Circulars - Quality Control Division in force

601(a)	7.06.08	Stage of construction - Apartments
602(a)	10.6.08	Stage of construction - Bungalows
603(a)	12.7.08	Inspecting stages of construction
604(a)	12.7.08	Quality control check
605(a)	12.11.08	Steel and concrete testing
606(a)	12.11.08	Consultants Reports
607(a)	11.02.09	Penalty for defaults and mistakes
608(a)	7.09.09	GI pipes and fittings.
609(a)	21.04.2010	QC check – revised guidelines and format of reports

Circular No. 601(a) – Quality Control Date: 07.06.2008

Sub.: Quality Control: Stages for inspection. – Apartments.

Project Managers (for apartments) shall ensure that the quality control team inspects each stage of construction and submits their report on each of the following stages.

The QC team shall make their reports in the prescribed format and send it to the HO. A copy of the report shall be forwarded to the Project Managers for corrections & comments. The Project Managers shall extend full co-operation to the QC Team and provide an assistant whenever requested. The QC team shall endeavor to complete their work without disturbing the work at site and submit a confidential report to the HO. The site engineers & supervisors will not interfere or influence their work. The Project Manager shall sign a copy of the report to certify that the report was made at site on the date mentioned.

The QC team inspection shall become mandatory for all sites from 15th July 2008. Till such time the QC team shall inspect the existing construction at all sites.

Apartments

1. Block marking. The following shall be checked:
   a. Site dimensions
   b. Distance of compound wall from centre of public road
   c. Block dimensions and diagonals
   d. Setbacks of each block from the boundary
   e. Setback between each block
   f. TOT lot dimensions and areas
   g. Reference FFL level marking on compound wall
   h. Condition of tools like tapes, auto leveler, etc.

2. Before casting footings. The following shall be checked:
   a. Pit size and depth
   b. Quality of PCC
   c. Footing size and depth
   d. Mat size, development length for mat & footings
   e. Steel
   f. Pegs for centerline marking
   g. Spacing between footing
   h. Quality of centering
   i. Size and position of covering blocks
   j. Condition of tools like tapes, auto leveler, etc.
   k. Curing

3. After casting footings and pedestals. The following shall be checked:
   a. Centerline & diagonal check as per check plan

b. Size of pedestals
c. Plumb of pedestals
d. Covering
e. Height of pedestals wrt FFL
f. Quality of centering, rod bending and concreting
g. Curing

4. After casting columns and before starting centering for each slab. The following shall be checked:
   a. Centerline and diagonal as per diagonal check plan
   b. Column size and column height of each column
   c. Plumb of columns
   d. Level marking on each column
   e. Steel
   f. Plinth beam & slabs dimensions check.
   g. Quality of centering, rod bending and concreting
   h. Curing

5. Before casting each slab and after completion of centering and rod bending work. The following shall be checked:
   a. Slab dimensions & levels
   b. Position of beams
   c. Steel
   d. Electrical
   e. Size and position of covering blocks
   f. Quality of centering, rod bending and concreting
   g. Scaffolding for safety
   h. Staircase marking
   i. Lift duct size
   j. Curing

6. After brickwork of each flat and before plastering. The following shall be checked:
   a. Thickness of brick wall & beds
   b. Chicken Mesh
   c. Dimensions and diagonal of each room
   d. Lentil and sill level check of each door and window
   e. Size, plumb line, holdfast and parallel check of each door frame
   f. Platform and loft heights & thickness
   g. Template size, plumb and depth check
   h. Chajja size and slope
   i. Height of each room
   j. Plumb line of walls
   k. Alignment of columns and beams with walls
   l. Motor mix ratio
   m. Provision of measurement boxes
   n. Slab cleaning and wastage

o. Storage of bricks, sand and cement
p. Edges and corner lines
q. Quality of plastering
r. Curing

7. After brick work and plastering and before finishing works. The following shall be checked:
   a. Sand screening and motor mix ratio
   b. Use of recron
   c. Provision of measurement boxes
   d. 9” provision for skirting
   e. Single coat for bathrooms and kitchen for tiles
   f. Electrical points - nos., height, positions and plumb line
   g. GI and PVC fittings - nos., height, positions and plumb line
   h. Waterproofing quality and height
   i. Slab cleaning and wastage
   j. Storage of bricks, sand and cement
   k. Quality of plastering
   l. Edges and corner lines
   m. Grooves for door frames
   n. Curing
   o. Windows check with templates.

