40306 Explain material science in a construction environment

Kaupae Level	4
Whiwhinga Credit	5
Whāinga Purpose	This skill standard recognises knowledge of construction material chemistry, physics, and compatibility.
	This skill standard contributes to qualifications designed for the construction environment.

Hua o te ako me Paearu aromatawai | Learning outcomes and assessment criteria

Hua o te ako Learning outcomes			Paearu aromatawai Assessment criteria		
1.	Explain the chemistry of common materials used in a construction trade.	a.	The material chemistry is described in relation to its impact on common tasks in a construction trade.		
2.	Explain the physics of common materials used in the construction environment.	a.	The material physical properties and behaviour under load are described in relation to their impact on construction tasks and ability to maintain building performance.		
3.	Explain the compatibility of common materials used in the construction environment.	a.	Material compatibility is described in terms of ability to maintain structural integrity, durability and building performance.		

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications:

A *construction environment* is any environment where construction, modification, or maintenance of buildings, structures, or infrastructure assets takes place.

Material chemistry includes composition, form, treatments, malleability, flammability, volatility of materials. It also includes the compatibility of different materials due to their chemical composition, the way they are used, their susceptibility to deterioration over time, their effects on building performance, the environment, and people.

Material physical properties refer to the strength, deflection and expansion of materials. It also includes how materials perform under compression and tension or when subject to friction, wear or extreme temperatures.

The level of building science knowledge required is that of a trade professional rather than that of an engineer, designer, or scientist.

Ngā momo whiwhinga | Grades available

Achieved.

Ihirangi waitohu | Indicative content

Timber

- Chemical composition of wood.
- Chemicals/preservatives/treatments that impact the durability and properties of timber.
- Moisture content and its effect on structural integrity and behaviour of timber.
- Adhesives and coatings used in timber construction.

Concrete

- Chemical reactions involved in concrete formation.
- Concrete additives and their effects on concrete properties.
- Factors affecting concrete durability.
- Concrete testing methods.

Metals

- Chemical composition of different metal types.
- Metal production processes.
- Corrosion mechanisms in steel structures and methods to prevent corrosion.
- Compatibility.

Chemistry principles

- Material composition.
- Form.
- Treatments.
- Malleability.
- Flammability.
- Volatility.

Physics principles

- Physical properties.
- Mechanical behaviour.
- Principles of energy efficiency in buildings.
- Principles of sound transmission in buildings.

Material compatibility

- Chemical.
- Thermal.
- Moisture.
- Mechanical.
- Environmental.
- Safety data sheets (SDSs) and E2 External Moisture, Acceptable Solution (E2AS.1).

Rauemi | Resources

Programme Guidance available from <u>qualifications@waihangaararau.nz</u>.

The New Zealand Building Code, available from www.building.govt.nz.

Industry standards, available from <u>www.standards.govt.nz</u>.

- NZS 3109:1997 Concrete construction.
- NZS 3404 Parts 1 and 2:1997 Steel structures.
- NZS 3631:1988 New Zealand timber grading rules.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa Standard Setting Body	Waihanga Ara Rau Construction and Infrastructure Workforce Development Council.	
Whakaritenga Rārangi Paetae Aromatawai DASS classification	Planning and Construction > Construction > Core Planning and Construction	
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga CMR	0048	

Hātepe Process	Putanga Version	Rā whakaputa Date	Rā whakamutunga mō te aromatawai Last date for assessment		
Rēhitatanga Registration	1	28 November 2024	N/A		
Kōrero whakakapinga Replacement information	This skill standard and skill standard 40307 replaced unit standard 30858.				
Rā arotake Planned review date	31 December 2029				

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council at <u>qualifications@waihangaararau.nz</u> to suggest changes to the content of this skill standard.