

INTERNATIONAL TRUCK AND ENGINE CORPORATION		
CEMS (CORPORATE ENGINEERING MATERIAL SPECIFICATION)		NUMBER: CEMS A-33
TITLE: Steel for Ball Bearing Race Rings		CURRENT ISSUE DATE: October 2001
WRITTEN/REVIEWED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES ISSUE OF: July 1999
PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION		
<i>This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.</i>		
Change Notice: Editorial Changes		

1.0 SCOPE

This specification covers the Corporation's requirement for chromium steel bars and seamless tubing for use in the manufacture of ball bearing race rings or for other special purposes.

2.0 INTRODUCTION

Ball bearing race rings supplied to the requirements of this specification are produced from bearing Quality, E 52100 steel that is vacuum carbon deoxidized.

3.0 CONTENTS

	PAGE
REFERENCE DOCUMENTS	1
GENERAL REQUIREMENTS	2
CHEMICAL COMPOSITION	2
METALLURGICAL REQUIREMENTS	2
DIMENSIONAL TOLERANCES	3
QUALITY	4
METHODS OF TEST	4
SOURCE APPROVAL AND QUALITY CONTROL	6
DESIGNATION ON DRAWINGS AND PURCHASE ORDERS	6
PACKING AND SHIPPING	6

4.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following standards, specifications and regulations are referenced in this specification. Unless otherwise specified, Product supplied shall confirm to the general requirements of ASTM A 29.

Quality System Standard QS-9000 (ISO 9001)	ASTM A 29
INTERNATIONAL IQR Quality Standard	ASTM A 295
INTERNATIONAL Manufacturing Standard D-13	ASTM A 892
CFR Title 29, Part 1910	ASTM E 45
	ASTM E 112
	ASTM E 381

5.0 CLASSIFICATION (Not applicable)

This document is restricted and may not be sent outside International Truck and Engine Corporation or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2001 by International Truck and Engine Corporation.

OCTOBER 2001

NUMBER: CEMS A-33	TITLE: Steel for Ball Bearing Race Rings	CURRENT ISSUE DATE: October 2001
-----------------------------	--	--

6.0 GENERAL REQUIREMENTS

6.1 Chemical Composition

Steel purchased to this specification will conform to the analysis for SAE E 52100 and will be bearing quality, vacuum carbon deoxidized.

6.2 Metallurgical Requirements

6.2.1 Hardness

Annealed bars and seamless tubing purchased to this specification will have hardness of Brinell 167-192 (Rockwell B 86-92) with the exception of the following products as shown in Table I:

TABLE I

Product		Hardness	
Round Bars	Annealed, Machine Straightened, Rough Turned	167 - 217 Bhn	Rockwell B 86 – 97
	Annealed, Cold Drawn	255 Bhn, max	Rockwell C25, max

6.2.1.1 Hardness is not specified for the following products:

Round Bars, Hot Rolled
Seamless Tubing, Annealed, Tube Reduced.

6.2.2 Inclusion Ratings

The inclusion rating will be determined in accordance with ASTM E 45, Method D. The average of all specimens tested, as well as 67% of all specimens, will not exceed the rating specified in Table II. See “Methods of Test,” page 4.

**TABLE II
INCLUSION RATINGS**

Inclusion Type	Thin Series	Heavy Series
A	2-1/2	1-1/2
B	2	1-1/2
C	2	1-1/2
D	1-1/2	1-1/2

6.2.3 Seams And Surface Defects

The depths of seams or other surface defects, including decarburization, will not exceed requirements described in ASTM A295. Grip marks on one end of cold drawn products are permissible provided they do not exceed 0.010 in (0.25 mm) in depth or 4 in (102 mm) in length. See “Methods of Test,” Section 8.

6.2.4 Austenitic Grain Size

Austenitic grain size will be No. 7 or finer. See “Methods of Test,” Section 8.

6.2.5 Homogeneity

Steel provided to this specification will meet requirements of ASTM A295 for homogeneity Macroetch.

This document is restricted and may not be sent outside International Truck and Engine Corporation or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2001 by International Truck and Engine Corporation.

OCTOBER 2001