

AEROSPACE TAPS



ZELX[®]SS

for Stainless steels

ZELX[®]NI

for Nickel base alloys

ZELX[®]TI

for Titanium alloys



Think threads with
YAMAWA

YAMAWA High Performance Taps for Aerospace Industry

The demands for tapping into heat resistant alloys and stainless steels are increasing rapidly in the Aerospace Industry. The most common heat resistant alloys are Nickel base alloys, such as A286, Inconel, Hastelloy, Waspalloy, and Titanium alloys. There are considerable difficulties in tapping these materials due to their material features which can easily cause severe damage to taps. YAMAWA has the best line of taps for such a severe tapping conditions.



ZELX[®] SS taps for Stainless steels



■ Features

- Custom blended vanadium high speed steel for high wear resistance
- Ideal cutting edge design to prevent welding
- Suitable surface treatment to prevent welding

ZELX[®] NI taps for Nickel base alloys, A286, Inconel, Hastelloy, Waspalloy



ZELX[®] TI taps for Titanium alloys



■ Features

- Premium PM high speed steel for high heat and wear resistance
- Ideal cutting edge design and thread relief for high heat resistance
- Optimum flute design to evacuate chips smoothly for each work material
- Suitable surface treatment to prevent welding and enhance wear resistance



Aerospace Taps Series

YAMAWA has assorted "ZELX series" taps for threading stainless steel, titanium alloys and nickel-based alloys that are used in many aircraft parts.

◆For through hole◆

Spiral Pointed Taps for Stainless Steels

ZELX[®] SS



Size Ranges
UNJC...No.4~1"
UNJF...No.4~1"



- | List No. | Description |
|----------|--|
| 3218 | Machine Screw sizes with oxide surface treatment |
| 3228 | Fractional sizes with oxide surface treatment |
| 3218T | Machine Screw sizes with TiN (Titanium Nitride) |
| 3228T | Fractional sizes with TiN (Titanium Nitride) |

Suitable work materials
303 STAINLESS STEEL
304 STAINLESS STEEL
410 STAINLESS STEEL
8740 (SNCM240)

Spiral Pointed Taps for Nickel Base Alloys

ZELX[®] NI



Size Ranges
UNJC...No.4~3/4
UNJF...No.6~3/4



- | List No. | Description |
|----------|---------------------|
| 3612 | Machine Screw sizes |
| 3622 | Fractional sizes |

Suitable work materials
INCONEL718, 750
Waspalloy
Hastelloy
A286
15-5PH
17-4PH (SUS630)
316 STAINLESS STEEL

Left Hand Spiral Fluted Taps for Titanium Alloys

ZELX[®] TI



Size Ranges
UNJC...No.4~1/2
UNJF...No.10~1/2



- | List No. | Description |
|----------|---------------------|
| 3613 | Machine Screw sizes |
| 3623 | Fractional sizes |

Suitable work materials
Titanium alloys (Ti-6Al-4V)

◆For blind hole◆

Spiral Fluted Taps for Stainless Steels

ZELX[®] SS



Size Ranges
UNJC...No.4~1"
UNJF...No.4~1"



- | List No. | Description |
|----------|--|
| 3318 | Machine Screw sizes with oxide surface treatment |
| 3328 | Fractional sizes with oxide surface treatment |
| 3318T | Machine Screw sizes with TiN (Titanium Nitride) |
| 3328T | Fractional sizes with TiN (Titanium Nitride) |

Suitable work materials
303 STAINLESS STEEL
304 STAINLESS STEEL
410 STAINLESS STEEL
8740 (SNCM240)

Spiral Fluted Taps for Nickel Base Alloys

ZELX[®] NI



Size Ranges
UNJC...No.4~3/4
UNJF...No.4~5/8



- | List No. | Description |
|----------|---------------------|
| 3615 | Machine Screw sizes |
| 3625 | Fractional sizes |

Suitable work materials
INCONEL718, 750
Waspalloy
Hastelloy
A286
15-5PH
17-4PH (SUS630)
316 STAINLESS STEEL

Spiral Fluted Taps for Titanium Alloys

ZELX[®] TI



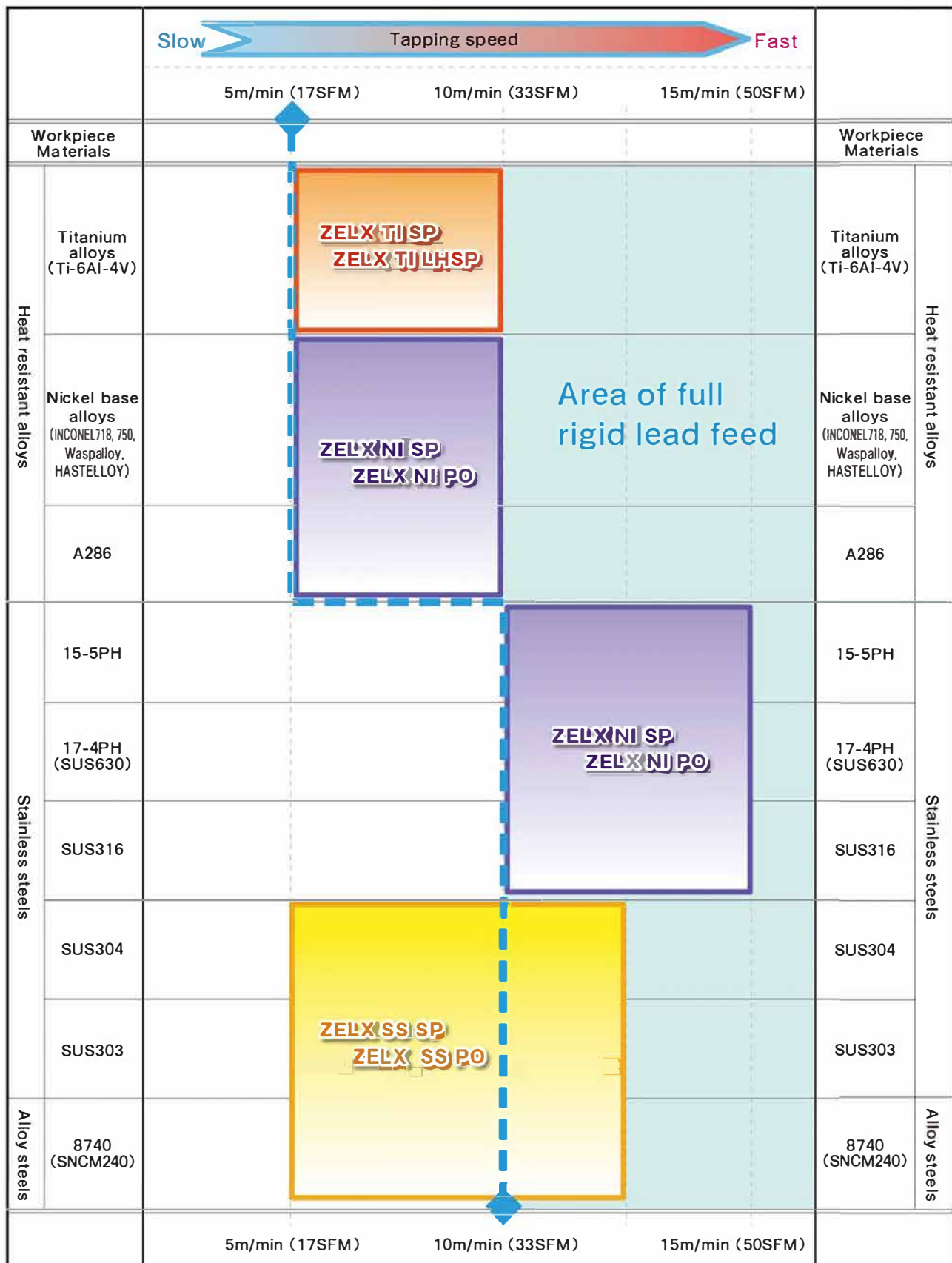
Size Ranges
UNJC...No.4~1/2
UNJF...No.10~1/2