Managing Director.

Circular No. 602(a) – Quality Control Date: 10.06.2008

Sub.: Quality Control: Stages for inspection. – Bungalows.

Project Managers (for Bungalows) shall ensure that the quality control team inspects each stage of construction and submits their report on each of the stages given below.

The QC team shall make their reports in the prescribed format and send it to the HO. A copy of the report shall be forwarded to the Project Managers for corrections & comments. The Project Managers shall extend full co-operation to the QC Team and provide an assistant whenever requested. The QC team shall endeavor to complete their work without disturbing the work at site and submit a confidential report to the HO. The site engineers & supervisors will not interfere or influence their work. The Project Manager shall sign a copy of the report to certify that the report was made at site on the date mentioned.

The QC team inspection shall become mandatory for all sites from 15th July 2008. Till such time the QC team shall inspect the existing construction at all sites.

<u>Bungalows</u>

8. Layout marking. The following shall be checked:
    a. Site dimensions
    b. Distance of compound wall from centre of public road
    c. Plot dimensions and diagonals
    d. Road widths.
    e. TOT lot dimensions and areas
    f. Reference FFL level marking on compound wall
    g. Condition of tools like tapes, auto leveler, etc.

9. Before casting footings. The following shall be checked:
    a. Pit size and depth
    b. Quality of PCC
    c. Footing size and depth
    d. Mat size, development length for mat & footings
    e. Steel
    f. Pegs for centerline marking
    g. Spacing between footing
    h. Quality of centering
    i. Size and position of covering blocks
    j. Condition of tools like tapes, auto leveler, etc.
    k. Curing

10. After casting footings and pedestals. The following shall be checked:
    a. Centerline & diagonal check as per check plan
    b. Size of pedestals

c. Plumb of pedestals
d. Covering
e. Height of pedestals wrt FFL
f. Quality of centering, rod bending and concreting
g. Curing

11. After casting columns and before starting centering for each slab. The following shall be checked:
    a. Centerline and diagonal as per diagonal check plan
    b. Column size and column height of each column
    c. Plumb of columns
    d. Level marking on each column
    e. Steel
    f. Plinth beam & slabs dimensions check.
    g. Quality of centering, rod bending and concreting
    h. Curing

12. Before casting each slab and after completion of centering and rod bending work. The following shall be checked:
    a. Slab dimensions & levels
    b. Position of beams
    c. Steel
    d. Electrical
    e. Size and position of covering blocks
    f. Quality of centering, rod bending and concreting
    g. Scaffolding for safety
    h. Staircase marking
    i. Curing

13. After brickwork of each bungalow and before plastering. The following shall be checked:
    a. Thickness of brick wall & beds
    b. Chicken Mesh
    c. Dimensions and diagonal of each room
    d. Lentil and sill level check of each door and window
    e. Size, plumb line, holdfast and parallel check of each door frame
    f. Platform and loft heights & thickness
    g. Template size, plumb and depth check
    h. Chajja size and slope
    i. Height of each room
    j. Plumb line of walls
    k. Alignment of columns and beams with walls
    l. Motor mix ratio
    m. Provision of measurement boxes
    n. Slab cleaning and wastage
    o. Storage of bricks, sand and cement

p. Edges and corner lines
q. Curing

14. After brick work and plastering and before finishing works. The following shall be checked:
    a. Sand screening and motor mix ratio
    b. Use of recron
    c. Provision of measurement boxes
    d. 9” provision for skirting
    e. Single coat for bathrooms and kitchen for tiles
    f. Electrical points - nos., height, positions and plumb line
    g. GI and PVC fittings - nos., height, positions and plumb line
    h. Waterproofing quality and height
    i. Slab cleaning and wastage
    j. Storage of bricks, sand and cement
    k. Quality of plastering
    l. Edges and corner lines
    m. Grooves for door frames
    n. Curing
    o. Windows check with templates.

