Manual of test hammer

Type HT75
(impact energy 0.735J)

_____

_____

_____

Catalogue

One Summary

HT75 test hammer born with smaller impact energy, is specially used to test the compressive strength of light material object such as brick. And also can be used to test all light bone material concrete and other lightweight materials.

Testing and determining compressive strength by test hammers has many advantages, high efficiency, high accurate, and easy to operate, easy to carry, easy to maintain, and the non-destructive testing.

Two Principle and technical performance

1. Work principles of test hammer

Inside of test hammer, the rebound hammer can get impact energy by stretched spring, and rebound hammer will impact the rebound pole, through rebound pole the energy will be transmitted to test sample, then rebound hammer and rebound pole will be rebounded, and the slider on the test hammer will move along with the rebound hammer till a highest point, and we can read the data by a scale, called rebound value.

2. Main technical parameters

①Normal Impact energy	0.735 J
②Rebound hammer stroke	75 mm
③Static friction between pointer slider and shaft	0.4-0.6N
④Average rebound values of calibration on steel anvil should be	74±2
⑤Size	Φ60*280mm
⑥Net weight	≈1 Kg

3. Structure

As following figure 1

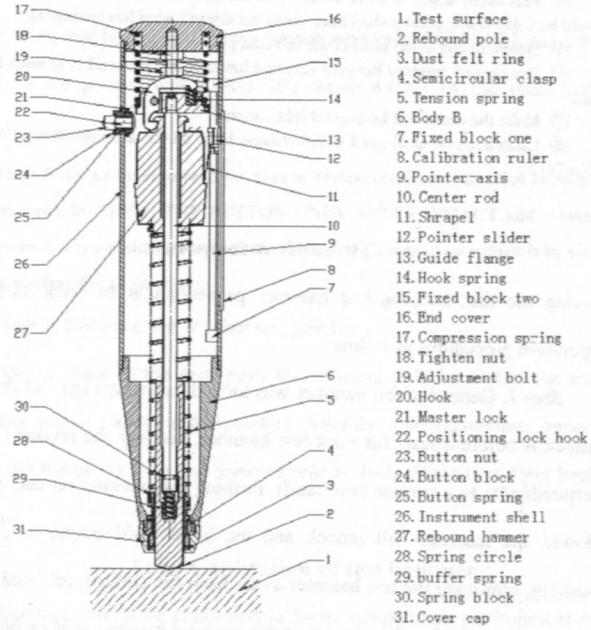

Figure 1

4. Standard status is the unified standard for all test hammers in testing procedure. All factories and users should ensure the test hammer in the status before and during testing, so that we can avoid differences and keep same accuracy among all testing hammer. The standard status as following:

① Test hammer level impact energy should be 0.735J

② Rebound hammer stroke: 75mm

③ Working length of the tension spring should be 61 mm, and the tension spring should be free status without any outside force at the moment of rebound hammer collide the rebound role

④ Maximum static friction force between pointer slider and pointer shaft should be 0.4N~0.6N, pointer shaft keep clean but doesn't need lubricating oil

⑤ Sphere radius of the head of the rebound pole is SR25mm

⑥ The contact surfaces between rebound hammer and rebound pole must keep clean

⑦ Make the center rod keep good lubrication

⑧ Calibration on steel anvil with hardness HRC 58-62, average rebound value is Rm74±2

Three How to operate

During the test, keeping test hammer perpendicular to brick surface. Operation procedures as follow:

Step 1. Generally, test hammer was locked during storage, we should unlock it before a test. Take out test hammer, keeping the rebound pole perpendicular to a surface (any hard). Pushing test hammer on end cover slowly, the hammer will unlock and the button will bound out, stop pushing, removing the test hammer away from the surface, rebound pole will reach out, and at the same time the rebound hammer will be hooked because of the pushing from compression spring, now it's ready for a test.