- | List No. | Description |
|----------|---------------------|
| 3613 | Machine Screw sizes |
| 3623 | Fractional sizes |

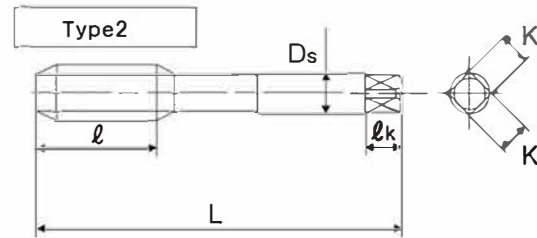
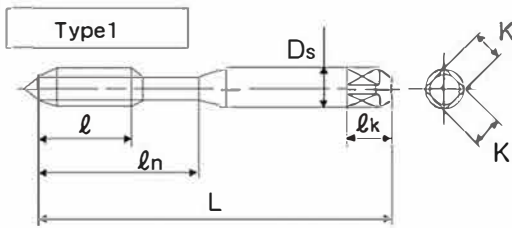
Suitable work materials
Titanium alloys (Ti-6Al-4V)

YAMAWA Products Chart for AEROSPACE INDUSTRY



An image telling possible applications

Taps Dimension



Size	OAL (L)	Thread length (ℓ)		Neck length (ℓn)	Shank dia (Ds)	Size of Square (K)	Square length (ℓk)	Type
		ZELX SS PO ZELX NI PO ZELX TI LHSP	ZELX SS SP ZELX NI SP ZELX TI SP					
No.2-56UNC	1.75	0.256	0.157	0.438	0.141	0.11	0.19	1
No.3-48UNC	1.81	0.295	0.197	0.5	0.141	0.11	0.19	1
No.4-40UNC	1.88	0.335	0.236	0.563	0.141	0.11	0.19	1
No.4-48UNF	1.88	0.335	0.236	0.563	0.141	0.11	0.19	1
No.5-40UNC	1.94	0.374	0.236	0.625	0.141	0.11	0.19	1
No.6-32UNC	2	0.413	0.276	0.688	0.141	0.11	0.19	1
No.6-40UNF	2	0.413	0.276	0.688	0.141	0.11	0.19	1
No.8-32UNC	2.13	0.453	0.276	0.75	0.168	0.131	0.25	1
No.8-36UNF	2.13	0.453	0.276	0.75	0.168	0.131	0.25	1
No.10-24UNC	2.38	0.531	0.354	0.875	0.194	0.152	0.25	1
No.10-32UNF	2.38	0.531	0.276	0.875	0.194	0.152	0.25	1
No.12-24UNC	2.38	0.571	0.354	0.938	0.22	0.165	0.28	1
No.12-28UNF	2.38	0.571	0.276	0.938	0.22	0.165	0.28	1
1/4-20UNC	2.5	0.591	0.433	1	0.255	0.191	0.31	1
1/4-28UNF	2.5	0.591	0.354	1	0.255	0.191	0.31	1
5/16-18UNC	2.72	0.669	0.472	1.125	0.318	0.238	0.38	1
5/16-24UNF	2.72	0.669	0.394	1.125	0.318	0.238	0.38	1
3/8-16UNC	2.94	0.748	0.551	1.25	0.381	0.286	0.44	1
3/8-24UNF	2.94	0.748	0.394	1.25	0.381	0.286	0.44	1
7/16-14UNC	3.16	0.866	0.591	-	0.323	0.242	0.41	2
7/16-20UNF	3.16	0.866	0.472	-	0.323	0.242	0.41	2
1/2-13UNC	3.38	0.984	0.63	-	0.367	0.275	0.44	2
1/2-20UNF	3.38	0.984	0.472	-	0.367	0.275	0.44	2
9/16-12UNC	3.59	0.984	0.709	-	0.429	0.322	0.5	2
9/16-18UNF	3.59	0.984	0.512	-	0.429	0.322	0.5	2
5/8-11UNC	3.81	1.083	0.748	-	0.48	0.36	0.56	2
5/8-18UNF	3.81	1.083	0.512	-	0.48	0.36	0.56	2
3/4-10UNC	4.25	1.201	0.827	-	0.59	0.442	0.69	2
3/4-16UNF	4.25	1.201	0.591	-	0.59	0.442	0.69	2
7/8-9UNC	4.69	1.339	0.827	-	0.697	0.523	0.75	2
7/8-14UNF	4.69	1.339	0.709	-	0.697	0.523	0.75	2
1-8UNC	5.13	1.496	0.984	-	0.8	0.6	0.81	2
1-12UNF	5.13	1.496	0.709	-	0.8	0.6	0.81	2
1"1/8-7UNC	5.44	1.535	1.181	-	0.896	0.672	0.88	2
1"1/8-12UNF	5.44	1.535	0.787	-	0.896	0.672	0.88	2
1"1/4-7UNC	5.75	1.535	1.181	-	1.021	0.766	1	2
1"1/4-12UNF	5.75	1.535	0.787	-	1.021	0.766	1	2
1"3/8-6UNC	6.06	1.811	1.575	-	1.108	0.831	1.06	2
1"3/8-12UNF	6.06	1.811	0.787	-	1.108	0.831	1.06	2
1"1/2-6UNC	6.38	1.811	1.575	-	1.233	0.925	1.13	2
1"1/2-12UNF	6.38	1.811	0.787	-	1.233	0.925	1.13	2
1"3/4-5UNC	7	1.929	1.772	-	1.43	1.072	1.25	2
2-4.5UNC	7.63	1.929	1.969	-	1.644	1.233	1.38	2

