

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS S-W-4.101-GS/PL
		<i>Former Designation:</i> ESP-W-4.101-GS
TITLE: Ball Joints – English Series (Noun Code – 4770)	CURRENT REV No.: 1506	DATE: June 2015
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: ESP-W-4.101-GS - August 2006
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: Changed to New MPAPS format; Combined GS, PP, NPP.		

1.0 GENERAL: This standard conforms to the latest issue of the SAE standard on Ball Joints. It covers the general and dimensional data for those types of ball joints commonly used on control linkages in automotive, construction, and industrial applications.

The inclusion of dimensional data in this standard is not intended to imply that all the products described are stock production sizes. Users are requested to consult with manufacturers concerning stock production parts.

2.0 CONTENTS:

	Page
General	1
Policy for Selecting Parts for New Design	1
Dimensions and Tolerances	1
Threads	2
Material	2
Finishes	2
Restricted Chemical Substances	2
Lubrication	2
Workmanship	2
Ball Joints	3
Part List	7
Technical Information	8

3.0 POLICY FOR SELECTING PARTS FOR NEW DESIGN:

For new design, parts shall be selected from "Approved" part list only.

Threads - Class 2A – Fine Pitch
Finish – Zinc Trivalent (ZN6A)

4.0 DIMENSIONS AND TOLERANCES: Tabulated dimensions will apply to the finished parts, plated or otherwise processed as specified by the user. Limits on hexagon or round bar shapes will be within the commercial tolerance of the bar stock material from which the components are produced. All dimensions are shown in decimal-inch.

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2015 by Navistar, Inc.

JUNE 2015

NUMBER: MPAPS S-W-4.101-GS/PL	TITLE: <i>Ball Joints</i>	REVISION: 1506
--	--	---------------------------------

- 5.0 THREADS:** Unified Series, Class 2A external threads and Class 2B internal thread will apply to plain finish (unplated) parts. For externally threaded components with additive finish, the maximum diameters of Class 2A may be exceeded by the amount of the allowance; that is, the basic diameters (Class 2A maximum diameters plus the allowance) apply to an externally threaded part after plating. For internally threaded components with additive finish, the Class 2B diameters apply after plating.

External threads will be chamfered to a diameter 0.01 inch less than the minor diameter to produce a length of chamfered or partial thread equivalent to 3/4 to 1-1/4 times the pitch (rounded to a three-place decimal).

Internal threads will be countersunk 90 degree included angle to a diameter 0.01 inch greater than the major diameter of the thread (rounded to a two-place decimal).

- 6.0 MATERIAL:** Ball joints are to be made from low carbon free machining steel. The ball screw and mating plug components of Types A, AL, B and C and for ball screws for Types F, G, and S will be case hardened to a core depth of .003 - .005 for sizes up to and including 3/8 inches, and .005 - .007 for sizes over 3/8 inches. Hardness is to be R15N 89 min or file hard.

Cushioning discs will be Neoprene, Buna N rubber, or equivalent material

Dust covers will be Neoprene, Buna N rubber, or equivalent material of such construction as to prevent dirt and dust from entering the ball cavity.

- 7.0 FINISHES:** Unless otherwise specified, carbon steel ball joints will be placed in accordance with International Engineering Material Specification and class listed below:

Zinc Trivalent (ZN6A) – MPAPS G-20, Class 6A.

Hardened carbon steel components of ball joints which are plated are subject to hydrogen embrittlement and will be baked or otherwise processed to obviate such embrittlement.

- 8.0 RESTRICTED CHEMICAL SUBSTANCES:** Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

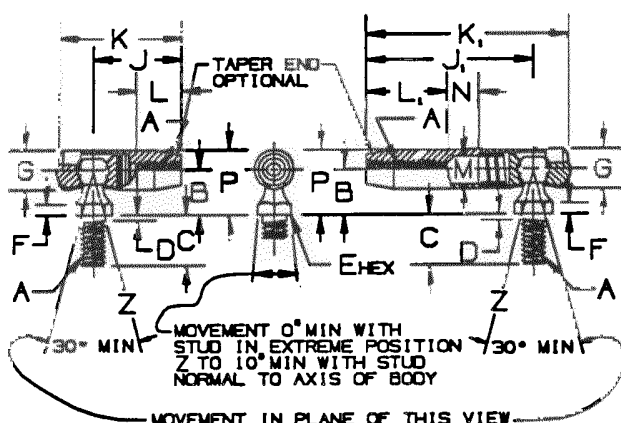
- 9.0 LUBRICATION:** Unless otherwise specified by user, ball joints will be supplied with ball sockets suitable lubricated in accordance with manufacturers practice.

