GRIHA V 2015
Building Envelope

GRIHA Council
February 2016

Overview of Changes in GRIHA V 2015

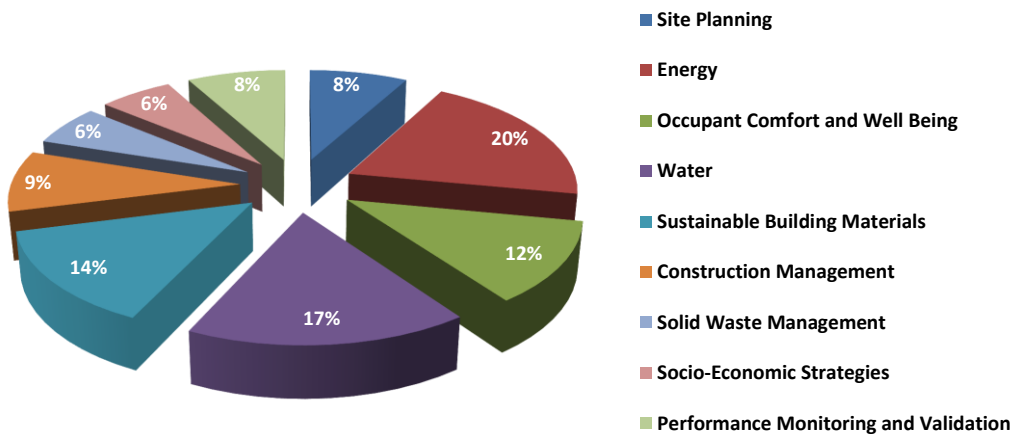
- Change in Rating Structure
- Revised Point Weightages

Change in Rating Structure

- The GRIHA V 2015 has 30 criteria + Innovation.
- Total points = 100 (+ 4 for innovation)

New Point Weightages

Based on AHP survey



Overview of Changes in GRIHA V 2015

- Change in Rating Structure
- Revised Point Weightages
- **Shift towards Sustainable Building Rating System**

Sections	Cr. No.	Criterion Name
Socio-Economic Strategies	24	Labour safety and sanitation
	25	Design for Universal Accessibility
	26	Dedicated facilities for service staff
	27	Increase in environmental awareness
Performance Monitoring and Validation	28	Smart metering and monitoring

Overview of Changes in GRIHA V 2015

- Change in Rating Structure
- Revised Point Weightages
- Shift towards Sustainable Building Rating System
- **No points for Mandatory Appraisals**
- **New Rating Thresholds**

New Rating Thresholds

New Rating Thresholds	GRIHA Rating
25 – 40	1 star
41 – 55	2 star
56 – 70	3 star
71 – 85	4 star
86 or more	5 star

Overview of Changes in GRIHA V 2015

- Change in Rating Structure
- New Rating Thresholds
- Shift towards Sustainable Building Rating System
- No points for Mandatory Appraisals
- Revised Point Weightages
- **Non-Linear point distribution**

Non-Linear Point Distribution (example)

Reduction in Landscape water requirement in design case versus base case	GRIHA V 2015	GRIHA V3 (previous)
30%	1	1
40%	2	2
50%	4	3

Overview of Changes in GRIHA V 2015

- Change in Rating Structure
- New Rating Thresholds
- Shift towards Sustainable Building Rating System
- No points for Mandatory Appraisals
- Revised Point Weightages
- Non-Linear point distribution
- New Criteria
- Restructured Criteria
- Technical Revisions in the criteria

GRIHA V 2015
Criteria on Building Envelope

Criterion 2: Low-impact design

Maximum Points: 4

Appraisals:

2.1.1: Demonstrate reduction in environmental impact through design by adoption of various passive design and low-impact site planning strategies.

No. of strategies adopted	Points
2	1
3	2
4	4

Criterion 3: Design to mitigate UHIE

Maximum Points: 2

Appraisals:

- 3.1.1 – 3.1.2: More than **25%/50%** of the site surfaces visible to sky ***(including building roofs but not the landscape area)*** are either ***soft paved/covered with high SRI coating (SRI > 0.5)/shaded by trees/shaded by vegetated pergolas/shaded by solar panels or any combination of these strategies*** – **1/2 point(s)**

