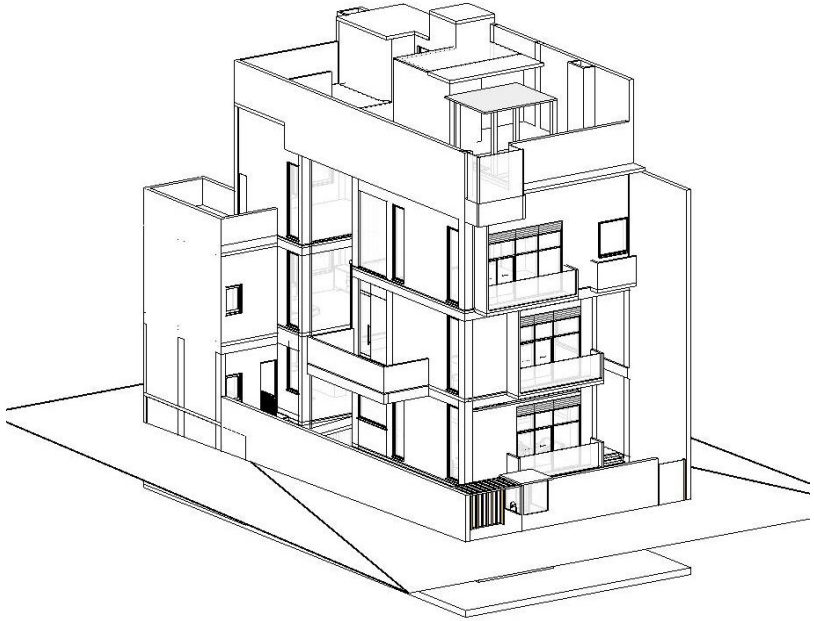
Villa Sec-44, Noida



Energy Simulation Report
IGBC GREEN HOMES

Revision No- 0, Date 29.05.12

1.1 Introduction:

The project 'Villa Sec-44' is being developed by Nutek Overseas Pvt Ltd at Noida. The single residential block is being developed giving due attention to the concept of Sustainability. The villa will have B+G+2 and approximate built-up area would be 6,000 sq.ft with 4,202 sq ft conditioned area.

1.2 Benefits of Green Homes:

Green homes can have tremendous benefits, both tangible and intangible. The most tangible benefits are the reduction in water and energy consumption right from day one of occupancy. The energy savings could range from 20 – 30 % and water savings around 30 – 50%. Intangible benefits of Green homes include enhanced air quality, excellent day lighting, health & wellbeing of the occupants, safety benefits and conservation of scarce national resources. Green homes rating system can also enhance marketability of a project.

1.3 IGBC Green Homes Requirement:

The proposed building is going under IGBC- Green Homes rating system. The Rating system requires the proposed project to demonstrate compliance with the mandatory provisions as well as quantify the energy savings under the "Energy Efficiency" category and this report assists to achieve the same.

1.4 Building Simulation:

The objective of the Draft Energy Analysis report is to evaluate Annual Energy usage and Energy Benefits associated with energy–efficient features. The report is prepared with the help of hourly simulation software which serves as an important tool to simulate various energy efficient measures particular to the building without being actually implementing. Energy efficiency measures in envelope, lighting and HVAC can be analyzed as well as thermal comfort of the occupants can be enhanced. After the energy and cost analysis, decisions on implementing the effective Energy Conservation Measures (ECMs) can be taken.

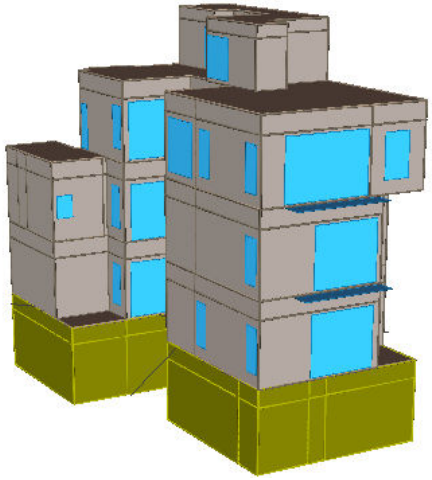
With several Energy Conservation Measures considered, the proposed building has achieve 33.*1%* improvement over the base building which is equivalent to base case and this will result in achieving *10* points for Optimized Energy Performance in IGBC rating system for Green Homes.

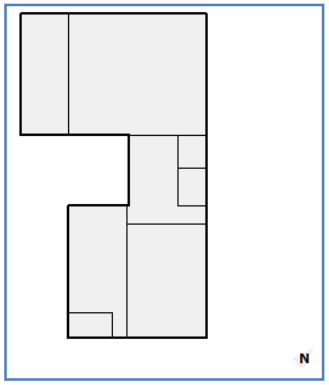
Energy Conservation Features:

Following are the Energy Conservation measures which were selected for the final analysis:

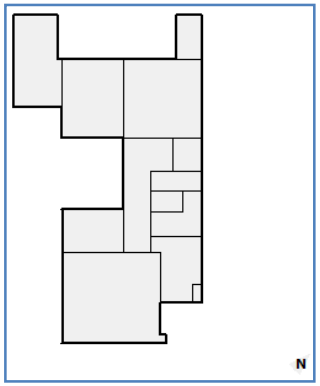
1. *Usage of better thermal properties fly ash brick with 25 MM rock wool insulation for external walls.*
2. *Usage of 25mm XPS insulation and green terrace for better thermal properties of roof.*
3. *Better orientation of envelope with external shading devices such as overhangs and balcony's.*
4. *Better thermal properties of Glass (SGU).*
5. *Efficient VRV units with COP 4.2*
6. *Efficient TFA units to treat fresh air effectively and reduce the heat load.*
7. *Optimize design of external lighting layout to minimize external lighting load by 20%.*

3. Building Model & Geometry:

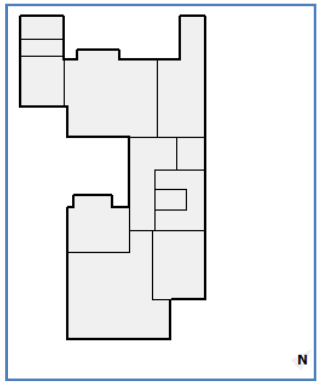




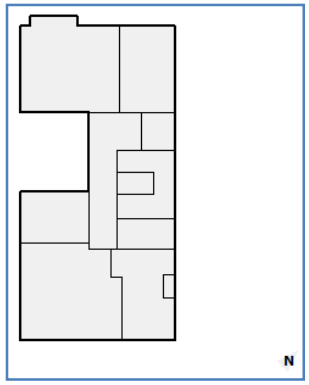
Basement



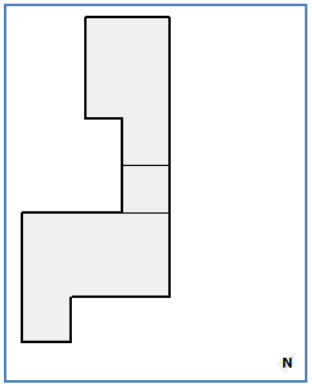
Ground



First



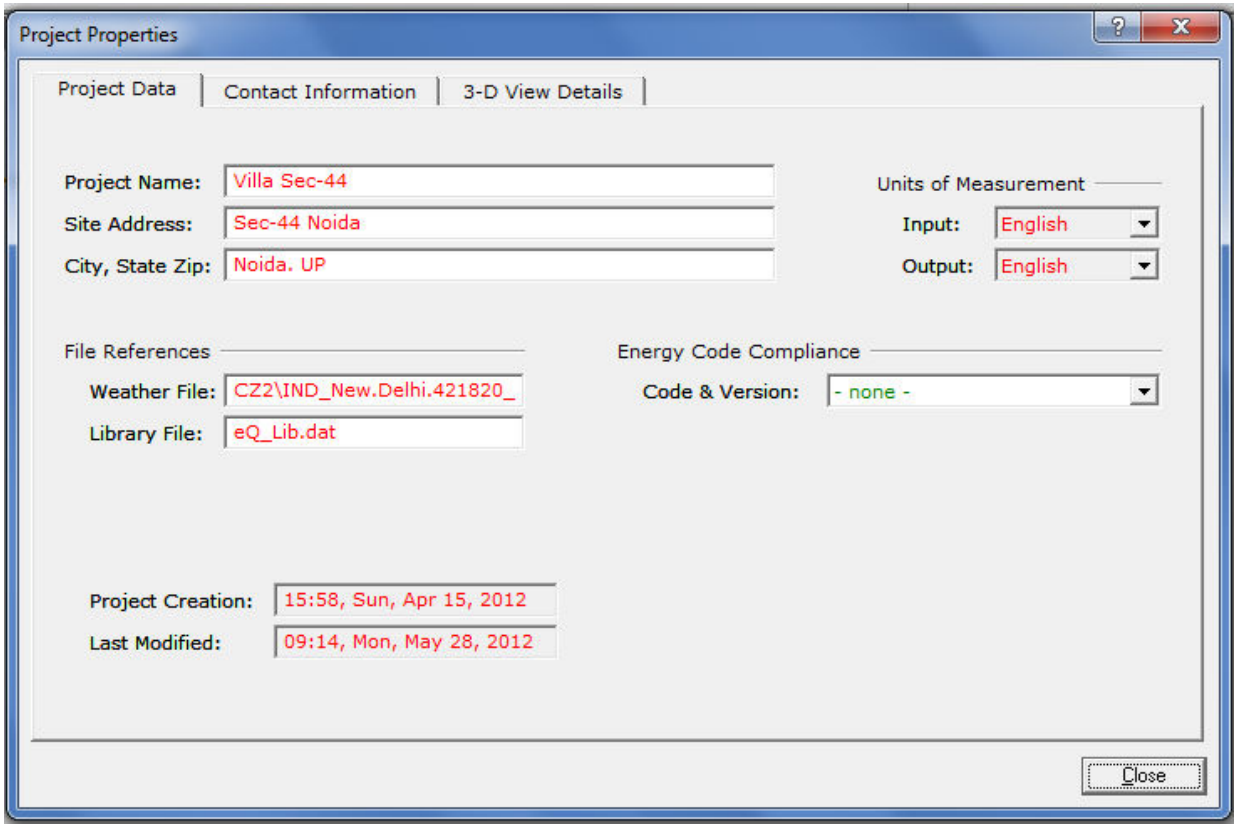
Second



Terrace

4. Weather Data:

The weather data file for city of New.Delhi.421820 was taken from ISHRAE with the following details:



SNAP SHOT of Weather Data Selection

5. Performance Rating Method Compliance Report

Performance Rating Method Compliance Report		
Project Name :	Villa Sec-44	
Project Address :	Noida, UP	
Designer of Record :	Godrej & Boyce	Date: 10-03-2012
Contact Person :	Jayesh Vira	Tel: 022-67961182
City :	Mumbai	
Weather Data : IND_New.Delhi.421820_ISHRAE.bin		
Climate Zone : Moderate		

Space Summary			
Building Use	**Conditioned Area (sf)**	**Unconditioned (sf)**	**Total (sf)**
1. Bed Room	1,272		1,272
2. Living Rooms	312		312
3. Kitchen	190		190
4. Home Theaters	392		392
5. Stairs		453	453
6. Restrooms		933.6	933.6
7. Lobby	700		700
8. Electrical Room		242.3	242.3
9. Store	45		45
10. Lounge	487		487
11. Play & Bar Room	562		562
12. Dining Room	250		250
13. Miscellaneous		261	261
Total	**4,210**	**1,889.9**	**6,099.9**

Advisory Messages			
	Proposed Building Design Case	**Budget Building**	**Difference (Proposed Budget)**
Number of hours heating loads not met (system/plant)	0	0	0
Number of hours Cooling loads not met (system/plant)	0	35	35
Number of warnings	-	-	-
Number of errors	-	-	-
Number of defaults overridden	-	-	-
Description of differences between the budget building and proposed design not documented on other forms :			
Not Applicable			

Additional Building Information	
Quantity of Bldg	1 Bldg's with B+G+2
Simulation Program	eQUEST 3-63
Utility Rate : Electricity	Rs. 6/kWh or $ 0.12/kWh
Utility Rate : Natural Gas	-
Utility Rate : Steam or Hot Water	-
Utility Rate : Chilled Water	-

Table 4: Baseline & Proposed Design Input Parameters

The building was first modeled on the basis of IGBC Green Homes Guidelines specifically incorporating all the requirements of Annexure 1.

The building was simulated with following input parameters:

Comparison of Proposed Design and Baseline Design

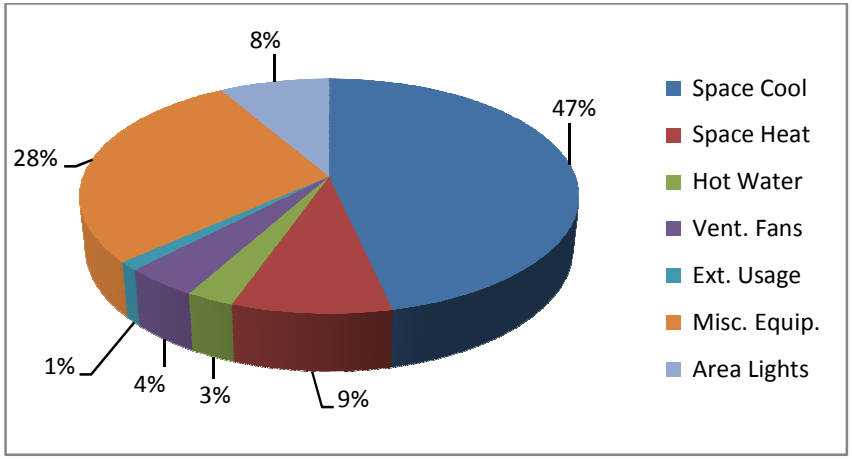
Model Input Parameter	Proposed Design Input	Baseline Design Input
Exterior Wall Construction	U-value of the wall a - 0.099 Btu/hr. sq feet °F or 0.56 W/sqm K (Section Detail Attached Below)	U-value of the wall for composite climate as per green homes guidelines is 0.44 Btu/hr. sq feet °F or 2.5 W/sqm K
Roof Construction	U-value of the roof - 0.11 Btu/hr. sq feet °F or 0.625 W/sqm K (Section Detail Attached Below)	U-value of the roof for composite as per green homes guidelines is 0.21 Btu/hr. sq feet °F or 1.2 W/sqm K
WWR	22%	22%
Fenestration U-factor	0.49 Btu/hr. sq feet °F	U-value of the glass for composite as per green homes guidelines is 1.0 Btu/hr. sq feet °F
Fenestration SHGC	0.40	0.42 (SHGC for composite climate as per green home guidelines)
Fenestration Visible Light Transmittance	0.51	0.51
Shading Devices	Yes (Balcony's and overhangs)	None
Lighting		
Interior Lighting Power Density (W/sf)	Interior Lighting (for residential units) – 5.7 W/sq m Common Area Lighting (for residential units) – 5.9 W/sq m	As per IGBC guidelines-: Interior Lighting (for residential units) – 5.0 W/sq m Common Area Lighting (for residential units) – 4.0 W/sqm
Daylighting Controls	Yes 10% saving consider (Dimmers)	None
Other Lighting Control Credits	None	None
Office Equipment density	Different for different areas Living Rooms : 1.0 W/ft2 Kitchen : 1.5 W/ft2 Bed Rooms : 0.5 W/ft2 Home Theaters: 1.5 W/ft2 Rest Rooms : 0.25 W/ft2	Different for different areas Living Rooms : 1.0 W/ft2 Kitchen : 1.5 W/ft2 Bed Rooms : 0.5 W/ft2 Home Theaters: 1.5 W/ft2 Rest Rooms : 0.25 W/ft2
Exterior Lighting Power (kW)	Total Power = 0.24 kW (20% reduction on external lighting load)	Total Power = 0.3 kW
Process Lighting (kW)	None	None
Elevator Load (KW)	10 KW	10 KW

