



## WATER ABSORPTION RATE OF CHATKA BRICK-A GENERAL PRACTICAL APPROACH

**MANOJ KUMAR VARSHANEY**

(FAE,FIWRS,FIPHE,FIIBE,FISCE,MIE,MISTE,MISRS,MNESA,MCEGR,MISCA,MBSNV)

SR.LECTURER/HOD CIVIL ENGINEERING,

D.N.POLYTECHNIC, MEERUT (U.P.) 250103

1- **Abstract:-**The quality of brick is assessed by doing various tests on it, like size, efflorescence, compressive strength, density, water absorption and beside it, some physical observations like metallic sound, sharp edges, regular shape and color etc. But some time to know the strength of brick without measuring on machine, then indirectly by weighing and doing water absorption test may result the strength of brick.

The author authenticate this term of water absorption that 3 to 4 hours curing of brick seems enough to place in masonry work of normal category as at initial level faster absorbance occurs in a very short of time and rest absorbance for saturation stands slow to very slow, which may consider negligible. The study reveals that more weight or more density lesser the water absorption, due to lesser air voids. Also the faster rate of water absorption shows the early saturation with water. The Chatka bricks are the bricks of bearing cracks of rough category that can absorb much more water like 20% of its weight or something more. Here the result revealed that at primary level water absorption is very faster rate and slower rate on successive ensuing time till its saturation.

2- **Key Words:-**

Nominal, Traditional, Water Absorption, Weight, Building, Testing etc.

3- **Introduction-**Bricks are of nominal and traditional type, having respective size of 19cm by 9cm by 9 cm and 23cm by 11.5cm by 7.5cm. Nominal bricks with 1cm thick mortar around bricks are taken as 20cm by 10cm by 10 cm, which are used for estimation purpose because of its easy calculation by its volume, area and length too. Traditional bricks are normally used for civil constructions like building, slab, pavements, flooring, lintel, arches, culverts, sewer line, bunkers, and retaining wall etc, which are tested before applying them in various construction works. Within limit testing results for bricks are used in construction work. For good quality construction work, first class bricks are used.

Various types of bricks have different quality, popularly known as Avval, doyam, soyam, talsa and chatka in rural areas while in technical terms these are of first class, second class, third class and poor class.

Bricks have compositions like Silica termed as Sand as  $\text{SiO}_2$ -55%, Alumina as  $\text{Al}_2\text{O}_3$ -30%, Iron oxide as  $\text{Fe}_2\text{O}_3$ -8%,Magnesia as  $\text{MgO}$  by 5%, Lime as  $\text{CaO}$  by 1% and rest as Organic matters by 1%. The initial mixing of silica and alumina prevents the brick from cracking, warping and shrinkage.

Alumina binds the ingredients and develops plasticity while mixing with water to shape the bricks in mould. It shrinks and wraps the brick while drying and burning the brick to harden it to make it usable.

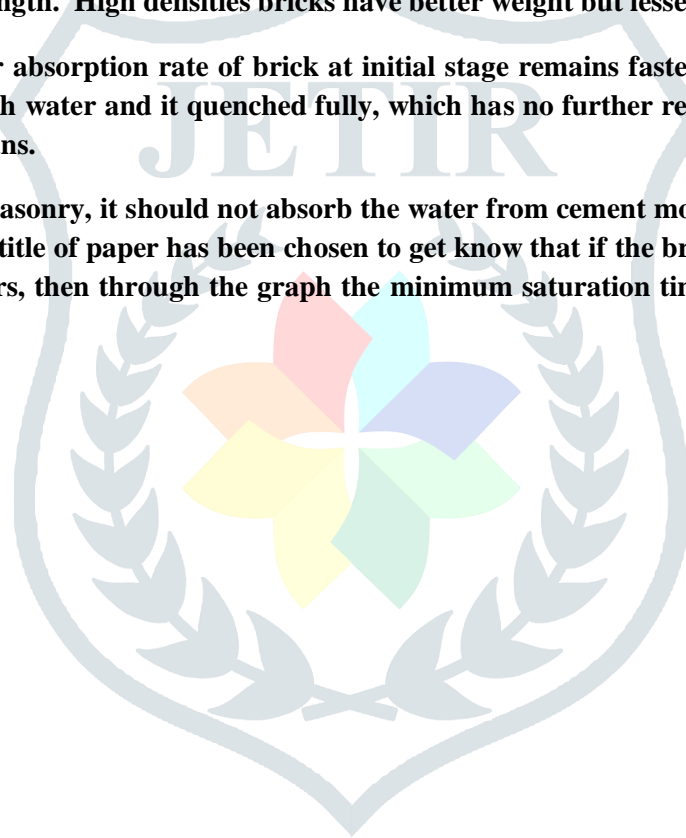
Silica mixed with clay forms aluminosilicate, which prevents the brick from shrinking, warping and cracking as well. It prevents the brick from crack formation after the final production of brick. It maintains the bricks in regular shape, sharpen the edges and strength too. It also prevents the brick to get fusion early for long temperatures. It prevents the brick for absorbance of water.

