

## 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.

**Subfield** Fire and Rescue Services

**Domain** Fire and Rescue Services - Structural and Industrial

**Status** Registered

**Status date** 20 November 2009

**Date version published** 20 November 2009

**Planned review date** 31 December 2014

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

**Accreditation** Evaluation of documentation and visit by NZQA and industry.

**Standard setting body (SSB)** Fire and Rescue Services Industry Training Organisation

**Accreditation and Moderation Action Plan (AMAP) reference** 0039

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

---

### Special notes

- 1 Compliance with the fire and rescue service provider's Health and Safety policy and procedures is mandatory.
- 2 Assessment against this unit standard may take place under real or practical simulated conditions.
- 3 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).

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

---

## Elements and performance criteria

### Element 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.

### Element 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.

### Element 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.

### Element 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.

---

#### Please note

Providers must be accredited by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

### **Comments on this unit standard**

Please contact the Fire and Rescue Services Industry Training Organisation  
[info@frsito.org.nz](mailto:info@frsito.org.nz) if you wish to suggest changes to the content of this unit standard.