HVAC system		
Primary HVAC System Type	VRV system with 4.2 COP	Three star rated PTAC units having 2.7 COP as per green homes guidelines.
Fan Control	VRV System – Two Speed	Constant Volume
Other HVAC System Type	None	None
Fan Power	0.000070 kw/cfm	0.000070 kw/cfm
Service Water Heating System	Electric heater to cater 100% load	Electric heater to cater 100% load

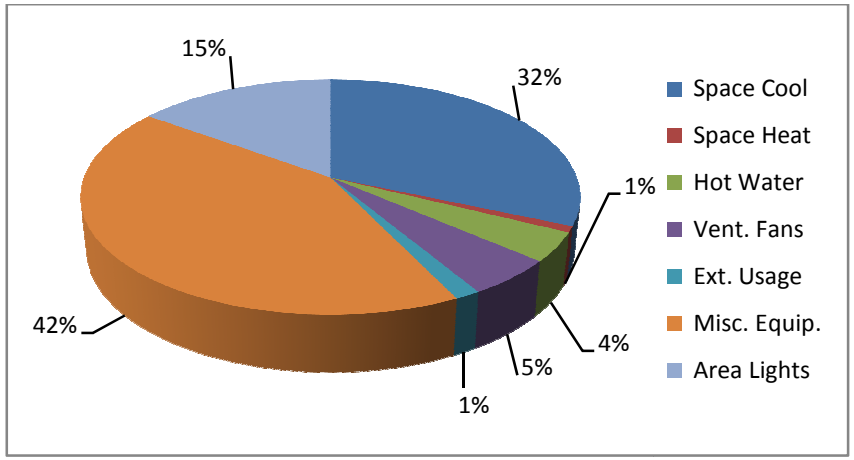
Table -IGBC Green Homes average baseline budget case figures of Annual Energy Consumption

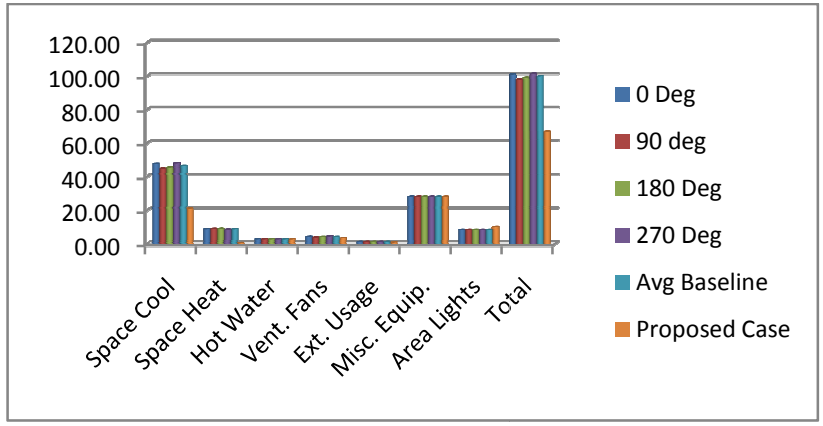
The following tabulated values determine the Average budget case figures of annual energy consumption of the building. The budget case was initially modeled with the original orientation and then again modeled each time by rotating the same to 90, 180 and 270 degrees.

Average Baseline Energy End Usage Characterization



Proposed Energy End Usage Characterization



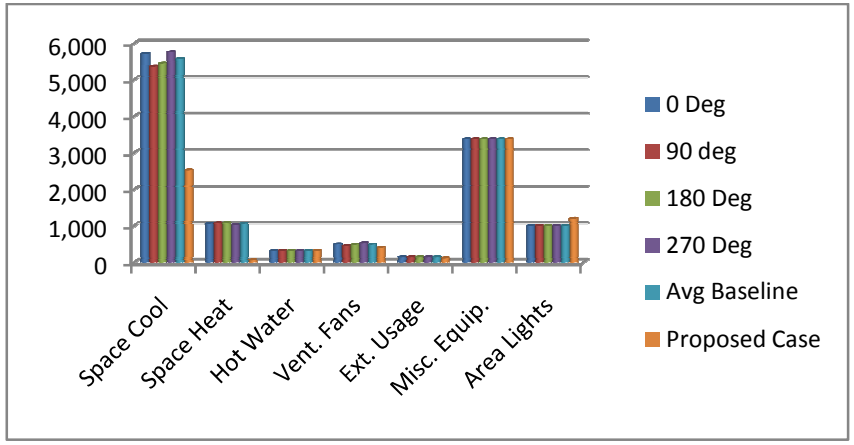


Energy – Use Comparison for all end uses (kWh*1000)