Managing Director.

Circular No. 603(a) – Quality Control Date: 12.07.2008

All Project Managers shall ensure that Quality Control Team inspects the following stages of construction from 21st July 2008 onwards

a. Before casting footings
b. After casting columns and before starting centering for slabs for all floors.
c. After finishing brick work including door frames, templates, chajjas, chicken mesh, lofts, platforms, etc., and before starting plastering.

Older constructions shall be exempted from the Q.C. inspection for these three stages. However, for new constructions, inspection shall be done for these 3 stages as follows:

a. PMR – all stages of D Block
b. MFH – All Blocks except B block south wing.
c. GMG – Nil
d. SOB III – all Bungalows
e. KNM – all Bungalows
f. MNM – all Bungalows
g. Greenwoods – all Blocks

Srujan shall be overall in-charge of Quality Control and Vijay Raj shall assist him in his work. Broadly, Srujan shall be responsible for KNM, PMR, MNM & GWE and Vijay Raj is responsible for SOB, MFH and GMG. However, upto the month end Satya Chari shall undertake the Q.C. for SOB. Project Managers shall send an SMS to the Q.C. team requesting for inspection atleast one day in advance. Q.C. team shall ensure that inspection is done promptly so that work does not get held up.

Quality Control team shall report to the Head Office on Saturday to ensure that all reports are filed in order. A copy of each report shall be sent to the respective Project Manager

Managing Director.

Circular No. 604(a) – Quality Control Date: 15.11.2008

Sub.: RCC work procedure.

After discussion with structural engineers and our site engineers some basic guidelines, procedures and precautions that are to be followed at all sites are given below:

a. Quality Control (QC) inspection should be done one day before the inspection by structural engineers and two days before casting the slab. Structural engineer inspection should be held atleast one day before casting the slab.
b. Contractor, Project Manager and the concerned engineer must be present at the time of QC inspection and structural engineers inspection.
c. Structural engineers and QC team should be informed about inspection atleast 2 days in advance. Intimation to QC team for inspection should be by email and /or SMS.
d. Under no circumstances shall concreting be scheduled on the same day of inspection by QC or structural engineer.
e. Reschedule concreting in case corrections are required. Quality should not be compromised to meet deadlines.
f. QC team will whenever required stop the concreting until corrections are made. An intimation to stop concreting shall be sent by email and/or SMS and a copy shall be marked to the M.D.
g. In case of major corrections second inspection by QC team and structural engineer must be undertaken before concreting.
h. Precautions that must be taken at the time of rod bending
    (i) Appropriate bearing must be given for cantilever and main beam rods.
    (ii) Dovel bars must be left wherever beams and slabs have to be extended. Dovel bar length should be atleast 25% of span.
    (iii) Slab steel spacing must be accurate.
    (iv) Shuttering oil should not adhere to steel.
    (v) Sunken slab should be at specified depth
    (vi) Overlapping steel for columns must be appropriately cranked.
    (vii) Extra bars should be placed across the beam.
    (viii) Overlapping lengths for columns should be 45 to 50 D and beams 35 to 50 D.
    (ix) Column reduction must be done in the middle of the beam and not above the slab.
    (x) Chairs must be made from 10 mm rods and adequate nos. should be provided specially in cantilevers and steel near beams.
i. In case of error in centerline of columns, wherever possible break and recast. When it is not possible to correct the column position, the same error should be repeated on all the floors. However, the position of beams should be kept in mind i.e., the entire beam must rest on the column.

j. Column starters should be carefully casted with the water cement ratio of 0.4 weight by weight.
k. Covering must be as specified by structural engineer. In general covering for slabs is ½",, beams 1", Columns 40 mm and footings – 50 mm. Covering blocks must be casted atleast 3 days in advance with a cement sand ratio of 1:1.
l. Bracing for atleast 50% of the props must be done. Bracing should undertaken at beam bottoms and diagonally at mid level of props.

