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AS G13 — 1968
UDC 669.14: 620.18:
669-175

Australian Standard G13—1968

SUPERSEDED BY A9 1733-1976

THE DETERMINATION OF THE AUSTENITE GRAIN SIZE OF STEELS COMPARISON METHOD



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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committees entrusted with the preparation of this standard :

Associated Chambers of Manufactures

Australian Forging Industries

Australian and New Zealand Railways Conferences

Bureau of Steel Manufacturers

Department of Supply

Federal Chamber of Automotive Industries

Society of Automotive Engineers—Australasia

Steel Merchants Association

This standard, prepared by Committees IS/1, Carbon Steels, and IS/2, Alloy Steels, was approved on behalf of the Council of the Standards Association of Australia on 10 April 1968.

To keep abreast of progress in industry, Australian Standards are regularly reviewed. Suggestions for improvements to published standards are welcomed ; these should be addressed to the head office of the Association, Sydney.

The specification is intended to include the technical provisions necessary for the supply of the material herein referred to, but does not purport to comprise all the necessary provisions of a contract.

This standard was issued in draft form for public review as Doc. 595.

AUSTRALIAN STANDARD METHOD

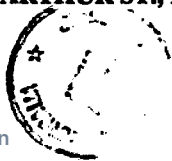
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First published 1968

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PREFACE

This Australian standard was prepared by the Association's Committees IS/1, Carbon Steels, and IS/2, Alloy Steels, to provide a suitable procedure for determining the austenite grain size of steel where grain size limits are prescribed in Australian standards for steel and steel products.

The standard is based primarily on Appendix III, Austenite Grain Size, Ferritic and Austenitic Steels, of ASTM E112-63, Estimating the Average Grain Size of Metals, and technically it is substantially identical with that appendix. In preparing the standard cognisance was also taken of Draft ISO Recommendation 920, Micrographic Determination of the Austenite Grain Size of Steels, a draft British standard specification for grain size determination and SAE J418a, Grain Size Determination of Steels.

The committee felt that the method of presentation in the draft British standard was more suitable for the applications in which the Australian standard would be used than the ASTM layout, and accordingly the standard is editorially more in line with the former than the latter.

British and metric unit equivalents are given in Appendix D. The values quoted in the text are to be regarded as standard and are shown in bold type in the appendix. The conversions are approximate; more accurate conversions should be based on the tables in BS 350, Conversion Factors and Tables.

CONTENTS

	<i>Page</i>
SPECIFICATION	
1 Scope	5
2 Micro-grain Size Number	5
3 Procedures for Establishing and Revealing the Austenite Grains	5
4 Estimating the Grain Size	8
5 Reporting the Results	8
 APPENDICES	
A Etching Agents	11
B Oxidation Procedure	12
C Notes on Specifying Austenite Grain Size Limits for Steel ...	13
D British and Metric Unit Equivalents	14

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Method
for
THE DETERMINATION OF THE
AUSTENITE GRAIN SIZE OF STEELS
COMPARISON METHOD

1 SCOPE. This standard sets out procedures for determining the austenite grain size in various steels by comparing a magnified area of a prepared test specimen with a series of standard charts or photomicrographs.

NOTE: Information regarding the methods of specifying limits for austenite grain size in steels is given in Appendix C.

2 MICRO-GRAIN SIZE NUMBER. The standard ASTM micro-grain size numbers given in Table 1 are based on the following equation:

$$n = 2^{N-1}$$

where n = number of grains per square inch at 100 diameters magnification
 N = micro-grain size number.

3 PROCEDURES FOR ESTABLISHING AND REVEALING THE AUSTENITE GRAINS. The standard procedures for establishing and revealing austenite grains are described below. The procedure to be used shall be the subject of agreement between the purchaser and the supplier.

NOTES:

1. Several methods are in use for determining austenite grain size, and a knowledge of grain coarsening behaviours is helpful in deciding which method to use. The size of austenite grains, in any particular steel, depends primarily on the temperature to which that steel is heated and the time it is held at that temperature. The atmosphere in which the steel is heated may also affect the grain growth characteristics at the surface.
2. Austenite grain size is influenced by most previous treatments to which the steel may have been subjected, e.g. hot working, cold working, normalizing, quenching. It is, therefore, advisable when determining the austenite grain size to consider the effects of any treatments to which the material may be subjected.

PROCEDURE A (McQuaid-Ehn Test). *Primarily for carbon and alloy case-hardening steels up to 0.25 per cent carbon, but also used for other grades up to about 0.6 per cent carbon.*

- (i) The sample shall be carburized at $925^{\circ} \pm 10^{\circ}\text{C}$ for 8 hours, using a carburizing compound, to produce a hypereutectoid case and shall then be slowly cooled to produce a cementite network in the austenite grain boundaries of the hypereutectoid zone of the case.