Unit : inch

ZELX[®] SS

Spiral Pointed Taps for Stainless Steels

For Unified threads



ZELX SS taps are suitable for UNJ Aerospace internal threading applications

- List 3218 Machine Screw sizes with oxide surface treatment
 3228 Fractional sizes with oxide surface treatment
 3218T Machine Screw sizes with TiN (Titanium Nitride)
 3228T Fractional sizes with TiN (Titanium Nitride)

Custom Blended Vanadium High Speed Steel
 Plug Style
 (3 to 5 threads chamfered)

TPI			No. of Flutes	Pitch Diameter Limit / EDP Numbers									Dimensions		
Nominal Size	UNJC UNC	UNJF UNF		H2	H2 TiN	H3	H3 TiN	H4	H4 TiN	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	382623	—	382624	—	—	—	—	—	—	.256	.181	1-3/4
3	48	—	2	382600	—	—	—	—	—	—	—	—	.295	.205	1-13/16
4	40	—	2	382601	382901	382602	—	382612	—	382634	—	—	.335	.227	1-7/8
4	—	48	2	382683	—	—	—	—	—	—	—	—	.335	.227	1-7/8
5	40	—	3	382603	382903	—	—	—	—	—	—	—	.374	.251	1-15/16
6	32	—	3	382604	—	382605	382905	382608	—	382635	382659	382665	.413	.274	2
6	—	40	3	382684	—	—	—	—	—	—	—	—	.413	.274	2
8	32	—	3	382606	—	382607	382907	382629	—	382637	382660	382667	.453	.297	2-1/8
8	—	36	3	382686	—	—	—	—	—	—	—	—	.453	.297	2-1/8
10	24	—	3	—	—	382609	382909	—	—	382639	382690	382669	.531	.344	2-3/8
10	—	32	3	382611	—	382610	382910	382630	—	382640	382661	382670	.531	.344	2-3/8
12	24	—	3	—	—	382688	—	—	—	—	—	—	.571	.366	2-3/8
12	—	28	3	—	—	382689	—	—	—	—	—	—	.571	.366	2-3/8
1/4	20	—	3	—	—	382613	382913	—	—	382643	382590	382673	.591	.409	2-1/2
1/4	—	28	3	—	—	382614	382914	382631	—	382644	382662	382674	.591	.409	2-1/2
5/16	18	—	3	—	—	382615	382915	—	—	382645	—	382675	.669	.456	2-23/32
5/16	—	24	3	—	—	382616	382916	382632	—	382646	382663	382676	.669	.456	2-23/32
3/8	16	—	3	—	—	382617	382917	—	—	382647	—	382668	.748	.502	2-15/16
3/8	—	24	3	—	—	382618	382918	382633	—	382648	382664	382678	.748	.502	2-15/16
7/16	14	—	3	—	—	382619	382919	—	—	382649	—	—	.866	—	3-5/32
7/16	—	20	3	—	—	382620	382920	—	—	382650	382691	382680	.866	—	3-5/32
1/2	13	—	3	—	—	382621	382921	—	—	382651	—	382681	.984	—	3-3/8
1/2	—	20	3	—	—	382622	382922	—	—	382652	382692	382682	.984	—	3-3/8
9/16	12	—	3	—	—	382653	382953	—	—	—	—	—	.984	—	3-19/32
9/16	—	18	3	—	—	382654	382954	—	—	—	—	—	.984	—	3-19/32
5/8	11	—	3	—	—	382625	382925	—	—	382655	—	—	1.083	—	3-13/16
5/8	—	18	3	—	—	382626	382926	382636	—	382656	382694	382591	1.083	—	3-13/16
3/4	10	—	3	—	—	382627	382927	—	—	382657	—	—	1.201	—	4-1/4
3/4	—	16	3	—	—	382628	382928	—	—	382658	—	382592	1.201	—	4-1/4
7/8	9	—	3	—	—	—	—	382695	382995	—	—	—	1.339	—	4-11/16
7/8	—	14	3	—	—	—	—	382696	382996	—	382699	—	1.339	—	4-11/16
1	8	—	3	—	—	—	—	382697	382997	—	—	—	1.496	—	5-1/8
1	—	12	3	—	—	—	—	382679	—	—	—	—	1.496	—	5-1/8
1-1/8	7	—	4	—	—	—	—	—	—	—	382700	—	1.535	—	5-7/16
1-1/8	—	12	4	—	—	—	—	—	—	382701	—	—	1.535	—	5-7/16
1-1/4	7	—	4	—	—	—	—	—	—	—	382702	—	1.535	—	5-3/4
1-1/4	—	12	4	—	—	—	—	—	—	382703	—	—	1.535	—	5-3/4
1-3/8	6	—	4	—	—	—	—	—	—	—	382705	—	1.811	—	6-1/16
1-3/8	—	12	4	—	—	—	—	—	—	382706	—	—	1.811	—	6-1/16
1-1/2	6	—	4	—	—	—	—	—	—	—	382707	—	1.811	—	6-3/8
1-1/2	—	12	4	—	—	—	—	—	—	382708	—	—	1.811	—	6-3/8
1-3/4	5	—	4	—	—	—	—	—	—	—	—	382709	1.929	—	7
2	—	4-1/2	4	—	—	—	—	—	—	—	—	382710	1.929	—	7-5/8



