

Procedural / Engineering Design

FNHA-3-A-235.00

Involute Splines

1. SCOPE

This standard covers Involute Splines.

2.2 This standard replaces the following company standard.

New Holland Standard 2.26.1

2. RELATED STANDARDS

3. REQUIREMENTS

2.1 REFERENCE STANDARDS

3.1 Broaches, hobs, and gauges are available for several types of involute splines. 16/32 pitch is preferred for shafts under 1-3/4 diameter.

ANSI B92.1 (1950) -
ANSI B92.1 (1960) -
86529543(FNHA-3-A-220.00) - Center Drills
86529827(FNHA-3-A-240.00) - Involute Splines
1976
86508287(FNHA-3-B-204.00) - CAD Figures for
Splines

3.1.1 16/32 Pitch, 30° Pressure Angle, Full Depth
(Data in Table 1). Hob # - 09322 (2.500 Dia.)

Table 1

Nominal Diameter	Number of Teeth	Broach Number	Pilot Diameter	Material	Max. Length of Cut
7/8	13		.747	Steel	1-3/4
1	15	18540	.872	Steel	1-1/4
1-1/8	17	18847	.998	Steel	2-1/4
1-1/4	19	81814	1.122	Steel	1-3/4
1-3/8	21	85666	1.250	Steel	2-3/4
1-1/2	23	08657	1.372	Cast Iron	4-5/8
1-5/8	25	31234	1.500	Steel	1-5/8
1-3/4	27	41775	1.622	Steel + Cast Iron	1
2	31	76492	1.872	Steel	1

					NAME	STD INV SPLINES		
					 NEW HOLLAND		ENGINEERING SPECIFICATION	
							FRAME	OF
							1	9
							PART NUMBER	
ALL	B	RLF	110244	8/97	THE INFORMATION HEREON IS THE CONFIDENTIAL AND PROPRIETARY PROPERTY OF NEW HOLLAND NORTH AMERICA, INC. AND/OR NEW HOLLAND CANADA, LTD. ANY USE, EXCEPT THAT FOR WHICH IT MAY BE LOANED, IS PROHIBITED.		86529826	
ALL	A	RE	107244	1/96			86529826	
FRAME NO.	REV	BY	ECN NO.	DATE			86529826	
APP.	DRAWN		BJFJR	1/96			86529826	
KHH 12/96	CHECKED						86529826	

Procedural / Engineering Design

FNHA-3-A-235.00

3.1.2 8/16 Pitch, 30° Pressure Angle, Full Depth
(Data in Table 2). Hob # - 09313 (2.750 Dia.)

Table 2

Nominal Diameter	Number of Teeth	Broach Number	Pilot Diameter	Material	Max. Length of Cut
1	7	40882	.765	Steel	1-1/4
1-1/4	9	15305	.997	Cast Iron	1-1/2
1-3/8	10	05547	1.122	Cast Iron	1-5/16
1-1/2	11	08658	1.247	Mallable Cast Iron	1-1/2
		11635	1.247	Cast Iron	2-1/2
1-5/8	12	04305	1.372	Steel	1-5/8
2	15	04176	1.747	Steel + Cast Iron	1-3/8
3-1/8	24	04307	2.872	Cast Iron	2
3-1/2	27	04162	3.249	Steel + Cast Iron	2-1/2
		18035	3.249	Cast Iron	1-1/8

Splines using available tooling listed in tables 1 and 2, shall be dimensioned using data from tables - and forms from section 3.1.1 of 86508287(FNHA-3-B-204). Involute splines designed for sizes other than listed in tables 1 and 2, shall also be dimensioned using forms from section 3.1.1 of 86508287(FNHA-3-B-204).

3.2 New Holland uses ASA 1950 standards for major, minor and TIF diameters, and for circular space width and circular tooth thickness. Tolerances (errors) are expressed in ASA 1960 standard terms, which are more realistic. The reason for using ASA 1950 for diameters is that the 1950 major diameters of the externally splined parts are on commercially available shaft sizes, while the ASA 1960 standards are based on externally splined parts using undersize diameter shafts that require machining, or tooling hobs. The 1950 circular space width and circular tooth thickness are used because they produce a fit that is tighter by about .001 than 1960 standards, and this can be very desirable under reciprocating loads.

The minimum effective clearance is equal to the minimum effective space width of the external part minus the maximum effective tooth thickness of the internal part. The maximum effective clearance is obtained by adding to the minimum effective clearance two machining tolerances. A minus means an interference fit.

Gauges are generally available for the above two fits and they should be used for most applications. Slightly tighter or looser fits may be obtained by varying dimensions "c" through "m" on the following data sheets for externally hobbled parts.

NOTE: All splined shafts require a center drill at the splined end for support in hobbing. See 86529543 (FNHA-3-A-220.00) for center drill dimensions.

NOTE: If no tooling exists for new applications, then ANSI B92.1, dated 1976, standards should be specified. Dimensions for 1976 standard splines are in 86529827 (FNHA-3-A-240.00).

 NEW HOLLAND	NAME				PART NUMBER	
	STD INV SPLINES				86529826	
ENGINEERING SPECIFICATION			REV. B	FRAME 2	OF 9	 86529826

3.3 EFFECTIVE CLEARANCES

Effective Clearances				
Pitch	Class A Fit		Class B Fit	
	Max.	Min.	Max.	Min
8/16	.0035	.0005	+.0017	-.0013
16/32	.0030	.0005	+.0014	-.0010

Gauges are generally available for the above two fits and they should be used for most applications. Slightly tighter or looser fits may be obtained by varying dimensions "c" through "m" on the following data sheets for externally hobbled parts.

NOTE: If no tooling exists for new applications, then ANSI B92.1, dated 1976, standards should be specified. Dimensions for 1976 standard splines are in 86529827 (FNHA-3-A-240.00).

NOTE: All splined shafts require a center drill at the splined end for support in hobbing. See 86529543 (FNHA-3-A-220.00) for center drill dimensions.

Comparison of Fits	
1976	1950 & 1960
Class "5"	Class "A"
Class "4"	Class "B"

3.4 SIZES

Tooling is available at New Holland for tapered spline fits in pitches and diameters listed under straight splines.

3.5 TAPERS

1-1/2" per foot is recommended for a good tight fit. 3" per foot is readily removable, but must be held securely endwise. Less than 1-1/2" per foot may be required under severe reversing loads, such as flywheels, tractor drive wheels, etc., however, a puller will be needed to disassemble.

For standardization of inspection gauge, use 1-1/2, 2, or 3 inches per foot tapers; for small tapers use 1" or 3/4" per foot.

3.6 CLASS OF FIT

Class A has been found satisfactory.

3.7 TOOLS

Hobs for cutting external taper splines are 3 inches O.D. (large end).

 NEW HOLLAND	ME				PART NUMBER	
	STD INV SPLINES				Documents	
ENGINEERING SPECIFICATION		REV. B	FRAME 3	OF 9	86529826	