

Australian Standard<sup>®</sup>

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**Metal finishing—Preparation and  
pretreatment of surfaces**

**Part 5: Pickling, descaling and  
oxide removal**

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This Australian Standard was prepared by Committee MT/9, Metal Finishing. It was approved on behalf of the Council of Standards Australia on 7 March 1994 and published on 16 May 1994.

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The following interests are represented on Committee MT/9:

Aluminium Development Council  
Australasian Institute of Metal Finishing  
Australian Chamber of Commerce and Industry  
Department of Defence  
Metal Trades Industry Association of Australia  
Royal Australian Chemical Institute  
Telecom Australia  
University of Queensland

Additional interests participating in preparation of Standard:

AUSTROADS  
Blast Cleaning and Coating Association of Australia

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## PREFACE

This Standard was prepared under the direction of the Multitechnics Standards Policy Board by the Standards Australia Committee on Metal Finishing to supersede AS 1627.5—1975, *Metal finishing—Preparation and pretreatment of surfaces, Part 5: Pickling steel surfaces*. It has been expanded to include methods for the preparation of other metals, in addition to steel, and now contains information on hydrogen embrittlement relief and stress relief of metals.

This Standard is one of a series of Standards covering the preparation and pretreatment of metal surfaces used in metal finishing. Others in the series are as follows:

## AS

- 1627.0 Part 0: Method selection guide for preparation and pretreatment of steel surfaces
- 1627.1 Part 1: Cleaning using liquid solvents and alkaline solutions
- 1627.2 Part 2: Power tool cleaning
- 1627.3 Part 3: Flame descaling
- 1627.4 Part 4: Abrasive blast cleaning
- 1627.6 Part 6: Chemical conversion treatment of metals
- 1627.7 Part 7: Hand tool cleaning of metal surfaces
- 1627.9 Part 9: Pictorial surface preparation standards for painting steel surfaces
- 1627.10 Part 10: Cleaning and preparation of metal surfaces using acid solutions (non-immersion)

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

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## FOREWORD

Pickling is used for the complete removal of scale, metallic oxides or other contaminants from metal surfaces prior to the application of a suitable protective coating. It is used as an alternative to mechanical methods such as abrasive blast cleaning.

The surface produced by pickling is generally smooth, and may not be suitable for the application of some coatings, e.g. inorganic zinc and high-build epoxy coatings, or for metal spray coatings. The use of corrosion inhibitors in rinse solutions to prevent early rusting of a pickled surface may also cause incompatibility with subsequent coatings. Coating manufacturers or suppliers should be consulted before the application of coating systems to pickled surfaces is carried out.

The two most common acids used for pickling are sulfuric acid and hydrochloric acid. With increasing enforcement of anti-pollution regulations, the popularity of the cheaper sulfuric acid is declining, as hydrochloric acid is more easily recovered in acid regeneration plants and hence is favoured for continuous pickling installations. Hydrochloric acid is also more practicable for batch pickling because the high heat of reaction reduces the amount of external heating necessary. It also dissolves scale faster than sulfuric acid. Acid fuming, often cited as a major deterrent to hydrochloric acid pickling, can be effectively controlled by adhering to correct operating procedures. Other acids, such as phosphoric, nitric, hydrofluoric, citric and sulfamic are used for special purposes. An inhibitor should always be used with any acid to prevent excessive attack on the base metal during pickling. Special finishing precautions, including fresh water rinsing, are necessary to remove residues of unreacted acid. Final rinses containing dilute phosphoric or chromic acid are often used to temporarily passivate the pickled surface. Pickled steel, like blast-cleaned steel, should be painted as soon as possible after cleaning and drying.

During the design of fabricated steel, special consideration should be given to the elimination of pockets or crevices which can trap acid during pickling.

## STANDARDS AUSTRALIA

## Australian Standard

## Metal finishing—Preparation and pretreatment of surfaces

## Part 5: Pickling, descaling and oxide removal

## SECTION 1 SCOPE AND GENERAL

**1.1 SCOPE** This Standard sets out procedures for preparing metal surfaces by immersion, or by other means, employing chemical solutions to remove oxidation products (scale), corrosion products and related foreign materials.

It includes acid pickling and alkaline descaling methods for the following materials.

- (a) Steels.
- (b) Cast iron.
- (c) Aluminium and aluminium alloys.
- (d) Copper and copper alloys.
- (e) Zinc and zinc alloys.
- (f) Nickel and nickel alloys.

NOTE: Advice and recommendations on information to be supplied by the purchaser at the time of enquiry or order are contained in Appendix A.

**1.2 REFERENCED DOCUMENTS** The following documents are referred to in this Standard:

## AS

- 1319 Safety signs for the occupational environment
- 1337 Eye protectors for industrial applications
- 1470 Health and safety at work—Principles and practices
- 1627 Metal finishing—Preparation and pretreatment of surfaces
  - 1627.1 Part 1: Cleaning using liquid solvents and alkaline solutions
  - 1627.2 Part 2: Power tool cleaning
- 1715 Selection, use and maintenance of respiratory protective devices
- 1716 Respiratory protective devices
- 1874 Aluminium and aluminium alloys—Ingots and castings
- 1875 Industrial safety gloves and mittens (excluding electrical and medical gloves)
- 2453 Electroplated coatings of chromium for engineering applications
- 2848 Aluminium and aluminium alloys—Compositions and designations
  - 2848.1 Part 1: Wrought products

## ASTM

- A380 Practice for cleaning and descaling stainless steel parts, equipment, and systems