Managing Director.

Circular No. 605(a) – Quality Control Date: 12.11.2008

Sub.: Steel and concrete testing.

1. Cube testing for ready mix and site mix at every stage of construction i.e., footings, pedestals, slabs and columns must be undertaken. Each site should have atleast 6 moulds of 6". Take 6 samples of CC at each stage.

2. Maintain a cube testing register (100 pages register) and draw the following columns in it.
   a. Sl. No.
   b. Date.
   c. Site mix / RMC
   d. Grade of concrete
   e. Supplier / Contractor
   f. DC No.
   g. Bungalow No / Block No.
   h. Used for (columns, slab, etc.,)
   i. Slab No. / Column No.
   j. Test date
   k. Test strength
   l. Remarks.

3. Write the Sl No. on each cube as per Sl. No. in the register. Use the following serial Nos.: MFH – 1001, GWE – 2001, PMR - 3001, GMG- 4001, MNM – 5001, KNM 6001,SOB – 7001 onwards.

4. Cube Testing machine is being purchased and tests will be done by QC at SOB. Test shall be done for 7^{th} day and 28^{th} day strength.

5. QC will collect steel rods for testing once a month from all sites. 1 Rod each of size 8 mm to 25 mm from different suppliers shall be tested. Collection of rods, labeling and testing shall be the responsibility of the QC team. Engineers shall give details of receipt of steel to the QC team.

Managing Director.

Circular No. 606(a) – Quality Control Date: 12.11.2008

Sub.: Consultants reports.

1. Each site shall maintain a pre-printed consultants report book at site consisting of 1+ 2 copies (white + yellow + pink).

2. Ensure that all consultants including architects, structural engineers, landscape architects record their comments in the consultants report book at the time of site visit.

3. Handover the original (white copy) to the consultant. QC team will pickup the HO copy (yellow) and attach to the appropriate QC report and the site copy (pink) shall be kept at site.

4. New books have been supplied to all sites. Surrender the old books, if any.

Managing Director.

Circular No.: 607(a) – Quality Control Date: 11.02.2009

Sub.: Penalty for defaults and mistakes.

I have found that common mistakes are being made repeatedly despite several remarks by the Quality Control team. Therefore, I have been left with no option but to fine contractors, site engineers and project managers. The schedule of fines shall be as follows:

S. No.	Item	Fine - Project manager	Fine - site engineer	Fine - contractor
1	Penalty for not intimating QC in writing (by email) 2 days in advance	500/-	NA	NA
2	Penalty for missing QC for: a. RCC slab b. RCC Column c. Footings d. After brick work e. After plastering	500/- per flat per item 1,000/- per bungalow per item	NA	NA
3	Penalty for incorrect column casting that requires breakage	500/-	500/-	2,500/-
4	Penalty for mistake in using covering blocks (numbers and thickness)	250/-	250/-	500/-
5	Penalty for mistakes in placing extra bars (Numbers and length)	500/-	500/-	1,000/-
6	Penalty per flat or bungalow for not placing beds in brickwork or for not using chicken mesh or for improper pointing in brickwork	500/-	500/-	1,000/-

Penalty for QC team for not completing QC within 2 working days from intimation / scheduled date shall be Rs: 500/- for ever day of delay.

QC team to attach a separate sheet as per given format for imposition of penalty.

Soham Modi.

Circular No. 608(a) – Quality Control Date: 07.09.2009

Sub.: GI pipes and fittings.

There are some reports of inferior quality GI being supplied to the site. To correct the situation the standards (BIS) for GI pipes are being specified herein. QC may regularly check the weight of the pipe to ensure that quality pipes are supplied at sites.

Pipes having NB or Inner dia of ½", ¾" of 1" should be of medium weight. Pipes with NB of more than 1" should also be of medium weight. However, in case of non-availability light weight pipes may be ordered. Project Managers and QC must check the quality and compare with the PO. Wherever medium pipes are ordered, light weight pipes must not be accepted.

