cfm/ft²	HEATING Btu/hr·ft²	Floor Area ft²
RTU-13	System - Variable Refrigerant Volume	12.71	1.97	415.5	211.3	56.80	12.71	1.97	-12.82	3,000

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-1
Zone - Reception
Room - Reception

Coil Location - Room

Ambient DB/WB/HR: 96 / 79 / 125 Coil Peak Calculation Time: August, hour 16

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h	
Solar Gain	Glass Transmission		70,488	8,051	
Entering Air (DB / WB)	Coil Entering Humidity Ratio		71.02	77.8 / 64.8	
Wall Transmission	255		255	0.2 %	
Roof Transmission	0		0	0.0 %	
Floor Transmission	Partition Transmission		0	0	
Sensible Load	Coil Total Load		108.70	133.38	
Net Ceiling Load	0		0	0.0 %	
Lighting	People	5,318	3,500	3,500	
Cooling Airflow	Resulting Room Relative Humidity	5,000.00	49.95	cfm	
Misc. Equipment Loads	0	0	0	0.0 %	
Cooling Infiltration	0	0	0	0.0 %	
Sub-Total ==>	87,612	3,500	91,112	68.3 %	
Ventilation Load	Exhaust Heat	11,906	-377	21,180	033,085
Load	125.18	11.1	ton	ft²/ton	
Supply Fan Load	1,481		1,481	1.1 %	
Return Fan Load	0		0	0.0 %	
Net Duct Heat Pickup	Wall Load to Plenum		0	60	
Outdoor Air	Airflow / Load		10.0	449.86	
Roof Load to Plenum	3,359		3,359	2.5 %	
Lighting Load to Plenum	Misc. Equip. Load to Plenum	1,330	0	0	1,330 0
Glass Transmission to Plenum	0		0	0.0 %	
Glass Solar to Plenum	Over/Under Sizing		3,324	0	0 3,324
Terminal Bypass	0	0	0	0.0 %	
Total Cooling Loads	108,695	24,680	133,375	100.0 %	

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
70,488			8,051	52.8 %	6.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			58.4 / 56.1	°F		
Coil Leaving Humidity Ratio			63.87	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			58.60	°F		
5,318			7,000	4.0 %	5.2 %	Total
%						

General Engineering Checks

-377 24.8 %		-0.3 %	Total Cooling Load	Area /	
Total Floor Area		1,391	ft²		
Cooling Airflow		3.59	cfm/ft²		
0 60		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
1.0 %	0.0 %				
0.0 %	2.5 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-10
Zone - Cardio2
Room - Cardio2

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		89.61	82.1 / 69.7			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		162.30	250.45			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	20,107	26,300	26,300			
Cooling Airflow	Resulting Room Relative Humidity	6,600.00	58.45	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	46,407	26,300	72,707	29.0 %			
Ventilation Load	Exhaust Heat	40,817	-3,721	61,844	0	102,661	
Load	Area / Load	252.03	20.9	ton ft²/ton			
Supply Fan Load	1,956		1,956	0.8 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		25.4	316.24			
Roof Load to Plenum	11,406		11,406	4.6 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	5,027	0	0	5,027	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		60,412	0	0	60,412	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	162,302	88,144	250,447	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0		0	0.0 %	0.0 %	Coil	
°F		gr/lb				
Coil Leaving Air (DB / WB)		59.8 / 58.5	°F			
Coil Leaving Humidity Ratio		71.26	gr/lb			
0		0	0.0 %	0.0 %	Coil	
MBh		MBh				
Cooling Supply Air Temperature		60.00	°F			
20,107		52,600	8.0 %	21.0 %	Total	
%						

General Engineering Checks

-3,721	41.0 %	-1.5 %	Total Cooling	
Total Floor Area	5,260	ft²		
Cooling Airflow	1.25	cfm/ft²		
0 0	0.0 %	0.0 %	Percent	
cfm/ton	%			
Cooling Load Methodology	TETD-TA1			
2.0 %	0.0 %			
0.0 %	24.1 %			

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-11
Zone - Trainers Office
Room - Trainers Office

