

# AEROSPACE TAPS



**ZELX<sup>®</sup>SS**  
for Stainless steels

**ZELX<sup>®</sup>NI**  
for Nickel base alloys

**ZELX<sup>®</sup>TI**  
for Titanium alloys



Think threads with

**YAMAWA**



# YAMAWA High Performance Taps for Aerospace Industry

The demand for tapping into heat resistant alloys and stainless steels is 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 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

• With “ZELX series”, Yamawa has designed a range of 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<sup>®</sup> SS PO



Size Range  
 UNJC...No.2~3/4  
 UNC...No.2~2"  
 UNJF...No.4~3/4  
 UNF...No.4~1"1/2

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

Spiral Pointed Taps for Nickel Base Alloys

### ZELX<sup>®</sup> NI PO



Size Range  
 UNJC...No.2~3/4  
 UNC...No.2~3/4  
 UNJF...No.6~3/4  
 UNF...No.6~3/4

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

Left Hand Spiral Fluted Taps for Titanium Alloys

### ZELX<sup>®</sup> TI LH SP



Size Range  
 UNJC...No.2~1/2  
 UNC...No.2~1/2  
 UNJF...No.10~1/2  
 UNF...No.10~1/2

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

## ◇ For blind hole ◇

Spiral Fluted Taps for Stainless Steels

### ZELX<sup>®</sup> SS SP



Size Range  
 UNJC...No.2~3/4  
 UNC...No.2~2"  
 UNJF...No.4~3/4  
 UNF...No.4~1"1/2

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

Spiral Fluted Taps for Nickel Base Alloys

### ZELX<sup>®</sup> NI SP



Size Range  
 UNJC...No.2~3/4  
 UNC...No.2~3/4  
 UNJF...No.6~3/4  
 UNF...No.6~3/4