Step 2. Aim at test point, keep perpendicular, push slowly, rebound pole will be pushed into the test hammer, at the same time, the compressing spring get compressed, but the tension spring get stretch and uptight, keep pushing till rebound hammer unhook, the rebound hammer will impact rebound pole by the pulling from tension spring. After impact

with rebound pole, the rebound hammer will be rebounded and take the pointer up; the pointer will stop at the highest position, and we can know the position by the gauge, each position against a value that is rebound value. Note that before you record the rebound value DO NOT loose your hand, or the pointer will ZERO SET automatically by the push from compression spring.

Note: If it is difficult to read the data in rayless conditions specified in Step 2, lock hammer by PRESS THE BUTTON ONLY AFTER IMPACT and remove the device to a convenient place in order to read the gauge. And unlock it by step 1 after reading for another test.

Step 3. Continue test at other test points.

Step 4. End of the test, push the rebound pole back into the test hammer, just like above test procedure. After the rebound hammer impact, press the button and the test hammer will be lock. Clear it and put back suitcase.

Four Calibration of test hammer

Test hammer should be calibrated in home temperature environment of 25℃±5℃, fix the steel anvil on hardened concrete ground, during calibrating, rebound pole should be revolved 4 time and each time 90 degree angles. Test five times after each revolve and calculate the average value. If all four average data (rebound values) in the range of Rm=74±2, we can say that the test hammer in a good status for works.

Five How to test brick

1. Sample

① Random sample, 10 pieces.

② During the samples, following 3 case must be rejected and take the adjacent brick replace it as sample.

a. place brick, crisp brick, spiral brick
b. bad appearance
c. failure to get 10 rebound data.

③Accident treatment

a. In case sample get rain or moist, bake firstly
b. Sample surface should be flat, or sand it if necessary and wipe off dust.

2. Testing equipment

Following is traditional testing equipment, imitate the real building structure, constituted by brick pier and lever compressor.

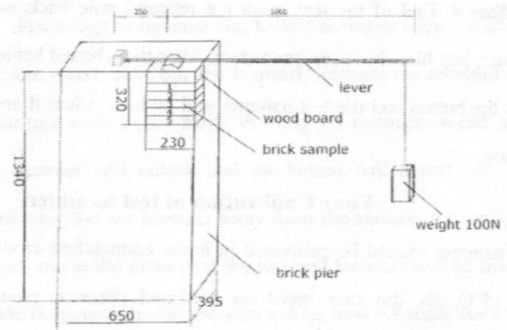

Figure 2

①In the equipment, we must make sure the brick sample's 3 sides completely get contact with equipment and each other..

② The press force from the level should be 500±50N.

3. Test points

Test points as figure 3, five test points at each long side of each brick,

total ten points. Please avoid taking follow cases as test point

a. over baked; b. rupture; c. sticky; d. hollow and lime spot

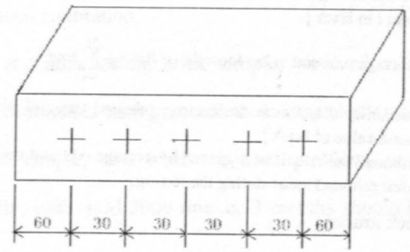

Figure 3

4. Testing procedures

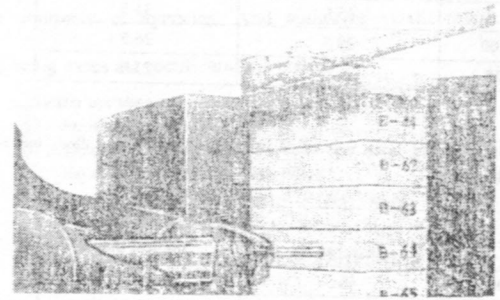

Figure 4

① 2 group samples total 10 pieces brick with Serial Number, fix one group sample on the brick pier, make sure their sides get good contact and fixed. Set wood plate and lever on sample as figure 4.

② Test and record rebound value. After testing five points in one side of the group, revolve the group sample and test the other side.