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		80.31	78.8 / 66.9			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		5.67	7.68			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	830	675	675			
Cooling Airflow	Resulting Room Relative Humidity	250.00	55.76	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	1,505	675	2,180	28.4 %			
Ventilation Load	Exhaust Heat	829	-321,340	02,169			
Load	339.01	0.6	tonft²/ton				
Supply Fan Load	74		74	1.0 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		13.6	390.56			
Roof Load to Plenum	482		482	6.3 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	207	0	0	207	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		2,602	0	0	2,602	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	5,666	2,015	7,681	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			59.8 / 57.4	°F		
Coil Leaving Humidity Ratio			66.84	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			60.00	°F		
830			1,350	10.8 %	17.6 %	Total
%						

General Engineering Checks

-32	28.2 %	-0.4 %	Total Cooling Load		Area /
Total Floor Area		217	ft²		
Cooling Airflow		1.15	cfm/ft²		
0	0	0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
2.7 %	0.0 %				
0.0 %	33.9 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-11
Zone - Lower Stairs
Room - Lower Stairs

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		78.02	78.8 / 66.5			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		41.32	54.55			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	5,734	2,000	2,000			
Cooling Airflow	Resulting Room Relative Humidity	2,000.00	53.75	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	7,734	2,000	9,734	17.8 %			
Ventilation Load	Exhaust Heat	6,628	-259	11,229	0	17,857	
Load	329.97	4.6	ton	ft²/ton			
Supply Fan Load	593		593	1.1 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		13.6	439.96			
Roof Load to Plenum	0		0	0.0 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	1,433	0	0	1,433	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		25,192	0	0	25,192	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	41,321	13,229	54,550	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			59.8 / 58.0	°F		
Coil Leaving Humidity Ratio			69.40	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			60.00	°F		
5,734			4,000	10.5 %	7.3 %	Total
%						

General Engineering Checks

-259	32.7 %	-0.5 %	Total Cooling Load	Area /	
Total Floor Area		1,500	ft²		
Cooling Airflow		1.33	cfm/ft²		
0 0		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
2.6 %	0.0 %				
0.0 %	46.2 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-11
Zone - Special Exercise
Room - Special Exercise

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		79.40	78.8 / 66.8
Wall Transmission	0		0	0.0 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		69.49	94.07
Net Ceiling Load	0		0	0.0 %
Lighting	People	5,222	6,825	6,825
Cooling Airflow	Resulting Room Relative Humidity	3,250.00	54.96	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	12,047	6,825	18,872	20.1 %
Ventilation Load	Exhaust Heat	10,771	-421	17,750 0 28,521
Load	174.26	7.8	ton	ft²/ton
Supply Fan Load	963		963	1.0 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	0
Outdoor Air	Airflow / Load		13.6	414.60
Roof Load to Plenum	3,033		3,033	3.2 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	1,305	0	0 1,305 0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		41,794	0 0 41,794
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	69,492	24,575	94,067	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			59.8 / 57.8	°F		
Coil Leaving Humidity Ratio			68.44	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			60.00	°F		
5,222			13,650	5.6 %	14.5 %	Total
%						

General Engineering Checks

-421	30.3 %	-0.4 %	Total Cooling Load		Area /
Total Floor Area		1,366	ft²		
Cooling Airflow		2.38	cfm/ft²		
0 0		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
1.4 %	0.0 %				
0.0 %	44.4 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-12
Zone - Spinning
Room - Spinning

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		79.17	78.7 / 66.7			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		74.67	100.71			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	4,362	5,700	5,700			
Cooling Airflow	Resulting Room Relative Humidity	3,500.00	54.41	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	10,062	5,700	15,762	15.7 %			
Ventilation Load	Exhaust Heat	12,184	-292	20,337	0	32,521	
Load	135.96	8.4	ton	ft²/ton			
Supply Fan Load	1,037		1,037	1.0 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		14.3	417.05			
Roof Load to Plenum	2,550		2,550	2.5 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	1,090	0	0	1,090	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		48,040	0	0	48,040	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	74,671	26,037	100,708	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total		Coil Selection Parameters			
0				0	0.0 %	0.0 %	Coil
°F				gr/lb			
Coil Leaving Air (DB / WB)				59.8 / 57.7	°F		
Coil Leaving Humidity Ratio				68.22	gr/lb		
0				0	0.0 %	0.0 %	Coil
MBh				MBh			
Cooling Supply Air Temperature				60.00	°F		
4,362				11,400	4.3 %	11.3 %	Total
%							

