International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

IS: 800-General Construction in Steel and its Comparison with International Codes

Vinesh S. Thorat[1], Amruta G. Whatte[2]

[1, 2]Department of Civil Engineering, Pune University, Pune, India

[1]Department of Civil Engineering at RSCOE, Tathawade, Pune. Pursuing M.E. Structure from Pune University, Pune, Maharashtra, India

[2]Department of Civil Engineering at Dr. D.Y. Patil School of Engineering Lohegaon Pune. M.E. Structure from Aurangabad Collage of Engineering, Aurangabad, Maharashtra, India

Abstract: ***The material used for high-rise structure i.e. steel, concrete and other. However the whatever type of material used for high-rise structure the main objective of structural engineer remain in safety, minimum material cost, minimum total weight, minimising different sections used while achieving maximum strength of section. In the present work a comparative study is carried out for Indian standard (IS 800-2007) American standard (AISC 13th edition), British standard (BS 5950, 1:2000) towards achieving these goals.***

Keywords: Limit stated design, Factor of Safety, Allowable stress design, Load and resistance factored design, Factor of safety, IS 800:2007,AISC 13th edition, BS 5950, 1:2000.

1. Introduction

The Indian Construction is often guided by steel, cement as the prime material of construction. Cement requires a healthy partnership with aggregates and steel to form the structural element called concrete. Steel, on the other hand has an advantage of partnering with concrete and also can go alone as an individual structural element. In order to reap the advantages of steel the whole supply chain needs to be in place. Use of steel as a preferred material for Design Engineers can be increased if the design codes are modified, updated with the scientific researches , user friendly etc. The design Engineers will then be inclined in deciding on using steel. This will increase the consumption in the country. IS-800, the code for general structural steel design which was published in 1984 reaffirmed in 1991 was much outdated with outdated philosophy. The working stress method or the Allowable stress method was prepared long back.

In the mean time the methodology of design of steel structures had undergone major changes due to two decades of research and the state-of-the-art practiced all over the world. Since an outdated code would be detrimental to the very purpose of the code of practice itself, the basic code for design of steel structures needed updating using recent research findings and practices in developed countries. Thus, the code was revised under the supervision of expert committee constituted. Almost all advanced countries are now taking advantage of efficient code stipulations, and the current practice all over the world is based on either Limit State Method (LSM) or Load and Resistance Factor Design (LRFD) method. Since LSM has become the design philosophy in most of the international design standards due to its rationality and consequent economy achieved in design, it was felt that IS: 800 should also be modified to LSM while maintaining Allowable Stress Design (ASD) as a transition alternative. This would also help the designers to understand both the design methods and utilize the most advantageous one. Even in USA, the codes on design of steel structures, still maintain a dual standards approach, viz. ASD, LSM as well as LRFD.

2. Load and Resistance Factor Design (LRFD)

In this method load on structure is considered and the resistance factor of material is considered in design considering yield stress. Basically LSM and LRFD both are same. There is difference is in the parameters and factors only in LSM and LRFD. With the advantage of modern state of the art design methodology in the form of the limit state method or the load and resistance factor design method, rationally and overall economy has become the key word in the design of steel structures.

2.1 Allowable Stress Design (ASD)

The allowable stress method of design, the critical combination of loads is found out the members are design on the basis of working stresses. These stresses should never increased the permissible stresses is considered. The method considers material behavior is elastic. Thus the permissible stresses may be elaborated in terms of factor of safety, which takes care of overload or other unknown factors.
Thus, Permissible stress = Yield stress / factor of safety
Thus, Working stress ≤ Permissible stress

2.2 Limit State Design (LSM)

Object of limit state design can be paraphrased as achievement of an acceptable probability that a part or whole structure will not become unfit for its intended use during its life time owing to collapse, excessive deflection etc, under the action of all loads & load effects. The acceptable limits of safety and serviceability requirements before failure occur are called as limit state. For achieving the design objectives, the design shall be based on characteristic values for material strength and applied loads, which take into account the probability of variations in the material strengths and in the loads to be supported. The

characteristic values shall be based on statical data, if available. Whereas such data is not available, these shall be based on experience. The design values are derived from characteristic values through the use of partial safety factors, both for material strength and for loads. In the absence of special consideration, these factors shall have the values given in this section according to the material, the type of load and the limit state being considered. The reliability of design is assured by satisfying the requirements.

Design action ≤ Design strength

3. Objective

The aim of the comparison and study of parameters for design of compression member, tension member, column, beam (flexural member), member subjected to combined forces as per IS800:2007, BS 5950- 1:2000, AISC13th edition

4. Future Scope

There are various international codes available for the design of steel structures. Developments are still going on, to achieve the great economy by using different methods as well as by using different codes of practice. By using this study we can make relation between different parameter of codes, to achieve above goals of structural engineer.

5. Conclusion

As general observation Indian code and British code includes safety factors allowing the users to obtain design values starting from characteristics values, where as American approach. The following issues related to the comparisons among the codes considered in this work are described regarding design of compression member, tension member, column, beam(flexural member), member subjected to combined forces. As per result discussion, after solving problems there is variation in the design strength obtained by three different codes because of variation in values of parameters or constant considered particular code are different and the main thing is that there is unavailability of same size section in all three codes.

References

[1] American Institute Of Steel Construction Inc.- Steel Construction Manual(13th Edition)
[2] BS 5950-1-2000-structural use of steel workbook in building.
[3] Comparative Study Of Steel Structures Design Using IS 800:1984 And IS 800: 2007 Prof.S.S. Patil, L.A. PansurVolume4, Issue4 April-2013.
[4] Design Manual For Designing Steel Structure According To New IS: 800-2007.
[5] Dr. N. Subramanian; Design Of Steel Structures; Oxford University Press, New Delhi.
[6] Dr. N. Subramanian, Code Of Practice On Steel Steel Structures-A Review Of IS 800: 2007, Computer Design Consultants, Gaithersburg, MD 20878, USA.
[7] Duggal S.K. Limit State Design Of Steel Structure Tata Mcgraw Hill Education Private Limited, New Delhi, 2010, 3rd Edition.