ZELX SS taps are suitable for UNJ Aerospace internal threading applications

- List 3318 Machine Screw sizes with steam oxide surface treatment
 3328 Fractional sizes with steam oxide surface treatment
 3318T Machine Screw sizes with TiN (Titanium Nitride)
 3328T Fractional sizes with TiN (Titanium Nitride)

Modified Bottoming Style
 (2-1/2 to 3-1/2 threads chamfered)

TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers									Dimensions		
Nominal Size	UNJC UNC	UNJF UNF	H2	H2 TiN	H3	H3 TiN	H4	H4 TiN	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	384623	—	—	—	—	—	—	—	.157	.280	1-3/4
3	48	—	2	384600	—	—	—	—	—	—	—	.197	.303	1-13/16
4	40	—	2	384601	384901	384602	—	384629	—	384634	—	.236	.326	1-7/8
4	—	48	2	384683	—	—	—	—	—	—	—	.236	.326	1-7/8
5	40	—	3	384603	384903	—	—	—	—	—	—	.236	.389	1-15/16
6	32	—	3	384604	—	384605	384905	384636	—	384635	384659	.276	.411	2
6	—	40	3	384684	—	384685	—	—	—	—	—	.276	.411	2
8	32	—	3	384606	—	384607	384907	—	—	384637	384660	.276	.474	2-1/8
8	—	36	3	—	—	384687	—	—	—	—	—	.276	.474	2-1/8
10	24	—	3	384624	—	384609	384909	—	—	384639	384690	.354	.521	2-3/8
10	—	32	3	384611	—	384610	384910	384630	—	384640	384662	.276	.599	2-3/8
12	24	—	3	—	—	384688	—	—	—	—	—	.354	.583	2-3/8
12	—	28	3	—	—	384689	—	—	—	—	—	.276	.661	2-3/8
1/4	20	—	3	—	—	384613	384913	—	—	384643	—	.433	.567	2-1/2
1/4	—	28	3	—	—	384614	384914	384631	—	384644	384664	.354	.646	2-1/2
5/16	18	—	3	—	—	384615	384915	—	—	384645	—	.472	.653	2-23/32
5/16	—	24	3	—	—	384616	384916	384632	—	384646	—	.394	.731	2-23/32
3/8	16	—	3	—	—	384617	384917	—	—	384647	—	.551	.699	2-15/16
3/8	—	24	3	—	—	384618	384918	384633	—	384648	—	.394	.856	2-15/16
7/16	14	—	3	—	—	384619	384919	—	—	384649	—	.591	—	3-5/32
7/16	—	20	3	—	—	384620	384920	—	—	384650	384691	.472	—	3-5/32
1/2	13	—	3	—	—	384621	384921	—	—	384651	—	.630	—	3-3/8
1/2	—	20	3	—	—	384622	384922	—	—	384652	384692	.472	—	3-3/8
9/16	12	—	3	—	—	384653	384953	—	—	—	—	.709	—	3-19/32
9/16	—	18	3	—	—	384654	384954	—	—	384698	—	.512	—	3-19/32
5/8	11	—	3	—	—	384625	384925	—	—	384655	—	.748	—	3-13/16
5/8	—	18	3	—	—	384626	384926	—	—	384656	—	.512	—	3-13/16
3/4	10	—	4	—	—	384627	384927	—	—	384657	—	.827	—	4-1/4
3/4	—	16	4	—	—	384628	384928	—	—	384658	—	.591	—	4-1/4
7/8	9	—	4	—	—	—	—	384695	384995	—	—	.827	—	4-11/16
7/8	—	14	4	—	—	—	—	384696	384996	—	—	.709	—	4-11/16
1	8	—	4	—	—	—	—	384697	384997	—	—	.984	—	5-1/8
1	—	12	4	—	—	—	—	384668	—	—	—	.709	—	5-1/8
1-1/8	7	—	4	—	—	—	—	—	—	384701	—	1.181	—	5-7/16
1-1/8	—	12	4	—	—	—	—	—	—	384702	—	0.787	—	5-7/16
1-1/4	7	—	4	—	—	—	—	—	—	384703	—	1.181	—	5-3/4
1-1/4	—	12	4	—	—	—	—	—	—	384705	—	0.787	—	5-3/4
1-3/8	6	—	4	—	—	—	—	—	—	384706	—	1.575	—	6-1/16
1-3/8	—	12	4	—	—	—	—	—	—	384707	—	0.787	—	6-1/16
1-1/2	6	—	4	—	—	—	—	—	—	384709	—	1.575	—	6-3/8
1-1/2	—	12	4	—	—	—	—	—	—	384711	—	0.787	—	6-3/8
1-3/4	5	—	4	—	—	—	—	—	—	—	384714	1.772	—	7
2	4-1/2	—	4	—	—	—	—	—	—	—	384715	1.969	—	7-5/8



ZELX NI taps are suitable for UNJ Aerospace internal threading applications

List 3612 Machine Screw sizes
3622 Fractional sizes

Plug Style
(3 to 5 threads chamfered)
Taps have an oxide and nitride surface toughening treatment.