General Engineering Checks

-292	32.3 %			-0.3 %	Total Cooling Load		Area /
Total Floor Area				1,141	ft²		
Cooling Airflow				3.07	cfm/ft²		
0	0			0.0 %	0.0 %	Percent	
cfm/ton				%			
Cooling Load Methodology				TETD-TA1			
1.1 %	0.0 %						
0.0 %	47.7 %						

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-13
Zone - Mezzanine
Room - Mezzanine

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		79.47	79.0 / 66.8			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		125.63	170.40			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	11,468	15,000	15,000			
Cooling Airflow	Resulting Room Relative Humidity	5,900.00	55.46	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	26,468	15,000	41,468	24.3 %			
Ventilation Load	Exhaust Heat	18,276	-1,052	29,773	0	48,049	
Load	Area / Load	211.26	14.2	ton	ft²/ton		
Supply Fan Load	1,748		1,748	1.0 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		12.7	415.48			
Roof Load to Plenum	6,605		6,605	3.9 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	2,867	0	0	2,867	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		70,719	0	0	70,719	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	125,632	44,773	170,405	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total		Coil Selection Parameters			
0				0	0.0 %	0.0 %	Coil
°F				gr/lb			
Coil Leaving Air (DB / WB)				59.8 / 57.9	°F		
Coil Leaving Humidity Ratio				68.85	gr/lb		
0				0	0.0 %	0.0 %	Coil
MBh				MBh			
Cooling Supply Air Temperature				60.00	°F		
11,468				30,000	6.7 %	17.6 %	Total
%							

General Engineering Checks

-1,052		28.2 %	-0.6 %	Total Cooling	
Total Floor Area		3,000	ft²		
Cooling Airflow		1.97	cfm/ft²		
0 0		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
1.7 %	0.0 %				
0.0 %	41.5 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-2
Zone - Child Restrooms
Room - Child Restrooms

Coil Location - Room

Ambient DB/WB/HR: 96 / 79 / 122 Coil Peak Calculation Time: July, hour 16

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h		
Solar Gain	Glass Transmission		0	0		
Entering Air (DB / WB)	Coil Entering Humidity Ratio		81.53	79.3 / 67.3		
Wall Transmission	107		107	5.2 %		
Roof Transmission	0		0	0.0 %		
Floor Transmission	Partition Transmission		0	0		
Sensible Load	Coil Total Load		1.53	2.06		
Net Ceiling Load	0		0	0.0 %		
Lighting	People	565	300	300		
Cooling Airflow	Resulting Room Relative Humidity	50.00	57.49	cfm		
Misc. Equipment Loads	0	0	0	0.0 %		
Cooling Infiltration	0	0	0	0.0 %		
Sub-Total ==>	972	300	1,272	61.9 %		
Ventilation Load	Exhaust Heat	166	-11231	0396		
Load	863.02	0.2	tonft²/ton			
Supply Fan Load	15		15	0.7 %		
Return Fan Load	0		0	0.0 %		
Net Duct Heat Pickup	Wall Load to Plenum		0	25		
Outdoor Air	Airflow / Load		14.0	291.83		
Roof Load to Plenum	364		364	17.7 %		
Lighting Load to Plenum	Misc. Equip. Load to Plenum	141	0	0	141	0
Glass Transmission to Plenum	0		0	0.0 %		
Glass Solar to Plenum	Over/Under Sizing		-147	0	0	-147
Terminal Bypass	0	0	0	0.0 %		
Total Cooling Loads	1,526	531	2,056	100.0 %		

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			58.3 / 54.3	°F		
Coil Leaving Humidity Ratio			56.45	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			58.50	°F		
565			600	27.5 %	29.2 %	Total
%						

General Engineering Checks

-11	19.3 %	-0.5 %	Total Cooling Load	Area /	
Total Floor Area		148	ft²		
Cooling Airflow		0.34	cfm/ft²		
0	25	0.0 %	1.2 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
6.9 %	0.0 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-2
Zone - Membership Sales
Room - Membership Sales

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		77.87	79.4 / 66.6
Wall Transmission	0		0	0.0 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		18.11	24.47
Net Ceiling Load	0		0	0.0 %
Lighting	People	2,624	2,000	2,000
Cooling Airflow	Resulting Room Relative Humidity	750.00	53.42	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	4,624	2,000	6,624	27.1 %
Ventilation Load	Exhaust Heat	2,559	-1634,367	06,926
Load	336.56	2.0	ton	ft²/ton
Supply Fan Load	222		222	0.9 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	0
Outdoor Air	Airflow / Load		14.0	367.72
Roof Load to Plenum	1,507		1,507	6.2 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	656	0	0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		8,702	0
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	18,108	6,367	24,475	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			58.4 / 56.4	°F		
Coil Leaving Humidity Ratio			64.74	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			58.60	°F		
2,624			4,000	10.7 %	16.3 %	Total
%						