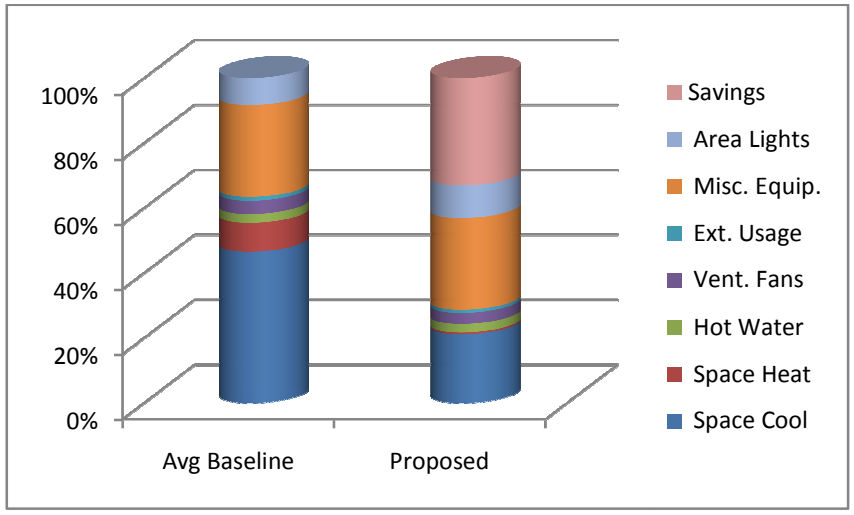
kWh*1000	*0 Deg*	*90 deg*	*180 Deg*	*270 Deg*	Avg Baseline	Proposed Case
Space Cool	47.60	44.75	45.41	47.99	46.44	21.06
Space Heat	8.85	8.98	9.02	8.54	8.85	0.55
Hot Water	2.67	2.67	2.67	2.67	2.67	2.67
Vent. Fans	4.18	3.79	4.10	4.45	4.13	3.38
Ext. Usage	1.18	1.18	1.18	1.18	1.18	0.95
Misc. Equip.	28.17	28.17	28.17	28.17	28.17	28.17
Area Lights	8.36	8.36	8.36	8.36	8.36	10.03
Total	101.01	97.90	98.91	101.36	99.80	66.81
Savings					33.1%	32.99

Energy – Use Comparison for all end uses (Cost $0.12/kWh)

Cost $0.12/kWh	*0 Deg*	*90 deg*	*180 Deg*	*270 Deg*	Avg Baseline	Proposed Case
Space Cool	5,712	5,370	5,449	5,759	5572.50	2,527.20
Space Heat	1,062	1,078	1,082	1,025	1061.70	66.00
Hot Water	320	320	320	320	320.40	320.40
Vent. Fans	502	455	492	534	495.60	405.60
Ext. Usage	142	142	142	142	141.60	114.00
Misc. Equip.	3,380	3,380	3,380	3,380	3380.40	3,380.40
Area Lights	1,003	1,003	1,003	1,003	1003.20	1,203.60
Total	12,121	11,748	11,869	12,163	11,975	8,017
Savings					33.1%	3958.20



Proposed Vs Baseline (kWh*1000)



When proposed model is compared to Green Home Baseline model, 33.1% energy savings can be obtained. The project qualifies to earn 10 IGBC Green Homes points

IGBC Green Homes® SUMMARY

The As Is case (Proposed) model shows a positive overall energy performance as compared with the IGBC Green Homes guidelines stipulated baseline model.

For the purposes of determining IGBC®Green Homes points for Energy and Atmosphere Credit, the energy costs associated with the entire building are considered for the As Is case model and compared to the overall building energy costs for the minimally-compliant model. The end-uses considered are the Lights, Equipment, Heating, Cooling, and Fan energy.

In our case the As Is model has a positive energy performance ***(33.1 %)*** as compared to IGBC baseline model. This will help us to target 10 (Ten) points.

7.1 Annexure – Schedules

Schedules for – Bed Rooms

Occupancy

Day Schedule Name: Bed room Occupancy WD
Type: Fraction

Hourly Values

Mdnt - 1:	1.0000 ratio	8-9 am:	0.0000 ratio	4-5 pm:	0.0000 ratio
1-2 am:	1.0000 ratio	9-10 am:	0.0000 ratio	5-6 pm:	0.0000 ratio
2-3 am:	1.0000 ratio	10-11 am:	0.0000 ratio	6-7 pm:	0.0000 ratio
3-4 am:	1.0000 ratio	11-noon:	0.0000 ratio	7-8 pm:	0.0000 ratio
4-5 am:	1.0000 ratio	noon-1:	0.0000 ratio	8-9 pm:	0.0000 ratio
5-6 am:	1.0000 ratio	1-2 pm:	0.0000 ratio	9-10 pm:	0.0000 ratio
6-7 am:	1.0000 ratio	2-3 pm:	0.2500 ratio	10-11 pm:	0.0000 ratio
7-8 am:	1.0000 ratio	3-4 pm:	0.2500 ratio	11-Mdnt:	1.0000 ratio