- 10.0 WORKMANSHIP:** Ball joints must be free from burrs, loose scale, sharp edges, and any other defects which might affect their serviceability.

NUMBER: MPAPS S-W-4.101-GS/PL	TITLE: <i>Ball Joints</i>	REVISION: 1506
---	-------------------------------------	---------------------------------

11.0 BALL JOINTS (NOUN CODE – 4770):

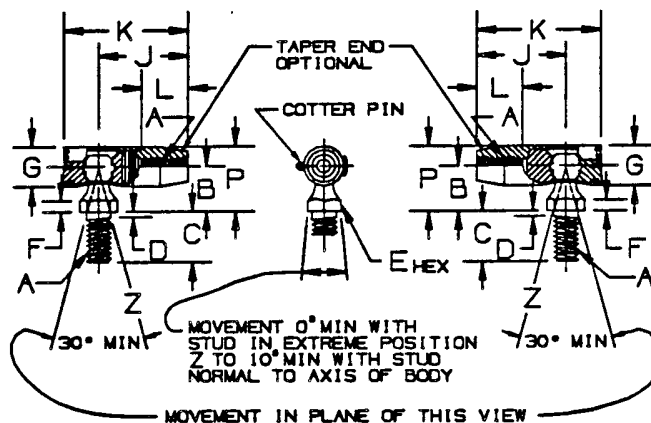
11.1 Type A, AL, B, C:



TYPE A

TYPE AL

**CRIMPED END PLUG WITH
SPRING CONSTRUCTION**



TYPE B

TYPE C

**THREADED END PLUG
WITH SPRING
CONSTRUCTION**

**THREADED END PLUG
WITHOUT SPRING
CONSTRUCTION**

DIMENSIONS OF TYPES A, AL, B, and C BALL JOINTS																			
Nominal Ball Joint Size And Thread Diameter, A	Thrds Per Inch	B	C	D	E	F	G	J	J ₁	K	K ₁	L Full	L ₁ Full	M Dia	N *	P *	Stud Ball Diameter, Ref*		
		± .02	±.02	Max	Hex	Min	Dia	± .03	± .03	± .03	± .03	Thd Min	Thd Min	+0.1 -0.0	Ref	Ref, Max	Max	Min	
No. 10 (.190)	32	.44	.44	.06	.312	.12	.38	.88	1.47	1.25	1.81	.44	.56	.20	.50	.65	.255	.250	
No. 12 (.216)	32	.44	.44	.06	.312	.12	.38	.88	1.47	1.25	1.81	.44	.56	.23	.50	.65	.255	.250	
1/4 (.250)	28	.47	.56	.06	.375	.12	.44	.97	1.81	1.38	2.25	.50	.88	.27	.50	.72	.305	.300	
5/16 (.312)	24	.53	.69	.09	.438	.16	.50	1.12	1.94	1.56	2.38	.56	1.00	.33	.50	.81	.350	.345	
3/8 (.375)	24	.69	.88	.09	.500	.19	.62	1.38	--	1.94	--	.75	--	--	--	1.03	.424	.419	
7/16 (.438)]	20	.88	1.12	.12	.625	.25	.75	1.94	--	2.62	--	1.00	--	--	--	1.28	.555	.550	
1/2 (.500)	20	.88	1.12	.12	.625	.25	.75	1.94	--	2.62	-	1.00	--	--	--	1.28	.555	.550	

*These dimensions are given for design purposes only and are not intended for inspection.

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2015 by Navistar, Inc.

JUNE 2015

Copyright Navistar International Corporation
Provided by IHS Markit under license with INTERN
No reproduction or networking permitted without license from IHS

Full document details: NAVISTAR MPAPS S-W-4.101-GS/PL 2015

Licensee=/, User=,
Not for Resale,

Documents
Document Sharing Hub
Page 3 of 8