Normally fittings should be of HB make, gate valves/ ball valves of 'Zoloto' make and ballcocks should be of 'Viking'/'Kohinoor' make. If any other make is received, please inform Purchase Division.

Pipes are sold in wholesale in weight and in retail by length. Therefore, there is every likelihood of suppliers supplying material of lesser weight. The standards for weight and wall thickness are given below

S. No.	GI Pipe Size	Wall Thickness (mm)	Weight in Kgs Per Meter
1.	½" - Medium	2.60	1.21
2.	¾" – Medium	2.60	1.56
3.	1" – Medium	3.20	2.41
4.	1 ¼ Light	2.60	2.54
5.	1 ¼ Medium	3.20	3.10
6.	1 ½" Light	2.90	3.23
7.	1 ½" Medium	3.20	3.56
8.	2" Light	2.90	4.08
9.	2" Medium	3.60	5.03
10.	2 ½" Light	3.20	5.71
11.	2 ½" Medium	3.60	6.42
12.	3" Light	3.20	6.72
13.	3" Medium	4.00	8.36
14.	4" Light	3.60	9.75
15.	4" Medium	4.50	12.20

As per BIS standard 7% tolerance is permitted. Site Engineers can easily verify wall thickness using a vernier calliper . QC should check weight, inner dia and valve thickness regularly, preferably once a month in each site.

The size of pipes to be used for villas/apartments projects are as follows:

S. No.	Description of use	For bungalows project	For apartment projects
1	Inside bathrooms	¾" main lines & ½" branch lines	½"
2.	Kitchen and utility	½"	½"
3.	External line for bathroom (supply)	Vertical 1 ¼" & 1" horizontal line	I & II floor ½", III floor ¾", IV and V floor 1".
4.	Drinking water line (supply).	½" HDP line from street	¾" external line
5.	Terrace lines	-NA -	Borewell water 2" main line with 1" branch lines. Drinking water 1 ½" mainline and ¾" branch line.
6.	Supply to OHT	¾" HTP pipe from street	1 or 1 ¼" GI line from borewell

Engineers must ensure use of pipes as above. Any change /deviation should be made only with prior approval of M.D. Nipple of 2" & 4" may be ordered. Nipples above that size may be made at site.

Managing Director.

Circular No. 609(a) – Quality Control Date: 21.04.2010

Sub.: QC check – revised guidelines and format of reports.

QC check should be undertaken at the following stages.

Villas/Bungalows

1. Plots marking – to check dimension and diagonals of all plots and common areas.
2. Before casting footing
3. Before casting plinth.
4. After casting columns at each stage.
5. Before casting slab at each stage.
6. RCC works of clubhouse, OHT, sump, septic tank, etc.
7. After brick work.
8. After plastering (Part 1- except Plumbing and electrical, Part 2 – Pluming and electrical).
9. After finishing.

Flats

1. Blocks marking – to check dimension and diagonals of all blocks and common areas.
2. Before casting footing
3. Before casting plinth.
4. After casting columns at each stage.
5. Before casting slab at each stage.
6. RCC works of lift room, water tank, staircase headroom, sump, septic tank, etc.
7. After brick work.
8. After plastering (Part 1- except plumbing and electrical in bathrooms, Part 2 – pluming and electrical in bathrooms).
9. After finishing.
10. After finishing of staircase, corridors and stilt floor – new report to be made.

Intimation to QC for checking must be done in writing atleast two working days in advance. Specify preferred date for checking. Failure to do so will attract penalty as given in circular 607(a).

QC reports formats have been changed to include the following.

a. Sl. No. – All new reports from this day shall be numbered as GMG 501, GMG 502 … . All old reports shall be numbered in retrospect as GMG 101, GMG 102 … . This is to ensure that missing reports can be tracked.
b. QC will give clearance to continue work or stop work for corrections and re-inspection.
c. QC will also indicate if an Action Taken Report as per prescribed format needs to be given by project manager before proceeding for further work.
d. Important changes made in the QC report are: table brick must be added at bottom of each door frame at brick work stage. 200 ltrs drums must be placed in each

flat/bungalow where work is under progress. Waterproof screeding must be completed in each bathroom before QC check of brick work.