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

Spiral Fluted Taps for Titanium Alloys

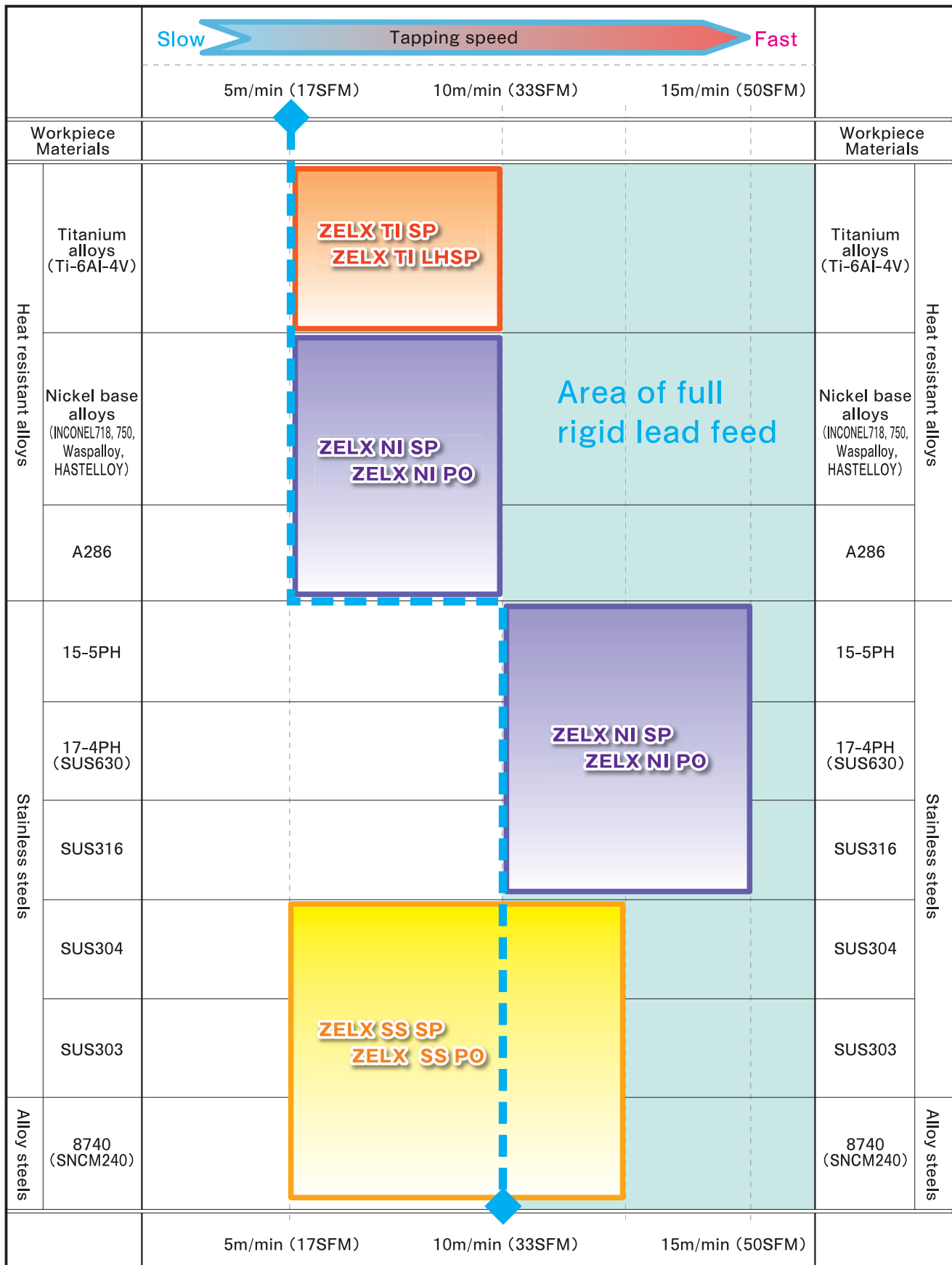
### ZELX<sup>®</sup> TI SP



Size Range  
 UNJC...No.2~1/2  
 UNC...No.2~1/2  
 UNJF...No.10~1/2  
 UNF...No.10~1/2

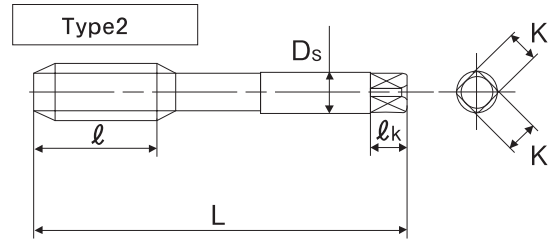
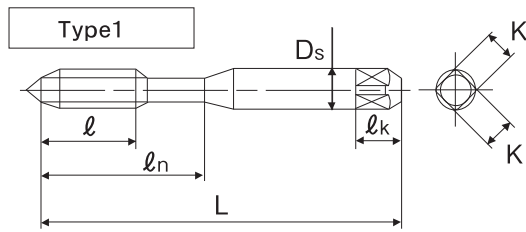
Typical work materials
Titanium alloys (Ti-6Al-4V)

# YAMAWA Products Chart for AEROSPACE INDUSTRY



An image telling possible applications

# Taps Dimension



Thread length ( $l$ )