TPI			No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
Nominal Size	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	385523	—	—	—	—	—	.256	.181	1-3/4
4	40	—	2	385501	385502	385504	—	—	—	.335	.227	1-7/8
5	40	—	3	385503	—	—	—	—	—	.374	.251	1-5/16
6	32	—	3	—	385505	385524	385535	—	—	.413	.274	2
6	—	40	3	385512	—	—	—	—	—	.413	.274	2
8	32	—	3	—	385507	385529	385537	385560	385567	.453	.297	2-1/8
10	24	—	3	—	385509	—	385539	—	—	.531	.344	2-3/8
10	—	32	3	—	385510	385530	385540	385561	385570	.531	.344	2-3/8
1/4	20	—	3	—	385513	—	385543	—	—	.591	.409	2-1/2
1/4	—	28	3	—	385514	385531	385544	385562	385574	.591	.409	2-1/2
5/16	18	—	3	—	385515	—	385545	—	—	.669	.456	2-23/32
5/16	—	24	3	—	385516	385532	385546	385563	385576	.669	.456	2-23/32
3/8	16	—	3	—	385517	—	385547	—	385553	.748	.502	2-15/16
3/8	—	24	3	—	385518	385533	385548	385564	385578	.748	.502	2-15/16
7/16	14	—	3	—	385519	—	385549	—	—	.866	—	3-5/32
7/16	—	20	3	—	385520	—	385550	—	—	.866	—	3-5/32
1/2	13	—	3	—	385521	—	385551	—	385581	.984	—	3-3/8
1/2	—	20	3	—	385522	—	385552	—	385582	.984	—	3-3/8
5/8	11	—	3	—	385525	—	385555	—	385585	1.083	—	3-13/16
5/8	—	18	3	—	385526	—	385556	—	385586	1.083	—	3-13/16
3/4	10	—	3	—	385527	—	385557	—	—	1.201	—	4-1/4
3/4	—	16	3	—	385528	—	385558	—	—	1.201	—	4-1/4

ZELX® NI

Spiral Fluted Taps for Nickel Base Alloys
For Unified threads



ZELX NI taps are suitable for UNJ Aerospace internal threading applications

List 3615 Machine Screw sizes
3625 Fractional sizes

Modified Bottoming Style
(3 to 4 threads chamfered)

Taps have an oxide and nitride surface toughening treatment.

TPI			No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
Nominal Size	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	387523	—	—	—	—	—	.157	.280	1-3/4
4	40	—	3	387501	387502	387512	—	—	—	.236	.326	1-7/8
5	40	—	3	387504	—	—	—	—	—	.236	.389	1-15/16
6	32	—	3	—	387505	—	387535	—	—	.276	.411	2
8	32	—	3	—	387507	387529	387537	—	—	.276	.474	2-1/8
10	24	—	3	—	387509	—	387539	—	—	.354	.521	2-3/8
10	—	32	3	—	387510	387530	387540	387561	387570	.276	.599	2-3/8
1/4	20	—	3	—	387513	—	387543	—	—	.433	.567	2-1/2
1/4	—	28	3	—	387514	387531	387544	387562	387574	.354	.646	2-1/2
5/16	18	—	3	—	387515	—	387545	—	—	.472	.653	2-23/32
5/16	—	24	3	—	387516	387532	387546	387563	—	.394	.731	2-23/32
3/8	16	—	3	—	387517	—	387547	—	—	.551	.699	2-15/16
3/8	—	24	3	—	387518	387533	387548	387564	387578	.394	.856	2-15/16
7/16	14	—	3	—	387519	—	387549	—	—	.591	—	3-5/32
7/16	—	20	3	—	387520	—	387050	—	—	.472	—	3-5/32
1/2	13	—	3	—	387521	—	387551	—	—	.630	—	3-3/8
1/2	—	20	3	—	387522	—	—	—	387582	.472	—	3-3/8
5/8	11	—	4	—	387525	—	387555	—	387585	.748	—	3-13/16
5/8	—	18	4	—	387526	—	387556	—	—	.512	—	3-13/16
3/4	10	—	4	—	387527	—	387557	—	—	.827	—	4-1/4
3/4	—	16	4	—	387528	—	387558	—	—	.591	—	4-1/4

ZELX® TI

Left Hand Spiral Fluted Taps for Titanium Alloys
For Unified threads



ZELX TI taps are suitable for UNJ Aerospace internal threading applications

List 3613 Machine Screw sizes
3623 Fractional sizes

Plug Style
(4.5 to 6 threads chamfered)
Taps have a nitride surface toughening treatment.

TPI			No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
Nominal Size	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	385623	—	—	—	—	—	.256	.181	1-3/4
4	40	—	3	385601	—	—	—	—	—	.335	.227	1-7/8
5	40	—	3	385603	—	—	—	—	—	.374	.251	1-15/16
6	32	—	3	—	385605	—	385635	—	—	.413	.274	2
8	32	—	3	—	385607	385629	385637	—	—	.453	.297	2-1/8
10	24	—	3	—	385609	—	385639	—	—	.531	.344	2-3/8
10	—	32	3	—	385610	385630	385640	—	385670	.531	.344	2-3/8
1/4	20	—	3	—	385613	—	385643	—	—	.591	.409	2-1/2
1/4	—	28	3	—	385614	385631	385644	385662	—	.591	.409	2-1/2
5/16	18	—	3	—	385615	—	385645	—	—	.669	.456	2-23/32
5/16	—	24	3	—	385616	—	—	—	—	.669	.456	2-23/32
3/8	16	—	3	—	385617	—	—	—	—	.748	.502	2-15/16
3/8	—	24	3	—	385618	385633	—	—	—	.748	.502	2-15/16
7/16	14	—	3	—	385619	—	—	—	—	.866	—	3-5/32
7/16	—	20	3	—	385620	—	385650	—	—	.866	—	3-5/32
1/2	13	—	3	—	385621	—	385651	—	—	.984	—	3-3/8
1/2	—	20	3	—	385622	—	385652	—	—	.984	—	3-3/8

ZELX® TI

Spiral Fluted Taps for Titanium Alloys

For Unified threads



ZELX TI taps are suitable for UNJ Aerospace internal threading applications

List 3616 Machine Screw sizes
3626 Fractional sizes

Taps have a nitride surface toughening treatment

Modified Bottoming Style
(3 to 4 threads chamfered)

