Title	**Apply knowledge of advanced fire development in structures and compartments**		
Level	**5**	**Credits**	**10**

Purpose	People credited with this unit standard are able to: classify the processes and conditions governing ignition and flame spread; analyse the fundamentals of advanced fire development; and demonstrate knowledge of fire severity in structure fires.
Classification	Fire and Rescue Services > Fire and Rescue Services - Structural and Industrial
Available grade	Achieved
Prerequisites	Unit 16943, *Identify principles of fire development in structures and compartments and smoke impact on people*, or demonstrate equivalent knowledge and skills.

Guidance Information

1 Recommended: Unit 4651, *Demonstrate knowledge of structural fire behaviour*.

2 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).

3 Definition
Fire and rescue service provider's requirements refer to policies and procedures on safety and operation set down by each fire and rescue service employer or host organisation.

Outcomes and performance criteria

Outcome 1

Classify the processes and conditions governing ignition and flame spread.

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Performance criteria

1.1 Typical sources of ignition at the point of fire origin are described in accordance with the primary references.

Range diffusion flames, smouldering, spontaneous combustion, premixed flames.

1.2 Heat transfer processes dominant in different types of fire spread are identified in relation to structural properties of the compartment of origin in accordance with the primary references.

Outcome 2

Analyse the fundamentals of advanced fire development.

Performance criteria

2.1 Temperature and time curves describing fire development are explained in relation to fuel type, fuel load, and construction configuration in accordance with the fire and rescue service provider's requirements.

Range fuel types may include but are not limited to – plywood, hardboard, particleboard, fiber insulation board, polyisocyanurate, construction foam, polystyrene, polycarbonate, poly methyl methacrylate, wool carpet, nylon carpet, gypsum board, asphalt shingle, fibreglass shingle, glass reinforced polyester, epoxy fiberite.

2.2 The effects that variables in fuel types, fuel loads, and construction configurations have on fire development are identified in accordance with the primary references.

Range fuel types may include but are not limited to – cellulose, plastic, liquid.

2.3 The effects that ventilation characteristics have on developing fires are identified in accordance with the primary references.

Range a minimum of two of – fire development, fire control, smoke funnelling, smoke training, heat control, positive pressure ventilation.

Outcome 3

Demonstrate knowledge of fire severity in structure fires.

Performance criteria

3.1 The differences between fuel-controlled and ventilation-controlled fires are explained in accordance with the fire and rescue service provider's requirements.

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3.2 The main heat transfer processes in a fully developed compartment fire are factored into structural decomposition and structural integrity losses in accordance with the primary references.

3.3 The principles of smoke flows inside and outside of compartments are applied to fire development rates and fire intensity rates in accordance with the primary references.

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	22 December 1999	31 December 2025
Review	2	25 March 2004	31 December 2025
Review	3	20 November 2009	31 December 2025
Review	4	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.

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