Title	**Demonstrate knowledge of metals used on vehicles, and the effect of applying heat to metals**		
Level	**4**	**Credits**	**6**

Purpose	People credited with this unit standard are able to demonstrate knowledge of metals used on vehicles, and the effect of applying heat to metals.

Classification	Motor Industry > Automotive Workshop Engineering

Available grade	Achieved

Guidance Information

1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable manufacturer's specifications, service information, company and legislative requirements. This includes the knowledge and use of suitable tools and equipment.

2 Legislation, regulations and/or industry standards relevant to this unit standard may include the current version of the Hazardous Substances and New Organisms Act 1996; Health and Safety at Work Act 2015 and any subsequent amendments and replacements.

3 Definitions
Company requirements refer to instructions to staff on policy and procedures that are available in the workplace. These requirements may include – company policies and procedures, work instructions, manufacturer specifications, product quality specifications and legislative requirements.
Service information refers to technical information for a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions; technical terms and descriptions; and detailed illustrations.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of metals used on vehicles.

Performance criteria

1.1 Location and uses of metals on vehicles are identified.

Range mild steel, high-strength steels, galvanised steel, aluminium alloy, magnesium, pre-coated steel, stainless steel;
evidence of five is required.

1.2 Methods of identifying metals used on vehicles are described.

Range colour, hardness, magnetic, manufacturer specifications.

1.3 Characteristics of metals are identified.

Range tensile strength, ductility, brittleness, toughness, hardness, malleability, elasticity, compressive strength, compatibility, weathering qualities, recyclability, weight.

1.4 Vehicle and machine body shell metal construction methods are identified.

Range monobody, unibody, full frame, partial frame, spaceframe;
evidence of three is required;
assembly of box sections, structural sections and panels, common platforms for different model vehicles, using ultra-light panels, hybrid structures combining metals with plastics or carbon fibre mixed metal structures;
evidence of two is required.

1.5 Metal panel attachment methods are described.

Range bonding includes – welding-bonding, rivet-bonding;
resistance spot welding; gas metal arc welding (GMAW); tungsten inert gas (TIG) welding; oxy-acetylene welding; electric arc welding; metal inert gas (MIG) welding; metal stitching; MIG brazing; bolts and studs; adhesive bonding; speedfix screws; rivets – solid, hollow, self-piercing; clips; hemmed panels; clinched panels; laser welding; magnetic pulse welding, plasma arc welding, deformation resistance welding;
evidence of twelve is required.

1.6 Metal treatment methods are described.

Range rust proofing; paint layers – electro-coat, primer, powder coatings, basecoat, clearcoat, aluminium deoxidisers and cleaners.

Outcome 2

Demonstrate knowledge of the effect of applying heat to metals.

Range mild steel, high-strength steels, low alloy (LA) steels, magnesium, boron steel, galvanised steel, aluminium, stainless steel.

Performance criteria

2.1 Changes in structure and strength of the metal when heated are described.

2.2 The temperature range when the metal changes its structure is identified.

2.3 Methods of heating metals are described.

Range heat lamp, oxy-acetylene, hot air gun, infrared heater, induction heating

2.4 Weldable and non-weldable steels are identified.

2.5 The importance of adhering to the vehicle manufacturer precautions when heating metal is described.

Range temperature limitations, maximum time heat can be applied to metal.

Planned review date	31 December 2025

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	29 January 1996	31 December 2018
Review	2	20 December 1998	31 December 2018
Revision	3	16 October 2003	31 December 2018
Review	4	26 November 2007	31 December 2018
Review	5	21 April 2016	31 December 2023
Review	6	25 November 2021	N/A

Consent and Moderation Requirements (CMR) reference	0014

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

Comments on this unit standard

Please contact the Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.