TPI			No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
Nominal Size	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	387623	—	—	—	—	—	.157	.280	1-3/4
4	40	—	3	387601	—	387612	—	—	—	.236	.326	1-7/8
6	32	—	3	—	387605	—	387635	—	—	.276	.411	2
8	32	—	3	—	387607	—	387637	387660	—	.276	.474	2-1/8
10	24	—	3	—	387609	—	—	—	—	.354	.521	2-3/8
10	—	32	3	—	387610	387630	387640	—	—	.276	.599	2-3/8
1/4	20	—	3	—	387613	—	—	—	—	.433	.567	2-1/2
1/4	—	28	3	—	387614	387631	387644	—	—	.354	.646	2-1/2
5/16	18	—	3	—	387615	—	—	—	—	.472	.653	2-23/32
5/16	—	24	3	—	387616	—	—	—	—	.394	.731	2-23/32
3/8	16	—	3	—	387617	—	—	—	—	.551	.699	2-15/16
3/8	—	24	3	—	387618	387633	387648	—	—	.394	.856	2-15/16
7/16	14	—	3	—	387619	—	—	—	—	.591	—	3-5/32
7/16	—	20	3	—	387620	—	387650	—	—	.472	—	3-5/32
1/2	13	—	3	—	387621	—	387626	—	—	.630	—	3-3/8
1/2	—	20	3	—	387622	—	387652	—	—	.472	—	3-3/8

Ground Thread Tap Limits

In addition to the nominal size and pitch of a tap, there is another important dimensional factor to be considered in selecting a ground thread tap for a given job. This factor is the "H" and "L" pitch diameter tap limits. "H" represents (high) above basic pitch diameter; "L" (low) is below basic pitch diameter. Tap limits have been established to provide a choice in the selection of the tap size best suited to produce the class of thread desired.

Figure 1 illustrates the numbering system and the .0005" diameter increment separation between successive limits. Since the starting point is basic pitch diameter, dividing the limit number by two establishes in thousandths of an inch, the amount the maximum tap pitch diameter is above basic in the "H" series and the amount the minimum tap pitch diameter is under basic in the "L" series.

Figure 2 illustrates the positioning of the tap limits in relation to the various classes of threads for a 1/4-20 size.

Figure 1

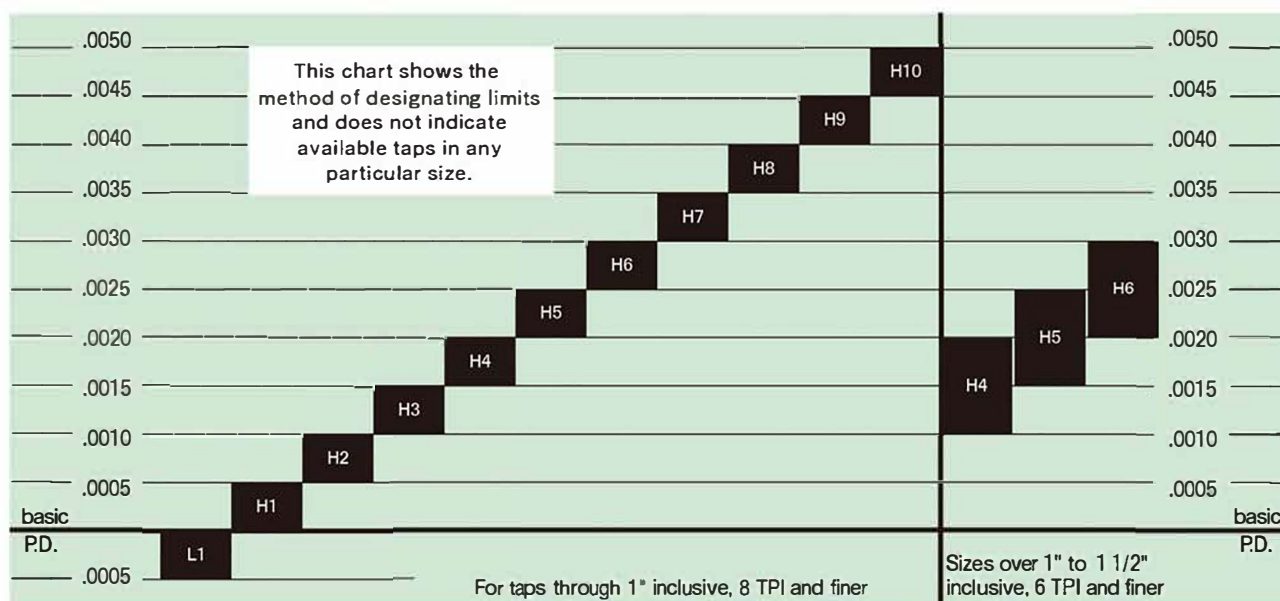
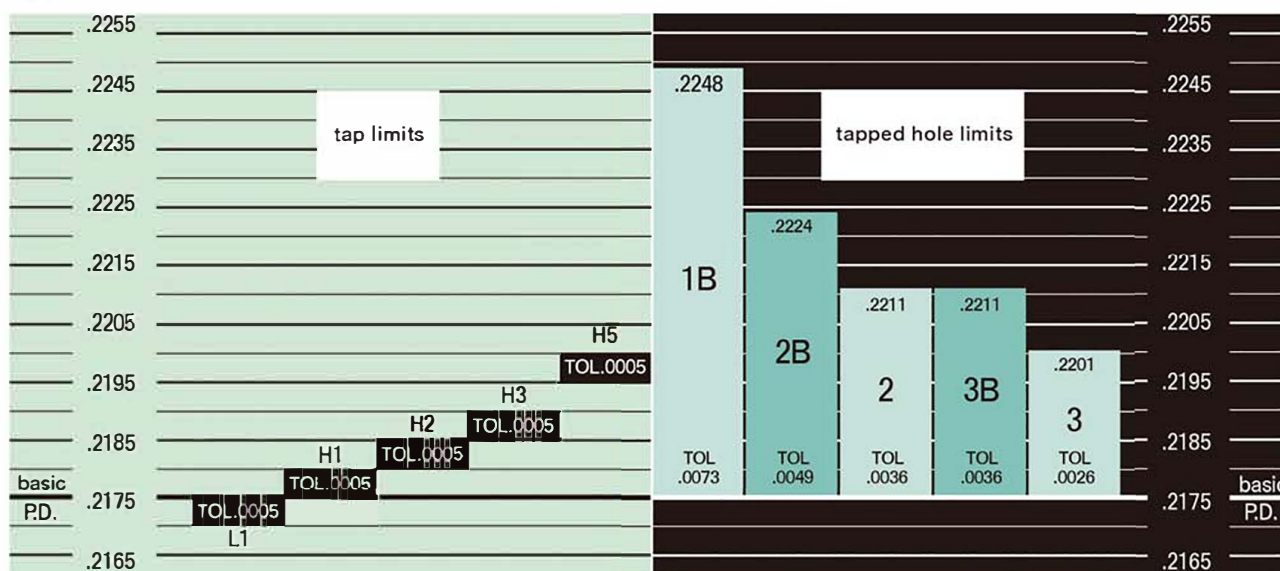


