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Designation: E 2061 – 00b

Guide for Fire Hazard Assessment of Rail Transportation Vehicles[1]

This standard is issued under the fixed designation E 2061; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

The traditional approach to codes and standards is the specification of individual fire-test-response requirements for each material, component, or product that is found in a given environment and is deemed important to maintain satisfactory levels of fire safety. This practice has been in place for so long that it gives a significant level of comfort; manufacturers know what is required to comply with the specifications and specifiers simply apply the requirements. The implicit assumptions are not stated, but they are that the use of the prescribed requirements ensures an adequate level of safety. There is no need to impose any change on those manufacturers who supply safe systems meeting existing prescriptive requirements; however, as new materials, components, and products are developed, manufacturers, designers, and specifiers often desire the flexibility to choose how overall safety requirements are to be met. It is the responsibility of developers of alternative approaches to state explicitly the assumptions being made which result in a design having an equivalent level of safety. One way to generate explicit and valid assumptions is to use a performance-based approach, based on test methods that provide data in engineering units, suitable for use in fire safety engineering calculations, as this guide provides.

This fire hazard assessment guide focuses on rail transportation vehicles. Such a fire hazard assessment requires developing all crucial fire scenarios that must be considered and consideration of the effect of all contents and designs within the rail transportation vehicle, which will potentially affect the resulting fire hazard. The intention of this guide is that rail transportation vehicles be designed either by meeting all the requirements of the traditional prescriptive approach or by conducting a fire hazard assessment, that needs to provide adequate margins of error, in which a level of safety is obtained that is equal to or greater than the level of safety resulting from the traditional approach.

1. Scope

1.1 This is a guide to developing fire hazard assessments for rail transportation vehicles. It has been written to assist professionals, including fire safety engineers, who wish to assess the fire safety of rail transportation vehicles, during or after their design (see also 1.6). This guide is not in itself a fire hazard assessment nor does it provide acceptance criteria; thus, it cannot be used for regulation.

1.2 Hazard assessment is a process that results in an estimate of the potential severity of the fires that can develop under defined scenarios, once defined incidents have occurred. Hazard assessment does not address the likelihood of a fire occurring. Hazard assessment is based on the premise that an ignition has occurred, consistent with a specified scenario, and that potential outcomes of the scenario can be reliably estimated.

1.3 Consistent with 1.2, this guide provides methods to estimate whether particular rail passenger designs provide an equal or greater level of fire safety when compared to designs developed based on the traditional applicable fire-test-response characteristic approaches currently widely used in this industry. Such approaches have typically been based on prescriptive test methodologies, as exemplified by guidelines of the Federal Railroad Administration (FRA) and recommended practices of the Federal Transit Administration (FTA) (Table X1.1). Selective use of parts of the methodology in this guide and of individual fire-test-response characteristics from Table X1.1 does not satisfy the fire safety objectives of this guide or of the table. This guide shall be used in its entirety to develop a fire hazard assessment for rail transportation vehicles or to aid in the design of such vehicles.

1.4 This guide includes and applies accepted and clearly defined fire safety engineering techniques and methods consistent with both existing, traditional prescriptive codes and standards and performance based fire codes and standards under development throughout the world.

1.5 This guide provides recommended methods to mitigate

[1] This guide is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.17 on Transportation.

Current edition approved Nov. 10, 2000. Published March 2001. Originally published as E 2061 – 00. Last previous edition E 2061 – 00a.

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