Lime in calcium oxide powdered form binds both compositions due to lowering the melting point of 1650 degree centigrade, so as to make bond with silica to alumina. The excess lime may cause the de-shape of brick. Iron oxide in very small quantity works as flux to melt the silica at lower temperature and also to provide the cherry red or terra cotta color to brick. Its presence, makes the brick impermeable and indirectly strengthen the brick as well. Excess quantity may change the color in blue. Magnesia reduces shrinkage after cooling and excess magnesia may reduce strength.

The water absorption of brick occurs due to alumina, air voids in brick due to silica, presence of cracks/fissures, alkalis as hygroscopic salts like  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{KCl}$ , pebbles, stone nodules, gravel and organic matters like leaves, trimmings, twigs, decomposed body parts etc. The water absorption of brick in due causes of cracks and voids have better absorption as well as lesser strength. High densities bricks have better weight but lesser water absorption.

It has been a matter that water absorption rate of brick at initial stage remains faster and gradually reduced and at last the bricks get saturated with water and it quenched fully, which has no further requirement till it becomes dry by natural process or by other means.

While putting the bricks into masonry, it should not absorb the water from cement mortar, so as cement may set hard to grip the brick masonry. The title of paper has been chosen to get know that if the bricks are even not saturated with water as prescribed for 24 hours, then through the graph the minimum saturation time of bricks could be known for early construction.



**4- Methodology:-**A sample of two bricks of Mohan traders was collected from the nearby construction site. The physical color of brick was not cherry red, but was terra cotta color and edges were sharp even the some cracks were there. Both bricks were in regular shape and size. To get the result early as well as early saturation, reading were taken at 2 minutes intervals. The water in which the bricks were dipped was at temperature 12 ° C. Total time was taken 16 minutes and accordingly the result has been revealed.

**Weight of dry brick - A- 2501 GRAM**

**Weight of dry brick-B-2569 GRAM**

TIME IN MINUTES	WEIGHT OF WET BRICK (B) GRAM.	WATER ABSORPTION GRAM	WATER ABSORPTION IN %	TOTAL RATE OF WATER ABSORBANCE IN GRAM/MINUTE	ABSORPTION RATE IN GRAM	ABSORPTION OF WATER IN GRAM PER MINUTE	%WATER ABSORPTION RATE PER MINUTE
2	2623	122	4.87	122/2=61	122	122/2=61	2.43
4	2660	159	6.35	159/2=79.5	159-122=37	18.5	0.74
6	2684	183	7.31	183/2=91.5	24	12	0.48
8	2706	205	8.19	205/2=102.5	22	11	0.44
10	2722	221	8.83	221/2=110.5	16	8	0.32
12	2740	239	9.55	239/2=119.5	18	9	0.36
14	2755	254	10.15	254/2=127	15	7.5	0.30
16	2762	261	10.43	261/2=130.5	7	3.5	0.14
TIME IN MINUTES	WEIGHT OF WET BRICK (B) GRAM.	WATER ABSORPTION GRAM	WATER ABSORPTION IN %	TOTAL RATE OF WATER ABSORBANCE IN GRAM/MINUTE	ABSORPTION RATE IN GRAM	ABSORPTION OF WATER IN GRAM PER MINUTE	%WATER ABSORPTION RATE PER MINUTE
2	2825	256	9.96	256/2=128	256	256/2=128	4.98
4	2884	315	12.25	315/2=157.5	315-256=59	29.5	1.15
6	2918	349	13.57	349/2=174.5	349-315=34	17	0.66
8	2934	365	14.19	365/2=182.5	365-349=16	8	0.31
10	2945	376	14.62	376/2=188	376-365=11	5.5	0.21