Unit : inch

Size	OAL (L)	ZELX SS PO ZELX NI PO ZELX TI LHSP	ZELX SS SP ZELX NI SP ZELX TI SP	Neck length ( $l_n$ )	Shank dia ( $D_s$ )	Size of Square (K)	Square length ( $l_k$ )	Type
No.2-56UNC-UNJC	1.75	0.256	0.157	0.438	0.141	0.11	0.19	1
No.3-48UNC-UNJC	1.81	0.295	0.197	0.5	0.141	0.11	0.19	1
No.4-40UNC-UNJC	1.88	0.335	0.236	0.563	0.141	0.11	0.19	1
No.4-48UNF-UNJF	1.88	0.335	0.236	0.563	0.141	0.11	0.19	1
No.5-40UNC-UNJC	1.94	0.374	0.236	0.625	0.141	0.11	0.19	1
No.6-32UNC-UNJC	2	0.413	0.276	0.688	0.141	0.11	0.19	1
No.6-40UNF-UNJF	2	0.413	0.276	0.688	0.141	0.11	0.19	1
No.8-32UNC-UNJC	2.13	0.453	0.276	0.75	0.168	0.131	0.25	1
No.8-36UNF-UNJF	2.13	0.453	0.276	0.75	0.168	0.131	0.25	1
No.10-24UNC-UNJC	2.38	0.531	0.354	0.875	0.194	0.152	0.25	1
No.10-32UNF-UNJF	2.38	0.531	0.276	0.875	0.194	0.152	0.25	1
No.12-24UNC-UNJC	2.38	0.571	0.354	0.938	0.22	0.165	0.28	1
No.12-28UNF-UNJF	2.38	0.571	0.276	0.938	0.22	0.165	0.28	1
1/4-20UNC-UNJC	2.5	0.591	0.433	1	0.255	0.191	0.31	1
1/4-28UNF-UNJF	2.5	0.591	0.354	1	0.255	0.191	0.31	1
5/16-18UNC-UNJC	2.72	0.669	0.472	1.125	0.318	0.238	0.38	1
5/16-24UNF-UNJF	2.72	0.669	0.394	1.125	0.318	0.238	0.38	1
3/8-16UNC-UNJC	2.94	0.748	0.551	1.25	0.381	0.286	0.44	1
3/8-24UNF-UNJF	2.94	0.748	0.394	1.25	0.381	0.286	0.44	1
7/16-14UNC-UNJC	3.16	0.866	0.591	-	0.323	0.242	0.41	2
7/16-20UNF-UNJF	3.16	0.866	0.472	-	0.323	0.242	0.41	2
1/2-13UNC-UNJC	3.38	0.984	0.63	-	0.367	0.275	0.44	2
1/2-20UNF-UNJF	3.38	0.984	0.472	-	0.367	0.275	0.44	2
9/16-12UNC-UNJC	3.59	0.984	0.709	-	0.429	0.322	0.5	2
9/16-18UNF-UNJF	3.59	0.984	0.512	-	0.429	0.322	0.5	2
5/8-11UNC-UNJC	3.81	1.083	0.748	-	0.48	0.36	0.56	2
5/8-18UNF-UNJF	3.81	1.083	0.512	-	0.48	0.36	0.56	2
3/4-10UNC-UNJC	4.25	1.201	0.827	-	0.59	0.442	0.69	2
3/4-16UNF-UNJF	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

