AGMA 926-C99
(Replaces AGMA 246.02a)

AMERICAN GEAR MANUFACTURERS ASSOCIATION

Recommended Practice for Carburized Aerospace Gearing

AGMA 926-C99

AGMA INFORMATION SHEET

(This Information Sheet is NOT an AGMA Standard)

American Gear Manufacturers Association

Recommeded Practice for Carburized Aerospace Gearing
AGMA 926-C99
(Replaces AGMA 246.02a)

Approved May 20, 1999

ABSTRACT

This document establishes recommended practices for material case and core properties, microstructure and processing procedures for carburized AISI 9310 aerospace gears. This document is not intended to be a practice for any gears other than those applied in aerospace.

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Foreword

[The foreword, footnotes and annexes, if any, in this document are provided for informational purposes only and are not to be construed as a part of AGMA Information Sheet 926–C99, *Recommended Practice for Carburized Aerospace Gearing.*]

AGMA Standard 246.02A, *Practice for Carburized Aerospace Gearing*, dated June, 1983, was prepared by the Metallurgy and Materials Committee and was designed to be a guide to manufacturers who make carburized gears to the high quality standards required of gears used in aerospace applications.

AGMA 926–C99 has been updated by the Aerospace Gearing Committee and replaces AGMA 246.02A, and includes references to the latest standards of other standard setting bodies including SAE/AMS and AISI. Also, reference is made to modern steel making techniques and carburizing methods which produce gears to three classes of quality.

AGMA Standards and Information Sheets are subject to constant improvement, revision, or withdrawal as dictated by experience. Any person who refers to AGMA technical publications should satisfy himself that he has the latest information available from the Association on the subject matter.

AGMA 926–C99 was approved by the AGMA Technical Division Executive Committee on May 20, 1999.

Suggestions for improvement of this standard will be welcome. They should be sent to the American Gear Manufacturers Association, 1500 King Street, Suite 201, Alexandria, Virginia 22314.

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American Gear Manufacturers Association –

Recommended Practice for Carburized Aerospace Gearing

1 Scope

This information sheet recommends material case properties, microstructure, processing procedures and other critical parameters for carburized aerospace gears.

This information sheet is for carburized aerospace gearing and does not apply to gears used in other industries.

2 Application

The purpose of this publication is to define methods for specifying material, case depths, case and core hardness, case and core microstructures, and processes for carburizing and hardening aerospace gearing. This information sheet pertains mainly to AISI 9310, *Carburizing Material.* Information on other common carburizing materials is also included. (Aerospace gearing is used in this document to delineate air vehicles and spacecraft gearing.)

3 Aerospace Grade definitions

Aerospace gearing is divided into three grades depending on the nature of the intended application.

Gear materials for aerospace are specified by three aerospace grades which use the same allowable stress numbers as Grades 1 to 3 in ANSI/AGMA 2001–C95 and ANSI/AGMA 2003–B97. Also, many of the same metallurgical control factors apply except where they have been changed for aerospace within the recommendations of this information sheet in clauses 4 through 10. The three grade numbers are:

Aerospace Grade 1 – aircraft quality;

Aerospace Grade 2 – premium aircraft quality;

Aerospace Grade 3 – ultra–premium aircraft quality

Aerospace Grade 1 materials are typically air melted (AM). Aerospace Grade 2 materials are typically single vacuum melted (SVM), while Aerospace Grade 3 materials are typically double vacuum melted (DVM) from the initial stock.

4 Materials

4.1 Materials selection

The following paragraphs describe the suggested materials for carburized aerospace gearing. The grades of steel recommended are based on the indicated specifications of the American Iron and Steel Institute (AISI) and the Society of Automotive Engineers/Aerospace Material Specifications (SAE/AMS). Typical carburizing steels are shown in table 1.

NOTE: It is to be understood that the materials listed are suggestions only and that specific material selection should be made by the engineer on the basis of material hardenability, material cleanliness, performance, and economic considerations. Performance criteria include, but are not limited to, the following: toughness, notch sensitivity, bending and contact fatigue, bending strength, wear resistance, high temperature and environmental operational characteristics.

4.2 Aerospace quality grades – carburizing alloy steels

For aerospace applications, Aerospace Grade 3 and 2 materials require conformance to ANSI/SAE AMS 2300 quality level, while Aerospace Grade 1 material requires ANSI/SAE AMS 2301. Aerospace Grade 3 and 2 materials may also require additional specific mill processing conditions such as tighter ultrasonic inspection requirements. These requirements are more stringent than those given in ANSI/AGMA 2001–C95, table 9, note 13 or other industry standards.