12	2948	379	14.73	379/2=189.5	379-376=3	1.5	0.06
14	2950	381	14.81	381/2=190.5	381-379=2	1	0.04
16	2952	383	14.90	383/2=191.5	383-381=2	1	0.04

**5- Conclusion:-**The Study reveals that water absorption rate of brick is faster in beginning and slower by gradually passing of time. Seeing the result of water absorption for the sampled two bricks of chatka category, it has been observed that 24 hours are much more time to saturate the brick. It needs less time to get quasi saturated brick while using the brick in masonry work.

In general brick work, most of the professional contactors, usually take 3 to 4 hours to saturate the brick, while using in masonry work, so as the brick could not absorb the water from the cement mortar to get set the cement mortar duly its hydration. Usually Portland cement has its initial setting time by 30 minutes, while the final setting time is 10 hours. During the 10 hours the brick should not absorb the water from mortar to get final set of mortar.

As the brick is covered with mortar, hence evaporation of water from brick is usually reduced. So not more saturation is required where the normal work is going on. Also after 24 hours of masonry curing is always done and hence the cement mortar may get hardened duly spraying of water on it. Hence the study reveals that bricks while putting in water for curing of drenching, 3 to 4 hours minimum are required to put in the normal brick masonry, as the faster quenching occurs in beginning hours and slow to very slow in ensuing hours.

#### References:-

- PUBLIC HEALTH ENGINEERING, PRACTICAL BOOK—ASHIAN PUBLISHERS, MUZAFFAR NAGAR- U.P.2004,  
 ENVIROMENTAL POLLUTION & CONTROL—ASHIAN PUBLISHERS, MUZAFFAR NAGAR-U.P.-2008-09,  
 CIVIL ESTIMATING & COSTING NAV BHARAT PUBLICATION, MEERUT-U.P.,  
 PUBLIC HEALTH ENGINEERING & IRRIGATION ENGINEERING DRAWING(HINDI)---NAV DISTRIBUTORS,  
 MEERUT –U.P.-2014,  
 CIVIL ENGINEERING DRAWING NAV BHARAT PUBLICATION, MEERUT –U.P.,  
 QUANTITY SURVEYING & VALUATION (HINDI)—NAV DISTRIBUTORS, MEERUT-U.P.-2008,  
 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT-ASHIAN PUBLISHER-2011-12,  
 DESIGN OF STEEL AND MASONRY STRUCTURES (English Language) WSM-(ISBN-978-93-83694-71-6)- JPNP-  
 MEERUT-2016,  
 DESIGN OF REINFORCED CONCRETE STRUCTURES (ENGLISH)-JPNP-MEERUT-2nd Edition 2019-20,  
 Advance Construction Technology-NBP-MEERUT,  
 BUILDING DRAWING (HINDI)-NAV BHARAT PUB.-MRT-2008,  
 CIVIL ENGINEERING DRAWING-1-(HINDI)-ASHIAN PUB. MZN-2018-19,  
 WWIE DRG-NAV DISTRIBUTORS MRT-2020,  
 DESIGN OF STEEL STRUCTURE (HINDI) LSM- JPNP-MRT-2021-ISBN-978-93-86539-06-9,  
 STRUCTURAL MECHANICS-ASHIAN PUB. MZN- 2012-13.,  
 ENVIRONMENTAL STUDIES-ASHIAN PUB.MZN-2019-20.,  
 HYDRAULIC ENGINEERING (HINDI)-ASHIAN PUB MZN-2014-15,  
 BUILDING DRAWING (HINDI) ISBN:978-93-91541-28-6- ASHIAN PUB. MZN-2016-17,  
 BUILDING DRAWING (ENGLISH)-ISBN: 978-93-91541-63-7- ASHIAN PUBLISHERS-MZN--2016-17,  
 ANALYSIS OF STRUCTURE (HINDI)-ASHIAN PUBLICATION-2021,  
 STEEL STRUCTURE DRAWING-ASHIAN PUBLICATION MZN-2021,  
 STEEL STRUCTURE DESIGN-JPNP MEERUT-2021,  
 General workshop practice-2nd Nav Bharat publication meerut-2019,  
 QUANTITY SURVEYING & VALUATION-NAV BHARAT PUBLICATION MRT-2021,  
 DESIGN OF STEEL & MASONRY STRUCTURES Hindi language (ISBN-978-93-86539-06-9) JPNP-MEERUT-4th  
 edition -2019,  
 STRENGTH OF MATERIAL-ASHIAN PUBLISHERS-MZN-2012-13.,  
 DESIGN OF STEEL STRUCTURES (ENGLISH)-JPNP-MRT-2021-22, ISBN-978-93-83694-71-6, 28-MECHANICS OF  
 SOLIDS (HINDI)-ASHIAN PUB. MZN-2012-13,  
 REINFORCED CEMENT CONCRETE STRUCTURES-JPNP-MRT-2021-22(ISBN-978-81-944036-9-2),  
 GENERAL ENGINEERING (HINDI)-JPNP-MRT-2019-20,  
 GENERAL ENGINEERING (ENGLISH)-JPNP-MRT-2019-20,  
 CIVIL ENGINEERING DRAWING-2 (HINDI)-ASHIAN PUB.MZN-2019-20