# ZELX<sup>®</sup> SS PO

Spiral Pointed Taps for Stainless Steels For Unified threads



TPI	Nominal Size		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
				H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	Y82623*	Y82624	—	—	—	—	.256	.181	1-3/4
3	48	—	2	Y82600*	—	—	—	—	—	.295	.205	1-13/16
4	40	—	2	Y82601*	Y82602*	Y82612	Y82634	—	—	.335	.227	1-7/8
4	—	48	2	Y82683*	—	—	—	—	—	.335	.227	1-7/8
5	40	—	3	Y82603*	—	—	—	—	—	.374	.251	1-15/16
6	32	—	3	Y82604*	Y82605*	Y82608	Y82635	Y82659	Y82665	.413	.274	2
6	—	40	3	Y82684*	—	—	—	—	—	.413	.274	2
8	32	—	3	Y82606*	Y82607*	Y82629	Y82637	Y82660	Y82667	.453	.297	2-1/8
8	—	36	3	Y82686*	—	—	—	—	—	.453	.297	2-1/8
10	24	—	3	—	Y82609*	—	Y82639	Y82690	Y82669	.531	.344	2-3/8
10	—	32	3	Y82611*	Y82610*	Y82630	Y82640	Y82661	Y82670	.531	.344	2-3/8
12	24	—	3	—	Y82688*	—	—	—	—	.571	.366	2-3/8
12	—	28	3	—	Y82689*	—	—	—	—	.571	.366	2-3/8
1/4	20	—	3	—	Y82613*	—	Y82643	Y82590	Y82673	.591	.409	2-1/2
1/4	—	28	3	—	Y82614*	Y82631	Y82644	Y82662	Y82674	.591	.409	2-1/2
5/16	18	—	3	—	Y82615*	—	Y82645	—	Y82675	.669	.456	2-23/32
5/16	—	24	3	—	Y82616*	Y82632	Y82646	Y82663	Y82676	.669	.456	2-23/32
3/8	16	—	3	—	Y82617*	—	Y82647	—	Y82668	.748	.502	2-15/16
3/8	—	24	3	—	Y82618*	Y82633*	Y82648	Y82664	Y82678	.748	.502	2-15/16
7/16	14	—	3	—	Y82619*	—	Y82649	—	—	.866	—	3-5/32
7/16	—	20	3	—	Y82620*	—	Y82650	Y82691	Y82680	.866	—	3-5/32
1/2	13	—	3	—	Y82621*	—	Y82651	—	Y82681	.984	—	3-3/8
1/2	—	20	3	—	Y82622*	—	Y82652	Y82692	Y82682	.984	—	3-3/8
9/16	12	—	3	—	Y82653*	—	—	—	—	.984	—	3-19/32
9/16	—	18	3	—	Y82654*	—	—	—	—	.984	—	3-19/32
5/8	11	—	3	—	Y82625*	—	Y82655	—	—	1.083	—	3-13/16
5/8	—	18	3	—	Y82626*	Y82636	Y82656	Y82694	Y82591	1.083	—	3-13/16
3/4	10	—	3	—	Y82627*	—	Y82657	—	—	1.201	—	4-1/4
3/4	—	16	3	—	Y82628*	—	Y82658	—	Y82592	1.201	—	4-1/4
7/8	9	—	3	—	—	Y82695	—	—	—	1.339	—	4-11/16
7/8	—	14	3	—	—	Y82696	—	Y82699	—	1.339	—	4-11/16
1	8	—	3	—	—	Y82697	—	—	—	1.496	—	5-1/8
1	—	12	3	—	—	Y82679	—	—	—	1.496	—	5-1/8
1-1/8	7	—	4	—	—	—	—	Y82700	—	1.535	—	5-7/16
1-1/8	—	12	4	—	—	—	Y82701	—	—	1.535	—	5-7/16
1-1/4	7	—	4	—	—	—	—	Y82702	—	1.535	—	5-3/4
1-1/4	—	12	4	—	—	—	Y82703	—	—	1.535	—	5-3/4
1-3/8	6	—	4	—	—	—	—	Y82705	—	1.811	—	6-1/16
1-3/8	—	12	4	—	—	—	Y82706	—	—	1.811	—	6-1/16
1-1/2	6	—	4	—	—	—	—	Y82707	—	1.811	—	6-3/8
1-1/2	—	12	4	—	—	—	Y82708	—	—	1.811	—	6-3/8
1-3/4	5	—	4	—	—	—	—	—	Y82709	1.929	—	7
2	—	4-1/2	4	—	—	—	—	—	Y82710	1.929	—	7-5/8

\* ZELX SS PO taps with H limit suitable for 3B UNJ Aerospace internal threading applications