Whenever recommended, Action Taken Report (ATR) shall be submitted by the project manager to QC and M.D. Project managers have been advised to pick up a copy of QC report from the HO every Saturday from Aruna. Reports must reach sites on Saturday. They must be filed in serial order. Whenever QC indicates that an ATR is required then Aruna shall issue 3 photo copies of the QC report – one for site, one for returning to QC with ATR and one for returning to M.D. with ATR. In cases of urgency of work ATR should be sent to QC as soon as possible. However, in all cases ATR should be sent to the M.D. within 2 weeks i.e., on Saturday along with vouchers. Aruna/Nagalaxmi shall help QC team identifying list of missing ATRs every Saturday. Padmanabha shall audit this entire process.

Preparation of ATR.

Project managers shall attach the ATR on QC report sheet to the photocopy of the QC report. Every mistake pointed out in the QC report must be circled with a red pen and marked with a tick (√) wherever corrections were made and cross (x) wherever corrections were not made. Similarly comments made by QC can be ticked and crossed. In the first sheet of the ATR remarks /explanation for every item where corrections were not made must be provided.

For the convenience of the project managers, the QC report after plastering has been split into two parts where the second part is exclusively for checking electrical conducting, GI / PVC work and waterproofing. Project managers may proceed with further works like painting, cladding, marble flooring, kitchen platforms, etc., after QC check part I. However, works like bathroom tiles, ceramic/vitrified flooring can not be taken up without the part II check.

Self check by project managers or senior engineers at site

Project managers shall ensure that an engineer at site performs a self check, fills in the self check report as per the prescribed format before calling the QC team for a check. The report shall be kept in a separate file at site and shall be made available for inspection by the QC team or M.D. at any time. The self check report shall be prepared for 3 stages i.e., a. After brick work, b. After plastering, c. After finishing (due to lack of man power this self check report i.e., after finishing shall be made from 1.6.10 for the villa projects). The self check report must be in the same format as the QC report. Self check shall ensure that engineers are made quality conscious and are able to assess the quality of their output.

Guidelines for stopping work and request for ATR.

Work shall be stopped and ATR requested from the project manager in the following cases. Here work can proceed only on recheck by QC team.

a. Major errors in marking, steel tying, shuttering, diagonals, dimensions, plumb of columns, etc., in RCC work.

b. Major errors in marking, diagonals, quality of brick work, etc. Error in plumb of several door frames or window templates.
c. Major errors in electrical conducting, pluming work and water proofing after plastering stage.
d. In cases of very poor quality work or incomplete work after finishing stage.

Work shall not be stopped, however ATR must be requested from the project manager in the following cases. Here work can proceed on submitting the ATR to the QC team. QC team may request for photographs as proof of corrections made whenever required.

a. Minor corrections in RCC works. Specially, heights of columns, covering of honey combs, steps for staircase, curing with gunny bags, making of bunds, etc.
b. After brick work stage – corrections like chicken mesh provision, covering external joints, corrections in templates, door frames, kitchen platform, etc.
c. After plastering stage corrections like provision of skirting, rough surface for tiling, corrections in plumbing and electrical work, etc.
d. After finishing stage any minor corrections.

<u>QC check to be deferred</u>

At the time of QC check, if the QC team finds that the work is incomplete and that it does not make sense to take up the QC check, they are advised to defer the QC check. A single page report can be sent to M.D. stating the reasons. Project managers may be given few more days to complete the work or make corrections so that the QC check is meaningful.

<u>Fines:</u>

Failure to show a self check report shall attract a penalty of Rs. 500/- per flat/villa at each stage of inspection. QC may send a separate email for fines. QC shall also sign the self check report as proof of it being prepared.

Failure to send ATR on QC check report to the HO within 2 weeks shall attract a fine of Rs. 100/- for every week of delay. ATR report can be sent even if work is incomplete stating reasons for delay in completing work. However, the ATR on QC report must be sent within two weeks.

Managing Director