③ Test the other group sample.

④ Each test point only test once

5. Calculation of rebound values

① Each brick average rebound value formula is: $Rmj=\frac{1}{10}\sum_{i=1}^{10} Ri(j=1,2...10)$

In above formula, Rmj is the average rebound value of brick j. Accuracy 0.1, Ri is the rebound value of test point i in brick j.

② All ten bricks average rebound value formula is: $Rm=\frac{1}{10}\sum_{j=1}^{10} Rmj$

In the formula, accuracy 0.1, Rm is the average rebound value of all bricks. Rmj is the average rebound value of brick j.

③Final average rebound value will be signified by average rebound value of 10 bricks and the minimal test rebound value during the testing.

6. Evaluation of brick grades

① Classing by sheet 1

Grade mark	Average rebound not less than	Minimal rebound value not less than
200	40.0	36.0
150	35.0	31.5
100	29.5	26.5
75	26.0	23.0

Sheet 1

② In some hill area, brick was made by original soil, also called "hill soil", brick grade follow sheet 2.

Grade mark	Average rebound not less than	Minimal rebound value not less than
200	46.5	42.5
150	41.5	38.5
100	35.5	33.0
75	32.0	30.0

Sheet 2

The above sheets only for reference

Six Rectification of test hammer

In order to keep test hammer work well, rectification is necessary.

1. General calibration

Before and after testing brick sample, we need calibrate test hammer. During continuous testing, rectification is need after each testing 5 groups of brick sample, also when we have problems with rebound values. Generally, each used 2000 time or 3 months should be rectified at least one time.

2. Rectification of standard status

This rectification should be performed by professional person or sent to test company or agencies. And authorize verification certificate. In following cases the rectification is need.

① After updating any main components
② After long time use (one year)
③ Adjustment bolt got loose
④ Total rebound time reach 6000 time.
⑤ Instrument was serious impacted or other damage

Seven Maintenance

1. How to maintenance

① Refer to figure 3: Let rebound pole(2) reach out, unscrew cover cap(31), demount dust felt ring(3) and semicircular clasp(4), unscrew end cover(16), take out the compression spring(17), move rebound hammer to rear end, unhook and take out.

② Rebound hammer(27) knock rebound role(2) lightly, the rebound role will leave from center rod, take out the buffer spring(29), unscrew the rebound hammer(27) from the center rod(10), update the tension spring(5) if necessary.

③ Washing all active components carefully, specially note the contact area between center rod (10) and rebound pole (2). Clean the holes in rebound pole and rebound hammer and the collision area with metal brush.

④ Insides of shell, feather key and pointer axis should be cleaned too.

⑤ After cleaning, install all component by reversed procedures from above, don't miss buffer spring(29) and dust felt ring(3), the center rod should be lubricated with watch oil before installing back.

⑥ After installing finished, test pointer slider friction, its value should be 0.4N~0.6N.

⑦ The last step, calibrate the test hammer on steel anvil, rebound values should be Rm=74±2.

⑧ Don't change any dimension of component.

⑨ After using, clean surface, push rebound role back into body and unhook rebound hammer, lock test hammer, put into package and store in dry shady place.

Eight Steel anvil

1. Steel anvil is a special device for calibrating test hammer. Mini test hammer should be calibrated by steel anvil of model GZ16. Steel anvil should be put on hardened concrete ground or hard platform. The collision area of steel anvil must be kept flat and clear, hardness is HEC58~62, weight is about 6KG.