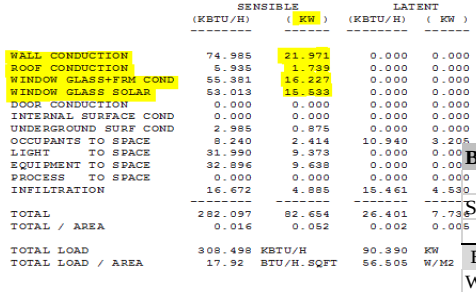
Criterion 8: Energy Efficiency

Maximum Points: 13

Appraisals:

- 8.1.2: Peak heat gain through building envelope (for each AC building individually) should meet the GRIHA Building Envelope Peak Heat Gain Factor thresholds – **2 points**

GRIHA Thresholds for Building Envelope Peak Heat Gain Factor (W/sqm)	
Climate	Threshold
Composite/Hot & Dry	40
Warm and Humid	35
Moderate	30



	SENSIBLE (KBTU/H)	SENSIBLE (KW)	LATENT (KBTU/H)	LATENT (KW)	
WALL CONDUCTION	74.985	21.971	0.000	0.000	
ROOF CONDUCTION	5.935	1.739	0.000	0.000	
WINDOW GLASS+FRM COND	55.381	16.227	0.000	0.000	
WINDOW GLASS SOLAR	53.013	15.533	0.000	0.000	
DOOR CONDUCTION	0.000	0.000	0.000	0.000	
INTERNAL SURFACE COND	0.000	0.000	0.000	0.000	
UNDERGROUND SURF COND	2.985	0.875	0.000	0.000	
OCCUPANTS TO SPACE	8.240	2.414	10.940	3.205	
LIGHT TO SPACE	31.990	9.373	0.000	0.000	
EQUIPMENT TO SPACE	32.896	9.638	0.000	0.000	
PROCESS TO SPACE	0.000	0.000	0.000	0.000	
INFILTRATION	16.672	4.885	15.461	4.530	
TOTAL	282.097	82.654	26.401	7.736	
TOTAL / AREA	0.016	0.052	0.002	0.005	
TOTAL LOAD	308.498	KBTU/H	90.390	KW	
TOTAL LOAD / AREA	17.92	BTU/H.SQFT	56.505	W/M2	

Figure 1: Simulation Results example

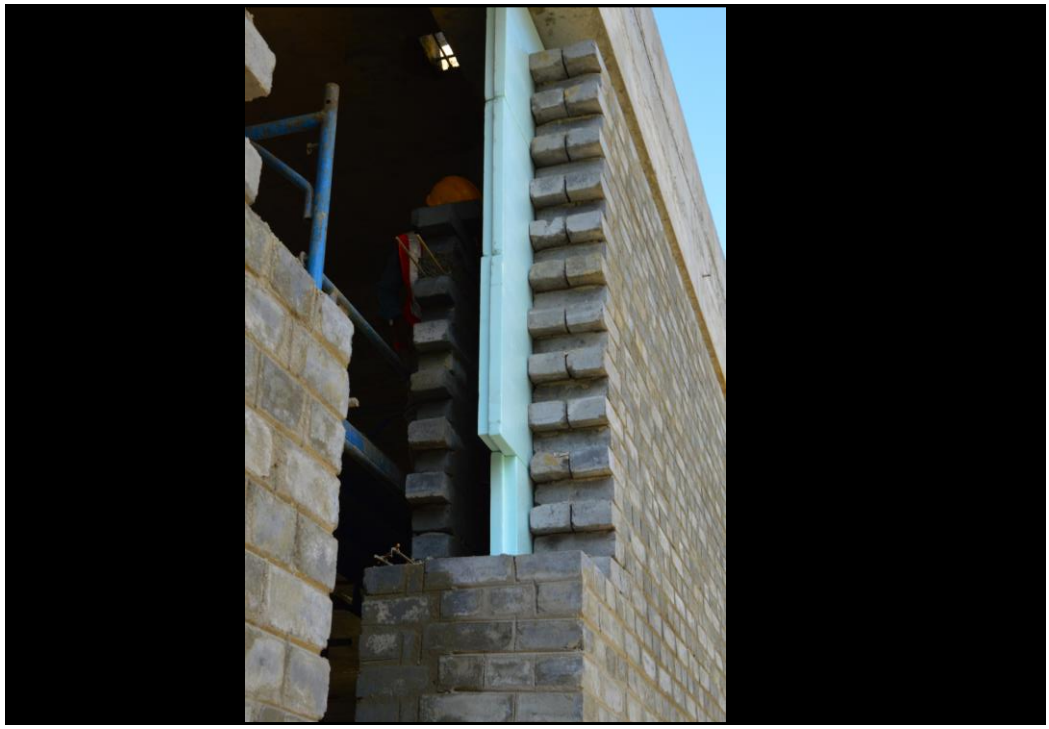
Building Envelope Peak Gain Components (Watts)	
Simulation done for:	(time,day,month)
Building Envelope Heat Gain	(Watts)
Wall Conduction Gains	21971
Roof Conduction Gains	1739
Window Glass+Frame Conduction Gains	16227
Window Glass Solar Gains	15533
Total	**55470**
Envelope Area (sqm)	2000
Heat gain/ Envelope Area (W/m2)	27.74