Figure 2

Class of Thread - 1/4 -20 UNC and NC



Differences between UN and UNJ threads

The minor diameter of both the external and internal screw threads of a UNJ are larger than that of a UN thread. This design is to enhance the bending and shearing strength of an external thread as per the diagrams below.

The standards for a UNJ screw thread (MIL-S-8879, AS 8879 and ISO 3161) are one of the Unified screw threads and were established for fastening parts of commercial and military aircrafts with threaded components called "Air-fastener". UNJ threads have only one combination of 3A class external threads and 3B class internal threads per size and both are the smallest tolerance for Unified threads to insure that air-fasteners are securely fastened for excessive loads.

The external screw threads of a UNJ have rounded root radii to specific tolerances for added strength. Yamawa (YMW) taps manufactured for UN threads can be used to produce internal UNJ threads per MIL-S-8879, AS 8879 and ISO 3161.

Internal threads require producing a larger minor diameter bore than those recommended for UN threads. This larger minor diameter prevents interference of external and internal threads within the tolerance for UNJ standards.

Tapping conditions must be highly accurate to produce an internal screw thread within a 3B class of thread. Thread results can be effected by tapping conditions such as feed mechanism of tapping machine, etc.

Tapping machines with synchronized tapping attachments are strongly recommended.

(1) Feature of UNJ threads:

Larger minor diameter (larger core diameter) and rounded root radii make the external screw threads of a UNJ stronger than a UN thread. Internal UNJ threads require producing a larger minor diameter bore than those recommended for UN threads while staying within the tolerance of the minor diameter for UNJ standards.

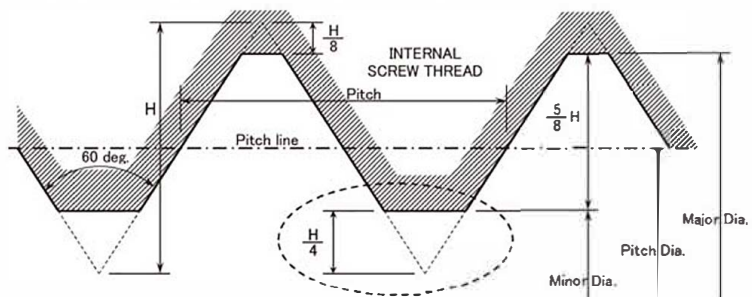
(2) Example:

Limit size for minor diameter of Unified internal threads

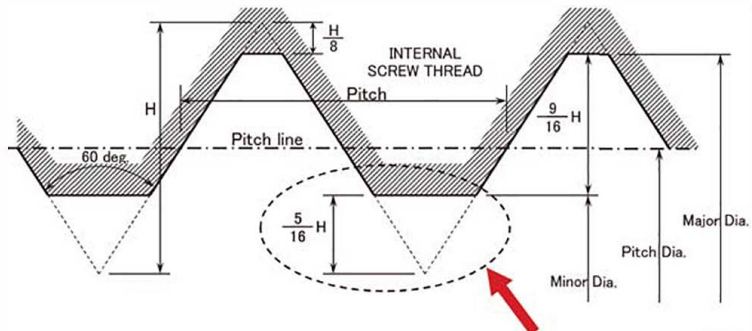
1/4-20UNC (2B) Min: 0.1960" (or 4.979mm) - Max: 0.2070" (or 5.257mm)

1/4-20UNJC (3B) Min: 0.2013" (or 5.114mm) - Max: 0.2121" (or 5.387mm)

Basic profile of UNC, UNF Internal screw thread



Basic profile of UNJC, UNJF Internal screw thread



Please Note: We need to show external minor as a radii

Our technical expertise continues to create high quality, high performance products while protecting the environment.

For more than 90 years, YAMAWA has continued to develop superior technical expertise as a pioneer in the taps and dies industry.

The Yamawa employees' technological know-how throughout its history has helped to produce many of the diverse products that have supported our growth over the years. We have established a flexible production system and a research and development system geared to the needs of our customers.

We remain committed to the development of high-quality, high-performance products, while continuing to refine and advance our technical capabilities.

YAMAWA's Unique Capabilities

Tap production involves the grinding of many features on a tap blank to produce a finished precision tool. For many years, YAMAWA has recognized the need to build these precision tap grinding machines "in house" as a means of achieving greater tool precision and higher quality tools. Today, YAMAWA makes more than 90% of its own production machines, thereby controlling tap quality from cutoff to final laser marking and measurement. Machines manufactured include machine tools to thread, flute grind, chamfer, machine tap squares, OD grind, and machines to measure all of the tap's critical elements such as thread pitch diameter. The self-reliance at YAMAWA allows us to control product quality and production capabilities by custom engineering machines not readily available in the open market. At YAMAWA, we understand how to make taps, tap manufacturing machines and tap measuring equipment.

Research and Development

To achieve maximum tapping efficiency, we analyze materials to be tapped in detail. After carefully selecting a tap base material we thoroughly control heat treatment and design. This allows us to develop and supply taps that are ideally suited to specific application.

In addition to the basic tap research taking place at our technical research center, we also have a test center where we conduct performance and durability tests on the taps produced at Yamawa to evaluate tool performance with the goal of continuous improvement.

