



Member of the FM Global Group

Approval Standard for Explosion Venting Systems Including Fasteners and Latches for Damage Limiting Construction

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Foreword

The FM Approvals certification mark is intended to verify that the products and services described will meet FM Approvals' stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for FM Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for certification by FM Approvals shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing shall ensure a consistently uniform and reliable product. Approval Standards strive to be performance-oriented. They are intended to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) must be readily identifiable.

Continuance of Approval and listing depends on compliance with the Approval Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials, and services as appropriate, and on periodic follow-up audits of the manufacturing facility.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods, or procedures.

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1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval requirements for explosion venting systems including fasteners and latches for damage limiting construction.
- 1.1.2 Accidental explosions in confined areas generally result in over-pressure situations where the actual pressures far exceed the design strength of the enclosure. This condition will result in significant damage to the enclosure which may be a room in a larger building or a separate stand alone building. To mitigate the potential damage caused by accidental explosions, some form of damage limiting construction (DLC) is needed. Explosion venting panels are used as an element of damage limiting construction .A common DLC design would combine venting panels with reinforced walls.
- 1.1.3 One style of damage limiting construction works by designing certain parts of the structure (generally the roof or walls) as pressure resistant and other areas (generally external walls as pressure relieving. This pressure relieving area results in a weak point (usually a wall panel or panels) on the exterior of the enclosure that will fail at a pressure below the design strength of the pressure resistant elements of the enclosure. The net effect of this design is the products of the explosion (i.e., excess pressure and flame) are directed out of the protected enclosure to a predefined location through the vent panel while the remainder of the enclosure remains intact.
- 1.1.4 One of the most common methods of securing the pressure reliving panels to an enclosure is with explosion venting fasteners. Under normal conditions, the explosion venting fasteners secure the wall panels to the structure and are able to withstand typical loadings such as wind. These fasteners allow the panels to remain in place but are designed to fail when a specific force per fastener is exceeded such as would be the case during an explosion.
- 1.1.5 In addition to large enclosures like buildings or rooms having a need for explosion venting due to potential explosion hazards, there are many pieces of equipment (e.g., industrial ovens) that have the potential for an internal explosion as well. There is also a need to limit damage to this equipment by providing damage limiting construction. Commonly access doors can be used for explosion venting by providing latches specifically designed to release the door during an explosion. These fasteners/latches may have different operating methods but they perform the same essential function – to secure a panel or door in place under normal conditions and release at a predetermined load that will allow venting of the enclosure.
- 1.1.6 Approval criteria shall include, but are not limited to, performance requirements, marking requirements, an examination of manufacturing facility(ies), an audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard sets the performance requirements for explosion venting systems. These systems are typically used on the exterior walls of enclosures (e.g., cut-off rooms, buildings and pre-fabricated stand alone storage buildings) that have been identified as having the potential for a room/building explosion hazard. They shall be examined for their ability to remain in place under normal conditions but to fail at pre-determined pressure levels characteristically associated with explosions.
- 1.2.2 This standard is intended to be applicable to wall fasteners used to secure wall panels to buildings, latches normally found on ovens and adjustable magnetic release devices used on other types of pressure relieving systems.

- 1.2.3 This standard is intended to evaluate only those hazards investigated and is not intended to determine suitability for the end use of the product.
- 1.2.4 This standard does not apply to detonations, bulk auto-ignition of gases or unconfined deflagrations such as open air or vapor cloud explosions or flameless duct explosion venting devices.
- 1.2.5 This standard does not provide any guidelines on the placement of venting panels or determining the amount of venting area needed for a given occupancy or construction. For recommendations on this type of information, refer to the latest edition of FM Global Property Loss Prevention Data Sheet 1-44, Damage Limiting Construction.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also considered.
- 1.3.2 The requirements of this standard reflect tests and practices used to examine characteristics of explosion venting wall systems including fasteners for damage limiting construction for the purpose of obtaining Approval. Explosion venting wall systems and fasteners having characteristics not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this Standard is demonstrated, or if the intent of the standard is met. Alternatively, explosion venting wall systems including fasteners which meet all of the requirements identified in this Standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

- 1.4.1 Examination and tests on production samples shall be performed to evaluate
- the suitability of the product;
 - the performance of the product as specified by the manufacturer and required by FM Approvals; and as far as practical,
 - the durability and reliability of the product.
- 1.4.2 An examination of the manufacturing facilities and audit of quality control procedures is made to evaluate the manufacturer's ability to consistently produce the product which is examined and tested, and the marking procedures used to identify the product. These examinations may be repeated as part of FM Approvals' product follow-up program.

1.5 Basis for Continued Approval

Continued Approval is based upon:

- production or availability of the product as currently FM Approved;
- the continued use of acceptable quality assurance procedures;
- satisfactory field experience;
- compliance with the terms stipulated in the Approval report;
- satisfactory re-examination of production samples for continued conformity to requirements; and