Figure 2: Calculator for Building Envelope Peak Heat Gain Factor

- 8.1.4: Demonstrate (through simulations) that project EPI is below GRIHA benchmark# - Mandatory
- 8.1.5: Additional reduction in EPI will be awarded points as mentioned below:

Reduction from EPI benchmark	Points
10%	2
20%	3
30%	5
40%	7
50%	10

Energy Performance Index Benchmarks (EPI) – (kWh/ m^2/year)		
Climate Classification	Day time occupancy	24 hours Occupancy
	5 Days a week	7 Days a week
Commercial/Institutional/Academic/Hospital buildings		
Moderate	75	225
Composite / Warm and humid / hot and dry	90	300
Residential buildings/Hostels		
Moderate	50	
Composite / Warm and humid / hot and dry	70	



Criterion 11: Achieving indoor comfort requirements (visual/thermal/acoustic)

Partly Mandatory

Maximum Points: 6

Appraisals:

11.1.1: Demonstrate compliance with either of the two Alternatives to demonstrate reduction in heat gain through fenestrations and provision of sufficient daylight in indoor living areas – Partly Mandatory

Alternative 1:

- WWR <= 60%
- SRR <= 5%
- All fenestrations must comply with one of the following:
  - SHGC requirement of ECBC-2007/Weighted Façade average SHGC (for each orientation) meets SHGC requirements of ECBC-2007
  - Shading as per SP -41
  - Shading to ensure that the window is completely shaded for the duration between 10:00 am on 1st April to 15:00 on 30th September
- At least 25% of living area should achieve Daylight Factors as mentioned in SP 41
- More than 50%/75% of living areas meet DF as per SP 41 – 2 / 4 points

Alternative 2:

- Demonstrate that the mean DA requirements (300* lux or more) are met over the total living area for at least 25% of total annual analysis hours (annual analysis hours – 800 to 1800 each day) – Mandatory
- Demonstrate that the mean DA requirements (3000 lux or more) are never exceeded over the total living area for across the total annual analysis hours (annual analysis hours – 800 to 1800 each day) – Mandatory
- Demonstrate that the mean DA requirements (300* lux or more) are met over the total living area for at least 50%/75% of total annual analysis hours (annual analysis hours – 800 to 1800 each day) – 2/4 points

** For residential typologies, the DA limit is 100 lux*


INFOSYS, Hyderabad

11.1.3: Demonstrate that project can achieve the thermal comfort requirements of NBC 2005 OR ASHRAE 55 OR requirement of ***Indian Adaptive Comfort Model*** as mentioned in Appendix 1 – Mandatory

11.1.4: The indoor noise levels should be within the acceptable limits as specified in NBC 2005 and key noise source on site (like DG sets, chiller plants etc.) should have sufficient acoustic insulation as per NBC 2005 norms - 2 points

Sound Insulation dB	Building component	Specifications
26 to 33	Wall/partition	Plywood or wood fibre board 12 mm thick nailed both sides of 50 mm x 50 mm timber framing members spaced at 400 mm centres.
43 to 50	Wall/partition	Solid Autoclaved Aerated concrete block 215 mm thick plaster or dry lined finish on both sides, blockwork joints well filled. Overall mass per unit area should be greater than 160 kg/sq.m.
50 to 54	Wall/partition	Brick wall nominal 230 mm thickness, weight more than 380 kg/sq.m. all joints should be filled and well finished
50 to 54	Wall/partition	Autoclaved aerated concrete block cavity wall consisting of two leaves, 100 mm blocks not less than 75 mm apart. Overall mass per unit area should be more than 150 kg/sq.m.
49 to 54	Floor	A concrete floor having mass per unit area more than 365 kg/sq.m.
49 to 54	Floor	A solid floor consisting of hollow concrete planks; together with a floating floor. The slab should have a mass per unit area of 300 kg/sq.m. or more.

Source:National Building Code(2005), Part 8, Section 4.

Thank You

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