General Engineering Checks

-163	28.3 %	-0.7 %	Total Cooling Load		Area /
Total Floor Area		686	ft²		
Cooling Airflow		1.09	cfm/ft²		
0 0		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
2.7 %	0.0 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-2
Zone - Storage
Room - Storage

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		75.88	79.4 / 66.2			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		4.90	6.41			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	803	300	300			
Cooling Airflow	Resulting Room Relative Humidity	200.00	51.67	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	1,103	300	1,403	21.9 %			
Ventilation Load	Exhaust Heat	682	-431,210	01,892			
Load	393.18	0.5	tonft²/ton				
Supply Fan Load	59		59	0.9 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		14.0	374.46			
Roof Load to Plenum	461		461	7.2 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	201	0	0	201	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		2,436	0	0	2,436	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	4,899	1,510	6,409	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			58.4 / 56.1	°F		
Coil Leaving Humidity Ratio			63.56	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			58.60	°F		
803			600	12.5 %	9.4 %	Total
%						

General Engineering Checks

-43	29.5 %	-0.7 %	Total Cooling Load		Area /
Total Floor Area		210	ft²		
Cooling Airflow		0.95	cfm/ft²		
0	0	0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
3.1 %	0.0 %				
0.0 %	38.0 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-2
Zone - Kids Club
Room - Kids Club

Coil Location - Room

Ambient DB/WB/HR: 96 / 79 / 125 Coil Peak Calculation Time: August, hour 16

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		140,616	22,688
Entering Air (DB / WB)	Coil Entering Humidity Ratio		44.73	79.3 / 59.6
Wall Transmission	1,927		1,927	0.9 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		176.92	219.20
Net Ceiling Load	0		0	0.0 %
Lighting	People	6,991	9,150	9,150
Cooling Airflow	Resulting Room Relative Humidity	3,600.00	24.47	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	181,373	9,150	190,523	86.9 %
Ventilation Load	Exhaust Heat	12,001	-78133,126	045,127
Load	100.13	18.3	tonft²/ton	
Supply Fan Load	1,067		1,067	0.5 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	239
Outdoor Air	Airflow / Load		14.0	197.08
Roof Load to Plenum	4,357		4,357	2.0 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	1,748	0	0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		-23,082	0
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	176,922	42,276	219,198	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
140,616			22,688	64.2 %	10.4 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			34.8 / 34.2	°F		
Coil Leaving Humidity Ratio			28.00	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			35.00	°F		
6,991			18,300	3.2 %	8.3 %	Total
%						

General Engineering Checks

-781	20.6 %		-0.4 %	Total Cooling Load		Area /
Total Floor Area			1,829	ft²		
Cooling Airflow			1.97	cfm/ft²		
0	239		0.0 %	0.1 %	Percent	
cfm/ton			%			
Cooling Load Methodology			TETD-TA1			
0.8 %	0.0 %					
0.0 %	-10.5					

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-2
Zone - Juice Bar
Room - Juice Bar

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		76.10	79.4 / 66.3
Wall Transmission	0		0	0.0 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		9.38	12.44
Net Ceiling Load	0		0	0.0 %
Lighting	People	994	650	650
Cooling Airflow	Resulting Room Relative Humidity	400.00	51.86	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	1,644	650	2,294	18.4 %
Ventilation Load	Exhaust Heat	1,365	-872,410	03,775
Load	250.81	1.0	tonft²/ton	
Supply Fan Load	119		119	1.0 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	0
Outdoor Air	Airflow / Load		14.0	385.86
Roof Load to Plenum	571		571	4.6 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	248	0	0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		5,520	0
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	9,380	3,060	12,440	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			58.4 / 56.5	°F		
Coil Leaving Humidity Ratio			65.11	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			58.60	°F		
994			1,300	8.0 %	10.5 %	Total
%						

General Engineering Checks

-87	30.3 %		-0.7 %	Total Cooling Load		Area /
Total Floor Area			260	ft²		
Cooling Airflow			1.54	cfm/ft²		
0	0		0.0 %	0.0 %	Percent	
cfm/ton			%			
Cooling Load Methodology			TETD-TA1			
2.0 %	0.0 %					

