Title	**Explain principles of structural fire**		
Level	**5**	**Credits**	**6**

Purpose	This unit standard is for people who must develop an understanding of the behaviour of fire in building structures, for the purposes of fire and rescue services, planning or investigation. People credited with this unit standard are able to explain fundamentals of: the process of fire development; fire severity in building compartment fires; fire behaviour tests; and fire growth models.

Classification	Fire and Rescue Services > Fire and Rescue Services - Structural and Industrial

Available grade	Achieved

Guidance Information

1 Recommended: Unit 4651, *Demonstrate knowledge of structural fire behaviour*, or demonstrate equivalent knowledge and skills.

2 Compliance with the fire and rescue service provider's Health and Safety policy and procedures is mandatory.

3 Assessment against this unit standard may take place under real or practical simulated conditions.

4 The primary references for this unit standard are: Edgerley, P.G., and Robinson, P.G., *Handbook for Fire Engineers* (Leicester: Institution of Fire Engineers, 1989); and Buchanan, A.H. (ed), *Fire Engineering Design Guide* (Christchurch: Centre for Advanced Engineering, 2001).

5 Performance of the outcomes and performance criteria during assessment against this unit standard must be in accordance with the primary references.

Outcomes and performance criteria

Outcome 1

Explain fundamentals of the process of fire development.

Performance criteria

1.1 Fire growth periods are identified in terms of variance in materials, construction, and protection systems.

1.2 Burning and decay periods are assessed in terms of time.

1.3 The rate of burning is explained in terms of the method of calculation.

1.4 The importance of rate of burning is explained in terms of fire development.

1.5 The progress of temperature change within fire is explained.

1.6 The concepts of flashover and backdraught are explained in terms of their differences.

Outcome 2

Explain fundamentals of fire severity in building compartment fires.

Performance criteria

2.1 The concept of fire severity is explained.

Range fuel load, fuel configuration.

2.2 Fuel-controlled and ventilation-controlled fires are described in terms of their differences.

Range fire severity, fire duration.

2.3 The heat balance for a building compartment is explained in terms of the structure's materials and design.

2.4 The method for calculating a fire load for a given compartment is identified in terms of the factors involved.

Outcome 3

Explain fundamentals of fire behaviour tests.

Performance criteria

3.1 The methods used to predict the combustibility and toxicity of materials are identified and explained.

Range non-combustibility tests, combustibility tests, toxicity tests, small-scale tests.

3.2 The methods used to predict the fire resistance of structural elements are identified and explained.

Range fire resistance test furnaces, standard fire curve, testing procedures, testing conditions.

3.3 The interpretation of test results, the pass or fail criteria for tests, and limitations of test methods are explained in terms of the factors involved.

Outcome 4

Explain fundamentals of fire growth models.

Performance criteria

4.1 Available fire growth models are identified in terms of type.

Range zone, field.

4.2 The limitations on computer modelling are explained in terms of programmed assumptions, data-entry decisions and the limitations of mathematical models.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 June 1995	31 December 2025
Revision	2	21 May 1998	31 December 2025
Revision	3	2 August 1999	31 December 2025
Review	4	25 March 2004	31 December 2025
Review	5	20 November 2009	31 December 2025
Review	6	30 September 2021	31 December 2025

Consent and Moderation Requirements (CMR) reference	0039

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.