Equipment

Day Schedule Name: Bed room Equipment WD
Type: Fraction

Hourly Values

Mdnt - 1:	0.0000 ratio	8-9 am:	0.0000 ratio	4-5 pm:	0.0000 ratio
1-2 am:	0.0000 ratio	9-10 am:	0.0000 ratio	5-6 pm:	0.0000 ratio
2-3 am:	0.0000 ratio	10-11 am:	0.0000 ratio	6-7 pm:	0.0000 ratio
3-4 am:	0.0000 ratio	11-noon:	0.0000 ratio	7-8 pm:	0.8000 ratio
4-5 am:	0.0000 ratio	noon-1:	0.0000 ratio	8-9 pm:	0.8000 ratio
5-6 am:	0.0000 ratio	1-2 pm:	0.0000 ratio	9-10 pm:	0.8000 ratio
6-7 am:	0.9000 ratio	2-3 pm:	0.0000 ratio	10-11 pm:	0.8000 ratio
7-8 am:	0.9000 ratio	3-4 pm:	0.0000 ratio	11-Mdnt:	0.8000 ratio

Lighting

Day Schedule Name: Bed room Lighting WD
Type: Fraction

Hourly Values

Mdnt - 1:	0.0000 ratio	8-9 am:	0.0000 ratio	4-5 pm:	0.0000 ratio
1-2 am:	0.0000 ratio	9-10 am:	0.0000 ratio	5-6 pm:	0.0000 ratio
2-3 am:	0.0000 ratio	10-11 am:	0.0000 ratio	6-7 pm:	0.0000 ratio
3-4 am:	0.0000 ratio	11-noon:	0.0000 ratio	7-8 pm:	0.8000 ratio
4-5 am:	0.0000 ratio	noon-1:	0.0000 ratio	8-9 pm:	0.8000 ratio
5-6 am:	0.0000 ratio	1-2 pm:	0.0000 ratio	9-10 pm:	0.8000 ratio
6-7 am:	0.9000 ratio	2-3 pm:	0.0000 ratio	10-11 pm:	0.8000 ratio
7-8 am:	0.9000 ratio	3-4 pm:	0.0000 ratio	11-Mdnt:	0.8000 ratio

Fan

Day Schedule Name: Bed room HVAC Fan WD
Type: On/Off

Hourly Values

Mdnt - 1:	1	8-9 am:	0	4-5 pm:	0
1-2 am:	1	9-10 am:	0	5-6 pm:	0
2-3 am:	1	10-11 am:	0	6-7 pm:	0
3-4 am:	1	11-noon:	0	7-8 pm:	0
4-5 am:	1	noon-1:	0	8-9 pm:	0
5-6 am:	1	1-2 pm:	0	9-10 pm:	0
6-7 am:	1	2-3 pm:	1	10-11 pm:	0
7-8 am:	1	3-4 pm:	1	11-Mdnt:	1

B. Schedules for Living Rooms

Space Cooling

Day Schedule Name: Bed room Cooling WD
Type: Temperature

Hourly Values

Mdnt - 1:	78.0	°F	8-9 am:	85.0	°F	4-5 pm:	85.0	°F
1-2 am:	78.0	°F	9-10 am:	85.0	°F	5-6 pm:	85.0	°F
2-3 am:	78.0	°F	10-11 am:	85.0	°F	6-7 pm:	85.0	°F
3-4 am:	78.0	°F	11-noon:	85.0	°F	7-8 pm:	85.0	°F
4-5 am:	78.0	°F	noon-1:	85.0	°F	8-9 pm:	85.0	°F
5-6 am:	78.0	°F	1-2 pm:	85.0	°F	9-10 pm:	85.0	°F
6-7 am:	78.0	°F	2-3 pm:	78.0	°F	10-11 pm:	85.0	°F
7-8 am:	78.0	°F	3-4 pm:	78.0	°F	11-Mdnt:	78.0	°F

Occupancy

Day Schedule Name: Living Room Occupancy WD
Type: Fraction

Hourly Values

Mdnt - 1:	0.0000	ratio	8-9 am:	0.3000	ratio	4-5 pm:	0.2000	ratio
1-2 am:	0.0000	ratio	9-10 am:	0.3000	ratio	5-6 pm:	0.2000	ratio
2-3 am:	0.0000	ratio	10-11 am:	0.3000	ratio	6-7 pm:	0.4500	ratio
3-4 am:	0.0000	ratio	11-noon:	0.3000	ratio	7-8 pm:	0.4500	ratio
4-5 am:	0.0000	ratio	noon-1:	0.5000	ratio	8-9 pm:	0.4500	ratio
5-6 am:	0.0000	ratio	1-2 pm:	0.5000	ratio	9-10 pm:	1.0000	ratio
6-7 am:	0.0000	ratio	2-3 pm:	0.2000	ratio	10-11 pm:	1.0000	ratio
7-8 am:	0.1500	ratio	3-4 pm:	0.2000	ratio	11-Mdnt:	0.3500	ratio

Space Heating

Day Schedule Name: Bed room Heating WD
Type: Temperature

Hourly Values

Mdnt - 1:	70.0	°F	8-9 am:	65.0	°F	4-5 pm:	65.0	°F
1-2 am:	70.0	°F	9-10 am:	65.0	°F	5-6 pm:	65.0	°F
2-3 am:	70.0	°F	10-11 am:	65.0	°F	6-7 pm:	65.0	°F
3-4 am:	70.0	°F	11-noon:	65.0	°F	7-8 pm:	65.0	°F
4-5 am:	70.0	°F	noon-1:	65.0	°F	8-9 pm:	65.0	°F
5-6 am:	70.0	°F	1-2 pm:	65.0	°F	9-10 pm:	65.0	°F
6-7 am:	70.0	°F	2-3 pm:	70.0	°F	10-11 pm:	65.0	°F
7-8 am:	70.0	°F	3-4 pm:	70.0	°F	11-Mdnt:	70.0	°F