ISO9001

Equipped with many measuring machines manufactured in-house, YAMAWA maintains a rigorous quality system that includes inspection of both the machine stage and for finished goods. This quality control system has received widespread acclaim, along with numerous awards. In 1996, the Yonezawa Plant stepped ahead of our competitors by receiving ISO9001. The Fukushima Plant and Aizu Plant were ISO9001 certified in 2000. The Tsutsumi plant were certified with ISO9001 in 2011. The headquarters were certified with ISO9001 in 2012.

ISO14001

Yamawa is proud to announce the certification of ISO14001 for all manufacturing facilities and operations. Our aim is to preserve the environment for future generation under the themes as an ecological friendly while producing the best screw threads available today. Yamawa recognizes that enterprise activities have a major influence on the earth's environments and as a large corporation we proceed with the protection and continuous improvement of the environment. Yamawa decreases the burden on environment, and respects the environmental rules as it continues to pursue an environment friendly enterprise.

Yonezawa Plant

(ISO9001: 1996)(ISO14001: 2003)



Yonezawa is the main manufacturing plant of the Yamawa Group, this location is equipped with production lines and is the Quality Control Center. The plant obtained ISO 9001 certification in 1996. Of the four Yamawa plants, the Yonezawa location has the longest history of manufacturing and the highest production capacity. Products include roll taps, spiral pointed, pipe and hand taps.

The Yonezawa Plant stepped ahead of our competitors by receiving ISO 9001 before any other cutting tool manufacturing in Japan.

Fukushima Plant

(ISO9001: 2000)(ISO14001: 2002)



The Fukushima plant provides both tap production lines and in house facilities for the manufacturing of specialized production machine tools to produce the exceptional high quality cutting tools. This plant develops and manufactures special tap and die production equipment. It also supplies these machines to our other manufacturing sites. Products include spiral fluted taps, dies and combined drills/countersinks as well as production machinery.

Aizu Plant

(ISO9001: 2000)(ISO14001: 2002)



Equipped with the most sophisticated machine tools available, this plant is famous for its automation and robotized labor saving manufacturing processes. The plant is designed for mass production of the highest quality cutting tools and screw thread tools. Products include spiral fluted taps and carbide taps.

Tsutsumi Plant

(ISO9001: 2011)(ISO14001: 2011)



The Tsutsumi plant is the main tool blank manufacturing operation of Yamawa group. This location is also the testing center where Yamawa executes the innovation in metal machining and performance tests of the products for the Yamawa group.

Head Office

(ISO9001: 2012)(ISO14001: 2003)

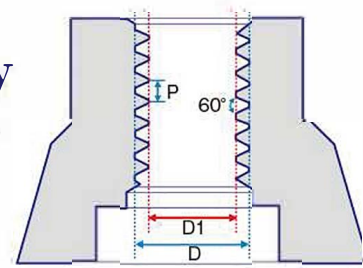


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Quality, Consistency, Performance and Product Development. All of the 800 Yamawa employees are committed to these principles and these are reflected in each tool we produce.

Threads for the aerospace industry

Recommended Drill Sizes for Tapping Internal UNJ Threads



UNJC Unified coarse thread SAE AS8879D

Nominal size (inch) D	P [T.P.I.]	Minor dia. of the internal thread D1		Recommended drill size	
		min[inch]	max[inch]	Drill size	Decimal inch
No.4 (0.112)	40	0.0877	0.0942	2.30mm	0.0906
No.5 (0.125)	40	0.1007	0.1072	2.60mm	0.1024
No.6 (0.138)	32	0.1076	0.1157	#33	0.1130
No.8 (0.164)	32	0.1336	0.1417	3.50mm	0.1378
No.10 (0.190)	24	0.1494	0.1600	3.90mm	0.1535
No.12 (0.216)	24	0.1754	0.1852	4.60mm	0.1811
1/4 (0.250)	20	0.2013	0.2121	5.30mm	0.2087
5/16 (0.313)	18	0.2584	0.2690	6.70mm	0.2638
3/8 (0.375)	16	0.3141	0.3250	8.10mm	0.3189
7/16 (0.438)	14	0.3680	0.3795	9.50mm	0.3740
1/2 (0.500)	13	0.4251	0.4368	10.90mm	0.4291
9/16 (0.563)	12	0.4814	0.4914	31/64"	0.4844
5/8 (0.625)	11	0.5365	0.5474	13.80mm	0.5433
3/4 (0.750)	10	0.6526	0.6646	16.75mm	0.6594
7/8 (0.875)	9	0.7668	0.7801	19.60mm	0.7717
1 (1.000)	8	0.8783	0.8933	22.50mm	0.8858

UNJF Unified fine thread SAE AS8879D

Nominal size (inch) D	P [T.P.I.]	Minor dia. of the internal thread D1		Recommended drill size	
		min[inch]	max[inch]	Drill size	Decimal inch
No.4 (0.112)	48	0.0917	0.0971	2.40mm	0.0945
No.5 (0.125)	44	0.1029	0.1088	2.70mm	0.1063
No.6 (0.138)	40	0.1137	0.1202	3.00mm	0.1181
No.8 (0.164)	36	0.1370	0.1442	#28	0.1405
No.10 (0.190)	32	0.1596	0.1675	4.20mm	0.1654
No.12 (0.216)	28	0.1812	0.1896	#13	0.1850
1/4 (0.250)	28	0.2152	0.2229	7/32"	0.2188
5/16 (0.313)	24	0.2719	0.2799	7.00mm	0.2756
3/8 (0.375)	24	0.3344	0.3417	8.60mm	0.3386
7/16 (0.438)	20	0.3888	0.3970	10.00mm	0.3937
1/2 (0.500)	20	0.4513	0.4591	11.60mm	0.4567
9/16 (0.563)	18	0.5084	0.5166	13.00mm	0.5118
5/8 (0.625)	18	0.5709	0.5788	14.60mm	0.5748
3/4 (0.750)	16	0.6892	0.6977	17.60mm	0.6929
7/8 (0.875)	14	0.8055	0.8152	13/16"	0.8125
1 (1.000)	12	0.9189	0.9289	59/64"	0.9219



YAMAWA Mfg. Co., Ltd.

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