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-3
Zone - Pool
Room - Pool

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		70,184	11,776
Entering Air (DB / WB)	Coil Entering Humidity Ratio		89.35	83.5 / 70.1
Wall Transmission	985		985	0.2 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		288.37	454.57
Net Ceiling Load	0		0	0.0 %
Lighting	People	15,718	20,575	20,575
Cooling Airflow	Resulting Room Relative Humidity	10,500.00	53.40	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	119,238	20,575	139,813	30.8 %
Ventilation Load	Exhaust Heat	85,289	-6,462	145,621
Load	Area / Load	108.55	37.9	ton ft²/ton
Supply Fan Load	3,111		3,111	0.7 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	144
Outdoor Air	Airflow / Load		33.3	277.19
Roof Load to Plenum	8,979		8,979	2.0 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	3,930	0	0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		74,140	0
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	288,370	166,196	454,567	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total		Coil Selection Parameters			
70,184				11,776	15.4 %	2.6 %	Coil
°F				gr/lb			
Coil Leaving Air (DB / WB)				57.9 / 57.1	°F		
Coil Leaving Humidity Ratio				68.58	gr/lb		
0				0	0.0 %	0.0 %	Coil
MBh				MBh			
Cooling Supply Air Temperature				58.10	°F		
15,718				41,150	3.5 %	9.1 %	Total
%							

General Engineering Checks

-6,462			50.8 %	-1.4 %	Total Cooling
Total Floor Area			4,112	ft²	
Cooling Airflow			2.55	cfm/ft²	
0	144		0.0 %	0.0 %	Percent
cfm/ton			%		
Cooling Load Methodology			TETD-TA1		
0	3,930	0	0.9 %	0.0 %	
74,140	0	74,140	0.0 %	16.3 %	

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-4
Zone - Lockers
Room - Lockers

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		97.08	84.9 / 71.9
Wall Transmission	2,483		2,483	0.7 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		222.20	366.84
Net Ceiling Load	0		0	0.0 %
Lighting	People	14,690	19,225	19,225
Cooling Airflow	Resulting Room Relative Humidity	8,300.00	57.90	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	36,398	19,225	55,623	15.2 %
Ventilation Load	Exhaust Heat	81,634	-5,882	125,407 0 207,041
Load	Area / Load	125.71	30.6	ton ft²/ton
Supply Fan Load	2,459		2,459	0.7 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	202
Outdoor Air	Airflow / Load		40.4	271.51
Roof Load to Plenum	8,406		8,406	2.3 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	3,673	0	0 3,673 0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		95,315	0 0 95,315
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	222,205	144,632	366,837	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters	
0		0	0.0 %	0.0 % Coil
°F		gr/lb		
Coil Leaving Air (DB / WB)		60.3 / 59.2	°F	
Coil Leaving Humidity Ratio		73.50	gr/lb	
0		0	0.0 %	0.0 % Coil
MBh		MBh		
Cooling Supply Air Temperature		60.50	°F	
14,690		38,450	4.0 %	10.5 % Total
%				

General Engineering Checks

-5,882		56.4 %	-1.6 %	Total Cooling
Total Floor Area		3,843	ft²	
Cooling Airflow		2.16	cfm/ft²	
0 202		0.0 %	0.1 %	Percent
cfm/ton		%		
Cooling Load Methodology		TETD-TA1		
1.0 %	0.0 %			
0.0 %	26.0 %			

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-5
Zone - Basketball
Room - Basketball

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		2,705	1,340
Entering Air (DB / WB)	Coil Entering Humidity Ratio		70.54	78.7 / 65.0
Wall Transmission	4,614		4,614	2.3 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		165.65	204.74
Net Ceiling Load	0		0	0.0 %
Lighting	People	14,564	5,000	5,000
Cooling Airflow	Resulting Room Relative Humidity	7,500.00	49.25	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	28,223	5,000	33,223	16.2 %
Ventilation Load	Exhaust Heat	18,276	-1,320	34,087 0 52,363
Load	Area / Load	223.31	17.1	ton ft²/ton
Supply Fan Load	2,222		2,222	1.1 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	321
Outdoor Air	Airflow / Load		10.0	439.59
Roof Load to Plenum	8,333		8,333	4.1 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	3,641	0	0 3,641 0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		105,956	0 0 105,956
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	165,652	39,087	204,738	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters
2,705	1,340	1.3 %	0.7 % Coil
°F	gr/lb		
Coil Leaving Air (DB / WB)	58.2 / 56.1	°F	
Coil Leaving Humidity Ratio	64.18	gr/lb	
0	0	0.0 %	0.0 % Coil
MBh	MBh		
Cooling Supply Air Temperature	58.40	°F	
14,564	10,000	7.1 %	4.9 % Total
%			