2. Rebound values should be in the range of Rm=74±2 when calibration on steel anvil.

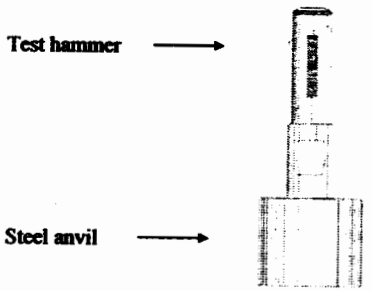

Figure 5

Nine Problems and resolutions

No.	Problem	Analyses	Resolution
1	Pointer slider out of work	Shrapnel broken or improper angle by pointer axis	Change shrapnel or adjust angle
2	Pointer slider was brought up earlier	Shrapnel's angle too big	Change shrapnel or adjust angle
3	Pointer slider stopped at a position	Shrapnel's angle too small; Pointer loose from pointer axis;	Adjust shrapnel's angel; adjust pointer slider and axis
4	Rebound hammer earlier collision	Angle of the hook too small; tail of rebound hammer was broken	Sanding hook angle till right angle; Revolve hammer or change one. Then calibration
5	Rebound hammer out of work	Hook spring lost or out of work; hook broken; hook angle too big	Install hook spring; change hook; sanding hook angle till right angle
6	Rebound hammer delayed work or can't work Rebound pole can't reach out	Hook frayed; hook spring out of work too much dust	Sanding hook angle; Adjust or change hook spring cleaning
7	Rebound values too high	Working length of tension spring more than 61mm; rebound hammer start point too high; too much lubricating oil on center rod	Adjust tension spring; adjust end cover to change rebound hammer's start point; clear center rod;
8	Rebound values too small	Working length of tension spring less than 61mm; rebound hammer start point too low; pointer slider get too much friction; collision areas between rebound hammer and rebound pole are dirty; rebound hammer get too much friction from center rod.	Adjust position of tension spring; adjust end cover; adjust pointer slider till its friction is 0.4~0.6N; clean collision areas; lubricate center rod.
9	Rebound values unstable	Collision surface not flat; collision areas or center rod get dirty; bend center rod; unsmooth pointer axis; shrapnel abnormal contact with rebound hammer; pointer slider collide nearby components; bend pointer axis;	Revolve rebound pole or update a new one; clear dust; rectify center rod; smooth pointer axis; adjust shrapnel angle; adjust pointer slider and pointer axis.

Ten Appendixes

Standard : GB/T50315-2011 Technical Standrd for site testing of masonry engine

1.Rebound strength conversion value of fired brick

Mathematical Model: $f=0.02R^2-0.45R+1.25$

Average rebound value R	Rebound strength conversion value (N/mm^2)
34.0	9.07
34.5	9.53
35.0	10.00
35.5	10.48
36.0	10.97
36.5	11.47
37.0	11.98
37.5	12.50
38.0	13.03
38.5	13.57
39.0	14.12
39.5	14.68
40.0	15.25
40.5	15.83
41.0	16.42
41.5	17.02
42.0	17.63
42.5	18.25
43.0	18.88
43.5	19.52
44.0	20.17
44.5	20.83
45.0	21.50
45.5	22.18
46.0	22.87
46.5	23.57
47.0	24.28
47.5	25.00
48.0	25.73
48.5	26.47
49.0	27.22
49.5	27.98
50.0	28.75
50.5	29.53
51.0	30.32
51.5	31.12
52.0	31.93

2.Rebound strength conversion value of perforated brick

Mathematical Model: $f=0.02R^{2.48}$

Average rebound value R	Rebound strength conversion value (N/mm^2)
34.0	10.68
34.5	11.07
35.0	11.47
35.5	11.89
36.0	12.30
36.5	12.73
37.0	13.17
37.5	13.62
38.0	14.07
38.5	14.53
39.0	15.01
39.5	15.49
40.0	15.98
40.5	16.48
41.0	16.99
41.5	17.51
42.0	18.03
42.5	18.57
43.0	19.12
43.5	19.67
44.0	20.24
44.5	20.82
45.0	21.40
45.5	21.99
46.0	22.60
46.5	23.21
47.0	23.84
47.5	24.47
48.0	25.11
48.5	25.77
49.0	26.43
49.5	27.11
50.0	27.79
50.5	28.48
51.0	29.19
51.5	29.90
52.0	30.63