**DISINFECTED WATER –AN EASY APPROACH**

Presented in AGM of IEI UP State Centre Lucknow on 28/10/2007

Published in Jawaharlal Nehru Technological University- Hyderabad 02-06/Feb-2010, 3-National Institute of Technical Teachers Training and Research Chandigarh-04-05/March-2010

4- 22nd Indian Engineering Congress of The Institution of Engineers India Udaipur 14-16 DEC-2007.(page no.-308-310)

**PERSPECTIVE OF INFORMAL EDUCATION IN ENGINEERING INDIA**

1-Published in 20th Indian Engineering Congress of the Institution of Engineers (India) Kolkata on 15- 18/DEC-2005,(page no.350).

**PERSPECTIVE OF PROFESSIONAL ENGINEERING MEMBERSHIP-**

Published in 19th Indian Engineering Congress of Institution of Engineers (India)-Mumbai 17- 19/DEC.2004,(page no.313-314)

Annual General Meeting of IEI UP State Centre Lucknow 13/NOV.-2005.

**WATER HYACINTHAN UTMOST APPROACH OF LAND TREATMENT**

1- Published in AGM of IEI Lucknow 11/FEB-2007.

**REVALUATION OF SINKING FUND-AN EMPIRICAL VIEW**

Published in Indian Surveyor of Institution of Surveyors India-New Delhi-July 2009(ISSN-0970- 3470),(page no.-54-56),

INDIAN VALUER/JOURNAL of INSTITUTION OF VALUERS INDIA- New DELHI on March-2009,

News Letter of Institution of Civil Engineers India-New Delhi on Dec-2008, 4-ANUSANDHAN -2017 ISSN-2322-0708, Impact factor-5.497, volume-1, part-5, page no.17-18.

**RE-ASSESSMENT OF DUTY IN IRRIGATION CHANNEL-A SUGGESTIVE APPROACH**

1-Published in Indian Surveyor JOURNAL (ISSN-0970-3470) of ISOI NewDelhi JANUARY 2012,(page no.-44-45).

**VALUATION of VOLUME of FRUSTUMIAL BODIES-A MATHEMATICAL STUDY**

1-Published in JOURNAL INDIAN VALUER JUNE 2009,

**OPTIMUM SHAPIAL BUILDING STRUCTURES-AN ECONOMICAL ESTIMATION**

1-Published in the Indian Surveyor of ISOI- New Delhi in July 2011.(page no.-46-51).

**VALUATION of VOLUME of DIFFERENTIAL FOLDING PATTERNS-A CALCULATORYVIEW**

1- Published in INDIAN SURVEYOR (ISSN-0970-3470) in January-2011 (page no.-50-52).