# ZELX<sup>®</sup> SS SP

Spiral Fluted Taps for Stainless Steels For Unified threads



Nominal Size	TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	Y84623*	—	—	—	—	—	.157	.280	1-3/4
3	48	—	2	Y84600*	—	—	—	—	—	.197	.303	1-13/16
4	40	—	2	Y84601*	Y84602*	Y84629	Y84634	—	—	.236	.326	1-7/8
4	—	48	2	Y84683*	—	—	—	—	—	.236	.326	1-7/8
5	40	—	3	Y84603*	—	—	—	—	—	.236	.389	1-15/16
6	32	—	3	Y84604*	Y84605*	Y84636	Y84635	Y84659	Y84665	.276	.411	2
6	—	40	3	Y84684*	Y84685	—	—	—	—	.276	.411	2
8	32	—	3	Y84606*	Y84607*	—	Y84637	Y84660	Y84667	.276	.474	2-1/8
8	—	36	3	—	Y84687*	—	—	—	—	.276	.474	2-1/8
10	24	—	3	Y84624*	Y84609*	—	Y84639	Y84690	Y84669	.354	.521	2-3/8
10	—	32	3	Y84611*	Y84610*	Y84630	Y84640	Y84662	Y84670	.276	.599	2-3/8
12	24	—	3	—	Y84688*	—	—	—	—	.354	.583	2-3/8
12	—	28	3	—	Y84689*	—	—	—	—	.276	.661	2-3/8
1/4	20	—	3	—	Y84613*	—	Y84643	—	Y84673	.433	.567	2-1/2
1/4	—	28	3	—	Y84614*	Y84631	Y84644	Y84664	Y84674	.354	.646	2-1/2
5/16	18	—	3	—	Y84615*	—	Y84645	—	Y84675	.472	.653	2-23/32
5/16	—	24	3	—	Y84616*	Y84632	Y84646	—	Y84676	.394	.731	2-23/32
3/8	16	—	3	—	Y84617*	—	Y84647	—	Y84677	.551	.699	2-15/16
3/8	—	24	3	—	Y84618*	Y84633	Y84648	—	Y84678	.394	.856	2-15/16
7/16	14	—	3	—	Y84619*	—	Y84649	—	Y84679	.591	—	3-5/32
7/16	—	20	3	—	Y84620*	—	Y84650	Y84691	Y84680	.472	—	3-5/32
1/2	13	—	3	—	Y84621*	—	Y84651	—	Y84681	.630	—	3-3/8
1/2	—	20	3	—	Y84622*	—	Y84652	Y84692	Y84682	.472	—	3-3/8
9/16	12	—	3	—	Y84653*	—	—	—	—	.709	—	3-19/32
9/16	—	18	3	—	Y84654*	—	Y84698	—	—	.512	—	3-19/32
5/8	11	—	3	—	Y84625*	—	Y84655	—	—	.748	—	3-13/16
5/8	—	18	3	—	Y84626*	—	Y84656	—	Y84672	.512	—	3-13/16
3/4	10	—	4	—	Y84627*	—	Y84657	—	—	.827	—	4-1/4
3/4	—	16	4	—	Y84628*	—	Y84658	—	Y84686	.591	—	4-1/4
7/8	9	—	4	—	—	Y84695	—	—	—	.827	—	4-11/16
7/8	—	14	4	—	—	Y84696	—	—	—	.709	—	4-11/16
1	8	—	4	—	—	Y84697	—	—	—	.984	—	5-1/8
1	—	12	4	—	—	Y84668	—	—	—	.709	—	5-1/8
1-1/8	7	—	4	—	—	—	—	Y84701	—	1.181	—	5-7/16
1-1/8	—	12	4	—	—	—	Y84702	—	—	0.787	—	5-7/16
1-1/4	7	—	4	—	—	—	—	Y84703	—	1.181	—	5-3/4
1-1/4	—	12	4	—	—	—	Y84705	—	—	0.787	—	5-3/4
1-3/8	6	—	4	—	—	—	—	Y84706	—	1.575	—	6-1/16
1-3/8	—	12	4	—	—	—	Y84707	—	—	0.787	—	6-1/16
1-1/2	6	—	4	—	—	—	—	Y84709	—	1.575	—	6-3/8
1-1/2	—	12	4	—	—	—	Y84711	—	—	0.787	—	6-3/8
1-3/4	5	—	4	—	—	—	—	—	Y84714	1.772	—	7
2	4-1/2	—	4	—	—	—	—	—	Y84715	1.969	—	7-5/8

\* ZELX SS SP taps with H limit suitable for 3B UNJ Aerospace internal threading applications