Lighting

Day Schedule Name: Living Room Lighting WD
Type: Fraction

Hourly Values

Mdnt - 1:	0.0050	ratio	8-9 am:	0.6500	ratio	4-5 pm:	0.0000	ratio
1-2 am:	0.0050	ratio	9-10 am:	0.0000	ratio	5-6 pm:	0.2000	ratio
2-3 am:	0.0050	ratio	10-11 am:	0.0000	ratio	6-7 pm:	0.6000	ratio
3-4 am:	0.0050	ratio	11-noon:	0.0000	ratio	7-8 pm:	1.0000	ratio
4-5 am:	0.0050	ratio	noon-1:	0.0000	ratio	8-9 pm:	1.0000	ratio
5-6 am:	0.0050	ratio	1-2 pm:	0.0000	ratio	9-10 pm:	1.0000	ratio
6-7 am:	0.0050	ratio	2-3 pm:	0.0000	ratio	10-11 pm:	1.0000	ratio
7-8 am:	0.8000	ratio	3-4 pm:	0.0000	ratio	11-Mdnt:	1.0000	ratio

Equipment

Day Schedule Name: Living Room Equipment WD
Type: Fraction

Hourly Values

Mdnt - 1:	0.0100 ratio	8-9 am:	0.3500 ratio	4-5 pm:	0.2500 ratio
1-2 am:	0.0100 ratio	9-10 am:	0.8500 ratio	5-6 pm:	0.2500 ratio
2-3 am:	0.0100 ratio	10-11 am:	0.8500 ratio	6-7 pm:	0.4500 ratio
3-4 am:	0.0100 ratio	11-noon:	0.8500 ratio	7-8 pm:	0.8500 ratio
4-5 am:	0.0100 ratio	noon-1:	0.8500 ratio	8-9 pm:	0.8500 ratio
5-6 am:	0.0100 ratio	1-2 pm:	0.8500 ratio	9-10 pm:	0.7000 ratio
6-7 am:	0.0100 ratio	2-3 pm:	0.2500 ratio	10-11 pm:	0.5000 ratio
7-8 am:	0.3500 ratio	3-4 pm:	0.2500 ratio	11-Mdnt:	0.3500 ratio

Space Cooling

Day Schedule Name: Living Room Cooling WD
Type: Temperature

Hourly Values

Mdnt - 1:	85.0 °F	8-9 am:	85.0 °F	4-5 pm:	78.0 °F
1-2 am:	85.0 °F	9-10 am:	85.0 °F	5-6 pm:	78.0 °F
2-3 am:	85.0 °F	10-11 am:	85.0 °F	6-7 pm:	78.0 °F
3-4 am:	85.0 °F	11-noon:	78.0 °F	7-8 pm:	78.0 °F
4-5 am:	85.0 °F	noon-1:	78.0 °F	8-9 pm:	78.0 °F
5-6 am:	85.0 °F	1-2 pm:	78.0 °F	9-10 pm:	78.0 °F
6-7 am:	85.0 °F	2-3 pm:	78.0 °F	10-11 pm:	85.0 °F
7-8 am:	85.0 °F	3-4 pm:	78.0 °F	11-Mdnt:	85.0 °F

Fan

Day Schedule Name: Living Room HVAC Fan WD
Type: On/Off

Hourly Values

Mdnt - 1:	0	8-9 am:	0	4-5 pm:	1
1-2 am:	0	9-10 am:	0	5-6 pm:	1
2-3 am:	0	10-11 am:	0	6-7 pm:	1
3-4 am:	0	11-noon:	1	7-8 pm:	1
4-5 am:	0	noon-1:	1	8-9 pm:	1
5-6 am:	0	1-2 pm:	1	9-10 pm:	1
6-7 am:	0	2-3 pm:	1	10-11 pm:	0
7-8 am:	0	3-4 pm:	1	11-Mdnt:	0

