



Designation: D6555 – 17

Standard Guide for Evaluating System Effects in Repetitive-Member Wood Assemblies¹

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INTRODUCTION

The apparent stiffness and strength of repetitive-member wood assemblies is generally greater than the stiffness and strength of the members in the assembly acting alone. The enhanced performance is a result of load sharing, partial composite action, and residual capacity obtained through the joining of members with sheathing or cladding, or by connections directly. The contributions of these effects are quantified by comparing the response of a particular assembly under an applied load to the response of the members of the assembly under the same load. This guide defines the individual effects responsible for enhanced repetitive-member performance and provides general information on the variables that should be considered in the evaluation of the magnitude of such performance.

The influence of load sharing, composite action, and residual capacity on assembly performance varies with assembly configuration and individual member properties, as well as other variables. The relationship between such variables and the effects of load sharing and composite action is discussed in engineering literature. Consensus committees have recognized design stress increases for assemblies based on the contribution of these effects individually or on their combined effect.

The development of a standardized approach to recognize “system effects” in the design of repetitive-member assemblies requires standardized analyses of the effects of assembly construction and performance. Users are cautioned to understand that the performance improvements that might be observed in system testing are often related to load paths or boundary conditions in the assembly that differ from those of individual members. This is especially true for relatively complex assemblies. For such assemblies, users are encouraged to design the test protocols such that internal load paths, as well as summations of “loads in” versus “loads out” are measured (see [X3.11.7.1](#)). Data from testing, preferably coupled with analytical predictions, provide the most effective means by which system factors can be developed. When system factors are intended to apply to strength (rather than being limited to stiffness), loads must be applied to produce failures so that the effects of nonlinearities or changes in failure modes can be quantified.

1. Scope

1.1 This guide identifies variables to consider when evaluating repetitive-member assembly performance for parallel framing systems.

1.2 This guide defines terms commonly used to describe interaction mechanisms.

1.3 This guide discusses general approaches to quantifying an assembly adjustment including limitations of methods and materials when evaluating repetitive-member assembly performance.

1.4 This guide does not detail the techniques for modeling or testing repetitive-member assembly performance.

1.5 The analysis and discussion presented in this guideline are based on the assumption that a means exists for distributing applied loads among adjacent, parallel supporting members of the system.

1.6 Evaluation of creep effects is beyond the scope of this guide.

1.7 This guide does not purport to suggest or establish appropriate safety levels for assemblies, but cautions users that designers often interpret that safety levels for assemblies and full structures should be higher than safety levels for individual structural members.

¹ This guide is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.05 on Wood Assemblies.

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NOTE 1—Methods other than traditional safety factor approaches, such