# ZELX<sup>®</sup> NI PO

Spiral Pointed Taps for Nickel Base Alloys For Unified threads



Nominal Size	TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	2	Y85523*	—	—	—	—	—	.256	.181	1-3/4
4	40	—	2	Y85501*	Y85502*	Y85504	—	—	—	.335	.227	1-7/8
5	40	—	3	Y85503*	—	—	—	—	—	.374	.251	1-5/16
6	32	—	3	—	Y85505*	Y85524	Y85535	—	—	.413	.274	2
6	—	40	3	Y85512*	—	—	—	—	—	.413	.274	2
8	32	—	3	—	Y85507*	Y85529	Y85537	Y85560	Y85567	.453	.297	2-1/8
10	24	—	3	—	Y85509*	—	Y85539	—	—	.531	.344	2-3/8
10	—	32	3	—	Y85510*	Y85530	Y85540	Y85561	Y85570	.531	.344	2-3/8
1/4	20	—	3	—	Y85513*	—	Y85543	—	—	.591	.409	2-1/2
1/4	—	28	3	—	Y85514*	Y85531	Y85544	Y85562	Y85574	.591	.409	2-1/2
5/16	18	—	3	—	Y85515*	—	Y85545	—	—	.669	.456	2-23/32
5/16	—	24	3	—	Y85516*	Y85532	Y85546	Y85563	Y85576	.669	.456	2-23/32
3/8	16	—	3	—	Y85517*	—	Y85547	—	Y85553	.748	.502	2-15/16
3/8	—	24	3	—	Y85518*	Y85533*	Y85548	Y85564	Y85578	.748	.502	2-15/16
7/16	14	—	3	—	Y85519*	—	Y85549	—	—	.866	—	3-5/32
7/16	—	20	3	—	Y85520*	—	Y85550	—	—	.866	—	3-5/32
1/2	13	—	3	—	Y85521*	—	Y85551	—	Y85581	.984	—	3-3/8
1/2	—	20	3	—	Y85522*	—	Y85552	—	Y85582	.984	—	3-3/8
5/8	11	—	3	—	Y85525*	—	Y85555	—	Y85585	1.083	—	3-13/16
5/8	—	18	3	—	Y85526*	—	Y85556	—	Y85586	1.083	—	3-13/16
3/4	10	—	3	—	Y85527*	—	Y85557	—	—	1.201	—	4-1/4
3/4	—	16	3	—	Y85528*	—	Y85558	—	—	1.201	—	4-1/4

\* ZELX NI taps with H limit suitable for 3B UNJ Aerospace internal threading applications



# ZELX<sup>®</sup> NI SP

Spiral Fluted Taps for Nickel Base Alloys For Unified threads



Nominal Size	TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	Y87523*	—	—	—	—	—	.157	.280	1-3/4
4	40	—	3	Y87501*	Y87502*	Y87512	—	—	—	.236	.326	1-7/8
5	40	—	3	Y87504*	—	—	—	—	—	.236	.389	1-15/16
6	32	—	3	—	Y87505*	—	Y87535	—	—	.276	.411	2
8	32	—	3	—	Y87507*	Y87529	Y87537	—	—	.276	.474	2-1/8
10	24	—	3	—	Y87509*	—	Y87539	—	—	.354	.521	2-3/8
10	—	32	3	—	Y87510*	Y87530	Y87540	Y87561	Y87570	.276	.599	2-3/8
1/4	20	—	3	—	Y87513*	—	Y87543	—	—	.433	.567	2-1/2
1/4	—	28	3	—	Y87514*	Y87531	Y87544	Y87562	Y87574	.354	.646	2-1/2
5/16	18	—	3	—	Y87515*	—	Y87545	—	—	.472	.653	2-23/32
5/16	—	24	3	—	Y87516*	Y87532	Y87546	Y87563	—	.394	.731	2-23/32
3/8	16	—	3	—	Y87517*	—	Y87547	—	—	.551	.699	2-15/16
3/8	—	24	3	—	Y87518*	Y87533*	Y87548	Y87564	Y87578	.394	.856	2-15/16
7/16	14	—	3	—	Y87519*	—	Y87549	—	—	.591	—	3-5/32
7/16	—	20	3	—	Y87520*	—	Y87550	—	—	.472	—	3-5/32
1/2	13	—	3	—	Y87521*	—	Y87551	—	—	.630	—	3-3/8
1/2	—	20	3	—	Y87522*	—	—	—	Y87582	.472	—	3-3/8
5/8	11	—	4	—	Y87525*	—	Y87555	—	Y87585	.748	—	3-13/16
5/8	—	18	4	—	Y87526*	—	Y87556	—	—	.512	—	3-13/16
3/4	10	—	4	—	Y87527*	—	Y87557	—	—	.827	—	4-1/4
3/4	—	16	4	—	Y87528*	—	Y87558	—	—	.591	—	4-1/4