General Engineering Checks

-1,320	25.6 %	-0.6 %	Total Cooling
Total Floor Area	3,810	ft²	
Cooling Airflow	1.97	cfm/ft²	
0 321	0.0 %	0.2 %	Percent
cfm/ton	%		
Cooling Load Methodology	TETD-TA1		
1.8 % 0.0 %			
51.8 %			

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-6
Zone - Free Weights
Room - Free Weights

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		70.04	78.9 / 64.9
Wall Transmission	2,713		2,713	1.3 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		158.77	209.01
Net Ceiling Load	0		0	0.0 %
Lighting	People	11,368	14,875	14,875
Cooling Airflow	Resulting Room Relative Humidity	6,000.00	47.41	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	28,956	14,875	43,831	21.0 %
Ventilation Load	Exhaust Heat	18,276	-1,064	35,357
Load	Area / Load	170.75	17.4	ton
Supply Fan Load	1,778		1,778	0.9 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	186
Outdoor Air	Airflow / Load		12.5	344.49
Roof Load to Plenum	6,546		6,546	3.1 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	2,842	0	0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		101,253	0
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	158,774	50,232	209,006	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			55.1 / 53.4	°F		
Coil Leaving Humidity Ratio			58.26	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			55.30	°F		
11,368			29,750	5.4 %	14.2 %	Total
%						

General Engineering Checks

-1,064		25.7 %	-0.5 %	Total Cooling	
Total Floor Area		2,974	ft²		
Cooling Airflow		2.02	cfm/ft²		
0	186	0.0 %	0.1 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
1.4 %	0.0 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-7
Zone - Aerobics
Room - Aerobics

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		68.48	78.5 / 64.5
Wall Transmission	3,616		3,616	1.2 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		239.32	301.79
Net Ceiling Load	0		0	0.0 %
Lighting	People	11,785	15,425	15,425
Cooling Airflow	Resulting Room Relative Humidity	10,000.00	47.51	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	30,826	15,425	46,251	15.3 %
Ventilation Load	Exhaust Heat	24,368	-1,471	47,051 0 71,420
Load	Area / Load	122.59	25.2	ton ft²/ton
Supply Fan Load	2,963		2,963	1.0 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	245
Outdoor Air	Airflow / Load		10.0	397.62
Roof Load to Plenum	6,780		6,780	2.2 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	2,946	0	0 2,946 0 1.0 % 0.0 %
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		172,661	0 0 172,661 0.0 % 57.2 %
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	239,318	62,476	301,794	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters	
0		0	0.0 %	0.0 % Coil
°F		gr/lb		
Coil Leaving Air (DB / WB)		56.4 / 54.5	°F	
Coil Leaving Humidity Ratio		60.48	gr/lb	
0		0	0.0 %	0.0 % Coil
MBh		MBh		
Cooling Supply Air Temperature		56.60	°F	
11,785		30,850	3.9 %	10.2 % Total
%				
-1,471		23.7 %	-0.5 %	Total Cooling
Total Floor Area		3,083	ft²	
Cooling Airflow		3.24	cfm/ft²	
0 245		0.0 %	0.1 %	Percent
cfm/ton		%		
Cooling Load Methodology		TETD-TA1		

General Engineering Checks

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-8
Zone - Raquetball
Room - Raquetball