Space Heating

Day Schedule Name: Living Room Heating WD
Type: Temperature

Hourly Values

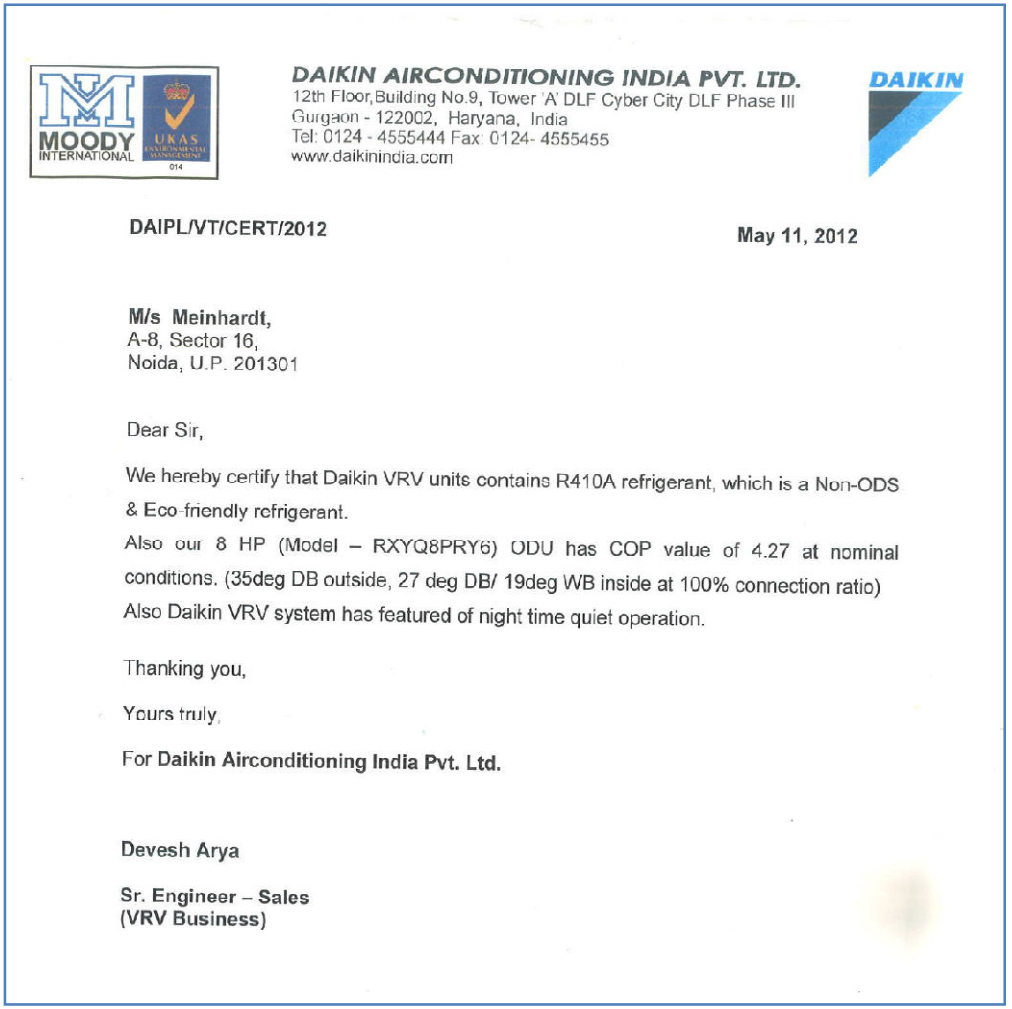
Mdnt - 1:	65.0 °F	8-9 am:	65.0 °F	4-5 pm:	70.0 °F
1-2 am:	65.0 °F	9-10 am:	65.0 °F	5-6 pm:	70.0 °F
2-3 am:	65.0 °F	10-11 am:	65.0 °F	6-7 pm:	70.0 °F
3-4 am:	65.0 °F	11-noon:	70.0 °F	7-8 pm:	70.0 °F
4-5 am:	65.0 °F	noon-1:	70.0 °F	8-9 pm:	70.0 °F
5-6 am:	65.0 °F	1-2 pm:	70.0 °F	9-10 pm:	70.0 °F
6-7 am:	65.0 °F	2-3 pm:	70.0 °F	10-11 pm:	65.0 °F
7-8 am:	65.0 °F	3-4 pm:	70.0 °F	11-Mdnt:	65.0 °F

Wall and Roof Section Details-:

WALL COMPOSITION				
Item	Thickness (mm)	Thickness (Inch)	R Value per inch (hrSq.ft°F/Btu)	R Value (hrSq.ft°F/Btu)
External Air				0.250
Plaster	20	0.787	0.2	0.157
Fly Ash Brick	230	9.055	0.35	3.169
Rock Wool Slab	25	0.984	5.8	5.709
Plaster	15	0.591	0.2	0.118
Internal Air	-			0.680
Total R Value				10.084
U Value (Btu/hrft²°F)				0.099

ROOF ASSEMBLY				
Particulars	Thickness (mm)	Thickness (Inch)	R Value per inch (hrSq.ft°F/Btu)	R Value (hrSq.ft°F/Btu)
External Air	-			0.25
Cement Plaster	20	0.787	0.2	0.16
Water Proofing	0	0.000		0.06
RCC Slab	150	5.906	0.11	0.65
XPS Insulation	25	0.984	5.2	5.12
Terrace Garden	300	11.811	0.167	1.97
Internal Air		0.000		0.92
Total R Value				9.13
U Value (Btu/hr-ft²°F)				0.11

Chiller Cut Sheet-:



DAIKIN AIRCONDITIONING INDIA PVT. LTD.
12th Floor, Building No.9, Tower 'A' DLF Cyber City DLF Phase III
Gurgaon - 122002, Haryana, India
Tel: 0124 - 4555444 Fax: 0124- 4555455
www.daikinindia.com

DAIPL/VT/CERT/2012

May 11, 2012

M/s Meinhardt,
A-8, Sector 16,
Noida, U.P. 201301

Dear Sir,

We hereby certify that Daikin VRV units contains R410A refrigerant, which is a Non-ODS & Eco-friendly refrigerant.

Also our 8 HP (Model – RXYQ8PRY6) ODU has COP value of 4.27 at nominal conditions. (35deg DB outside, 27 deg DB/ 19deg WB inside at 100% connection ratio)

Also Daikin VRV system has featured of night time quiet operation.

Thanking you,

Yours truly,

For Daikin Airconditioning India Pvt. Ltd.

Devesh Arya

Sr. Engineer – Sales
(VRV Business)