\* ZELX NI taps with H limit suitable for 3B UNJ Aerospace internal threading applications

# ZELX<sup>®</sup> TI LH SP

Left Hand Spiral Fluted Taps for Titanium Alloys For Unified threads



Nominal Size	TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	Y85623*	—	—	—	—	—	.256	.181	1-3/4
4	40	—	3	Y85601*	—	—	—	—	—	.335	.227	1-7/8
5	40	—	3	Y85603*	—	—	—	—	—	.374	.251	1-15/16
6	32	—	3	—	Y85605*	—	Y85635	—	—	.413	.274	2
8	32	—	3	—	Y85607*	Y85629	Y85637	—	—	.453	.297	2-1/8
10	24	—	3	—	Y85609*	—	Y85639	—	—	.531	.344	2-3/8
10	—	32	3	—	Y85610*	Y85630	Y85640	—	Y85670	.531	.344	2-3/8
1/4	20	—	3	—	Y85613*	—	Y85643	—	—	.591	.409	2-1/2
1/4	—	28	3	—	Y85614*	Y85631	Y85644	Y85662	—	.591	.409	2-1/2
5/16	18	—	3	—	Y85615*	—	Y85645	—	—	.669	.456	2-23/32
5/16	—	24	3	—	Y85616*	—	—	—	—	.669	.456	2-23/32
3/8	16	—	3	—	Y85617*	—	—	—	—	.748	.502	2-15/16
3/8	—	24	3	—	Y85618*	Y85633*	—	—	—	.748	.502	2-15/16
7/16	14	—	3	—	Y85619*	—	—	—	—	.866	—	3-5/32
7/16	—	20	3	—	Y85620*	—	Y85650	—	—	.866	—	3-5/32
1/2	13	—	3	—	Y85621*	—	Y85651	—	—	.984	—	3-3/8
1/2	—	20	3	—	Y85622*	—	Y85652	—	—	.984	—	3-3/8

\* ZELX TI taps with H limit suitable for 3B UNJ Aerospace internal threading applications

