

A Reliability-Based Comparison of EC3 & SANS 10162-1

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Abstract – Wind and seismic activity effects are described in SANS 10160 (2018) [13]; however, these loading conditions' scope and depth are limited. Typically, South African practicing engineers refer to other international design standards when seeking information that is not described in the current national standards. It is essential to understand that these international standards cannot be used without considering local conditions. In this study the authors compare Eurocode 3 and SANS 10162-1 (the steel standards) using reliability principles to determine if the adoption or adaption of the Eurocode is possible. The reliability analysis presented in this paper assessed the material resistance reliability of a member in bending and a member under axial compression. The resulting reliability indices of the study, from a Monte Carlo Simulation, were compared to their respective target reliability index values. The beam and column, for their respective steel design standards, achieved minimum reliability index levels, with the column generally resulting in higher reliability indices. The authors also concluded that the SANS 10162-1 standard is usually consistent with European practice, which is confirmed by similar reliability levels. However, the differences in reliability levels show the effect and significance of local differences (e.g., construction methods, design loads, local conditions). Finally, the authors concluded that an adaption of the Eurocode's relevant sections is possible without a need for further calibration.

Keywords: Eurocode 3, SANS 10162-1, Probability of failure, Reliability, Comparison, Steel design.