**MODERN CONTRUCTION viz-a-viz PRIMITIVE CONSTRUCTION-A CASE STUDY for VIABLE VALUATION**

1-Published in IOV New Delhi in June 2013(page no.674-682) and Indian Surveyor ISSN- 0970-3470 of Institution of Surveyor India of its July 2012 volume,(page no.-17-22)

**VALUATION of METHODS for DESIGNING of RCC STRUCTURES-A CASE STUDY with WORKING STRESS**

v/s LIMIT STATE vis-a vis ULTIMATE LOAD

1-Published in IOV of Dec-2013(page no.-1524-1526) and ABHIYANTA BANDHU of IEI U.P. Lucknow in 2015.(page no.-170-173), IOV of September-2013, (page no.-1078-1081).

**VALUATION of SINGLE ROOM BELOW GROUND LEVEL –AN ESTIMATIONAL STUDY for SPREAD v/s QUASI SPREAD FOOTING FOUNDATION**

1- Published in IOV in April-2014.(page no.-402-407).

**VALUATION of STRENGTH of STRUCTURAL STEEL ANGLES- A CASE STUDY with EQUAL vis-à-vis UNEQUAL ANGLES under I.S. CODE: 800-1984**

Published in IOV New Delhi in 24/MAY-2015

International Journal of Engineering Research and Application-DEC-2015 ISSN-2248-9622.

**MULYANKAN KE NAYE AAYAM**

1- Published in VIGYAN GARIMA SINDHU (A-Journal under MHRD-GOI) in June-2009.

**VALUATION of STEEL COLUMN BASE – A ECONOMICAL CASE STUDY under I.S. CODE: 800-1984**

1-Published in journal of CERAMICS and CONCRETE TECHNOLOGY bearing ISSN: 2457-0828 in 12/04/2019 under MANTECH Publications Pvt. Ltd. GHAZIABAD.



RE-ASSESSMENT of RIVET SIZE by EMPIRICAL WAY for THEORITICALLY CALCULATING TENSILE STENGTH under IS Code: 800-1984

Published in Journal of CERAMICS and CONCRETE TECHNOLGY in 13/05/2019 under MANTECH Publication Ghaziabad, bearing ISSN: 2457-0828

49--Perspective of Diploma in Engineering Courses vis-a-vis Simple Graduation within U.P. Province-A Case Study-2020 1-Journal of ISTE-New Delhi-IJTE bearing ISSN-0971-3034, volume-44, no.-4, oct-dec-2021, page-4-11.

Innovations in Multidisciplinary Research-volume -1, issue-1 of CR Subscription Agency.

Diploma in Engineering an Equivalent to Intermediate -The State Level Study 1-Published in "ANUSANDHAN" page number 79-80

(Science Research Journal)-ISSN-2322-0708/EISSN-2350-0123 (year-2021) volume-1, part-9, Impact Factor-7.247.

Valuation of Design for RCC Balanced Beam Versus Under Reinforced Beam Using I.S.Code-456-2000

1-Published in Innovations in Civil Engineering and Management journal (volume-1 , issue-1) under CR Subscription Agency Ghaziabad in Jan-June 2021 page no.44/47

WORKING STRESS VERSUS LIMIT STATE METHOD-A GISTICAL VIEW FOR DESIGNING OF RCC STRUCTURES- published in

1-Innovations in Civil Engineering and Management journal (volume-1, issue-1) under CR Subscription Agency Ghaziabad in July-Dec.2021 page no.20/31

International Journal of Enhanced Research in Science, Technology & Engineering -11-01-2023-ISSN-2319-7463, volume-12, Issue-1 , page number-48-57, Impact factor-7.957.

IMT-Greater Noida -National Conference paper presented on 24-12-2021

Equivalency of Diploma in Engineering-A Case Study –

1-Journal of ISTE-New Delhi-IJTE bearing ISSN-0971-3034, volume-45, no.-1, JAN-MARCH-2022, page-4-11.

Comparative Study of Compressive Force Borne by Equal versus Unequal Angle under I.S. Code:800-1984-

1-Journal of Emerging Technologies and Innovative Research (JETIR)-ISSN-2349-5162- Volume10,Issue-1,page-544-548, date-9.1.2023, Impact Factor-7.95

Comparative Study of Valuation of Design for RCC Balanced Beam Versus Under Reinforced Beam Using I.S.Code- 456-2000

1-Anusandhan Science Research Journal-BSNV Vigyan Parishad-Lucknow-31.12.2022-ISSN-2322-0708, page-42-46, volume-1-part-10, Impact Factor-7.247