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h
Solar Gain	Glass Transmission		0	0
Entering Air (DB / WB)	Coil Entering Humidity Ratio		72.25	79.4 / 65.5
Wall Transmission	3,305		3,305	2.6 %
Roof Transmission	0		0	0.0 %
Floor Transmission	Partition Transmission		0	0
Sensible Load	Coil Total Load		98.96	126.65
Net Ceiling Load	0		0	0.0 %
Lighting	People	15,959	5,000	5,000
Cooling Airflow	Resulting Room Relative Humidity	4,000.00	49.32	cfm
Misc. Equipment Loads	0	0	0	0.0 %
Cooling Infiltration	0	0	0	0.0 %
Sub-Total ==>	24,265	5,000	29,265	23.1 %
Ventilation Load	Exhaust Heat	12,184	-971	22,691 0 34,875
Load	395.57	10.6	ton	ft²/ton
Supply Fan Load	1,185		1,185	0.9 %
Return Fan Load	0		0	0.0 %
Net Duct Heat Pickup	Wall Load to Plenum		0	676
Outdoor Air	Airflow / Load		12.5	378.99
Roof Load to Plenum	9,101		9,101	7.2 %
Lighting Load to Plenum	Misc. Equip. Load to Plenum	3,990	0	0 3,990 0
Glass Transmission to Plenum	0		0	0.0 %
Glass Solar to Plenum	Over/Under Sizing		48,534	0 0 48,534
Terminal Bypass	0	0	0	0.0 %
Total Cooling Loads	98,963	27,691	126,654	100.0 %

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			57.4 / 55.3	°F		
Coil Leaving Humidity Ratio			62.01	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			57.60	°F		
15,959			10,000	12.6 %	7.9 %	Total
%						

General Engineering Checks

-971 27.5 %		-0.8 %	Total Cooling Load		Area /
Total Floor Area		4,175	ft²		
Cooling Airflow		0.96	cfm/ft²		
0 676		0.0 %	0.5 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
3.2 %	0.0 %				
0.0 %	38.3 %				

Design Cooling Load Summary

By PSU

LA Fitness West Oaks
Houston, TX
System - RTU-9
Zone - Cardio
Room - Cardio

Coil Location - Room

Ambient DB/WB/HR: 97 / 80 / 129 Coil Peak Calculation Time: August, hour 15

COOLING COIL LOAD INFORMATION

Load Component	Sensible	Btu/h	Latent	Btu/h			
Solar Gain	Glass Transmission		0	0			
Entering Air (DB / WB)	Coil Entering Humidity Ratio		89.61	82.1 / 69.7			
Wall Transmission	0		0	0.0 %			
Roof Transmission	0		0	0.0 %			
Floor Transmission	Partition Transmission		0	0			
Sensible Load	Coil Total Load		162.30	250.45			
Net Ceiling Load	0		0	0.0 %			
Lighting	People	20,107	26,300	26,300			
Cooling Airflow	Resulting Room Relative Humidity	6,600.00	58.45	cfm			
Misc. Equipment Loads	0	0	0	0.0 %			
Cooling Infiltration	0	0	0	0.0 %			
Sub-Total ==>	46,407	26,300	72,707	29.0 %			
Ventilation Load	Exhaust Heat	40,817	-3,721	61,844	0	102,661	
Load	Area / Load	252.03	20.9	ton ft²/ton			
Supply Fan Load	1,956		1,956	0.8 %			
Return Fan Load	0		0	0.0 %			
Net Duct Heat Pickup	Wall Load to Plenum		0	0			
Outdoor Air	Airflow / Load		25.4	316.24			
Roof Load to Plenum	11,406		11,406	4.6 %			
Lighting Load to Plenum	Misc. Equip. Load to Plenum	5,027	0	0	5,027	0	
Glass Transmission to Plenum	0		0	0.0 %			
Glass Solar to Plenum	Over/Under Sizing		60,412	0	0	60,412	
Terminal Bypass	0	0	0	0.0 %			
Total Cooling Loads	162,302	88,144	250,447	100.0 %			

COOLING COIL SELECTION

Total	Btu/h	Percent of Total	Coil Selection Parameters			
0			0	0.0 %	0.0 %	Coil
°F			gr/lb			
Coil Leaving Air (DB / WB)			59.8 / 58.5	°F		
Coil Leaving Humidity Ratio			71.26	gr/lb		
0			0	0.0 %	0.0 %	Coil
MBh			MBh			
Cooling Supply Air Temperature			60.00	°F		
20,107			52,600	8.0 %	21.0 %	Total
%						

General Engineering Checks

-3,721		41.0 %	-1.5 %	Total Cooling	
Total Floor Area		5,260	ft²		
Cooling Airflow		1.25	cfm/ft²		
0 0		0.0 %	0.0 %	Percent	
cfm/ton		%			
Cooling Load Methodology		TETD-TA1			
2.0 %	0.0 %				
0.0 %	24.1 %				

Design Cooling Load Summary

By PSU