

RISK CRITERIA AS A RATIONAL BASIS FOR SEISMIC RESISTANCE  
OF STRUCTURES OF DIFFERENT GRADES<sup>1</sup>

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Introduction

Economic growth of a country involves continuous rapid development in the various sectors of the construction industry. The housing sector creates particular problems in developing countries, as the demand for mass housing is very great, the majority who are in need of this housing are the low-income people and their budgets are very limited. To meet the demand for low-cost mass housing in the shortest possible time, it may be a matter of government policy to implement housing schemes in which various grades of housing are considered based on their durability, thus on their building cost. The useful lifetime of those buildings may vary from as little as 10 years to perhaps 30 years, depending on the type and grade of building material used. When these buildings are located in seismic areas, they should be seismic resistant. The problem, therefore, is how to determine the seismic design loads for these buildings, because the normal seismic loading stipulated in building codes is not intended for the design of buildings of different grades. A rational basis is to provide the building appropriate strength and stiffness, so that no matter what its lifetime (whether short or long) it will have a uniform risk with respect to onset of structural damage and with respect to incipient failure. This paper will discuss these two different risks and how to implement them in design.

Risk Criteria

Seismic activities are natural events which recur from time to time. Like a few other natural phenomena such as river floods, seismic events are stochastic processes which can be represented by a mathematical model of a given physical system that changes in accordance with the laws of probability. Therefore, by knowing the seismic history of a region obtained from observations or records made over a sufficiently long period of time in the past, the return periods of the various seismic intensities in that region can be assessed by applying