# ZELX® TI SP

Spiral Fluted Taps for Titanium Alloys For Unified threads



Nominal Size	TPI		No. of Flutes	Pitch Diameter Limit / EDP Numbers						Dimensions		
	UNJC UNC	UNJF UNF		H2	H3	H4	H5	H6	H7	Length of Thread	Length of Neck	Length Overall
2	56	—	3	Y87623*	—	—	—	—	—	.157	.280	1-3/4
4	40	—	3	Y87601*	—	Y87612	—	—	—	.236	.326	1-7/8
6	32	—	3	—	Y87605*	—	Y87635	—	—	.276	.411	2
8	32	—	3	—	Y87607*	—	Y87637	Y87660	—	.276	.474	2-1/8
10	24	—	3	—	Y87609*	—	—	—	—	.354	.521	2-3/8
10	—	32	3	—	Y87610*	Y87630	Y87640	—	—	.276	.599	2-3/8
1/4	20	—	3	—	Y87613*	—	—	—	—	.433	.567	2-1/2
1/4	—	28	3	—	Y87614*	Y87631	Y87644	—	—	.354	.646	2-1/2
5/16	18	—	3	—	Y87615*	—	—	—	—	.472	.653	2-23/32
5/16	—	24	3	—	Y87616*	—	—	—	—	.394	.731	2-23/32
3/8	16	—	3	—	Y87617*	—	—	—	—	.551	.699	2-15/16
3/8	—	24	3	—	Y87618*	Y87633*	Y87648	—	—	.394	.856	2-15/16
7/16	14	—	3	—	Y87619*	—	—	—	—	.591	—	3-5/32
7/16	—	20	3	—	Y87620*	—	Y87650	—	—	.472	—	3-5/32
1/2	13	—	3	—	Y87621*	—	Y87626	—	—	.630	—	3-3/8
1/2	—	20	3	—	Y87622*	—	Y87652	—	—	.472	—	3-3/8

\* ZELX TI taps with H limit suitable for 3B UNJ Aerospace internal threading applications

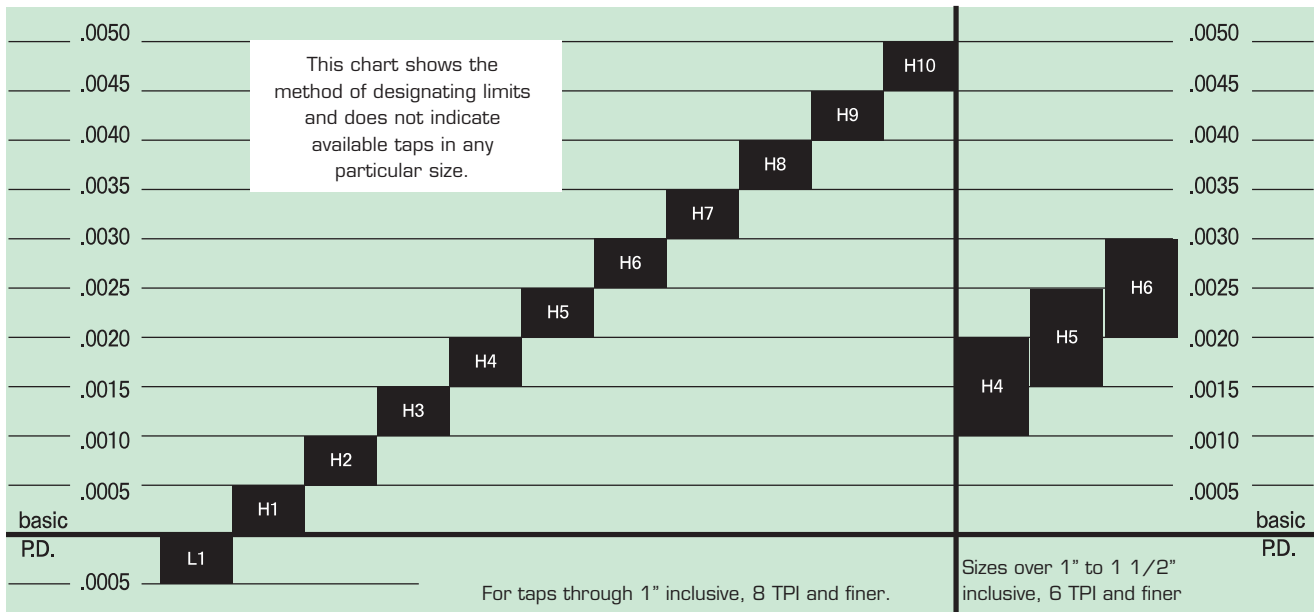
# Ground Thread Tap Limits

In addition to the nominal size and pitch of a tap, there is another important dimensional factor to be considered in selecting a group 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 thousands of an inch, the amount of the maximum tap pitch diameter is above basic in the "H" series and the amount of the minimum tap pitch diameter is under basic in the "L" series.

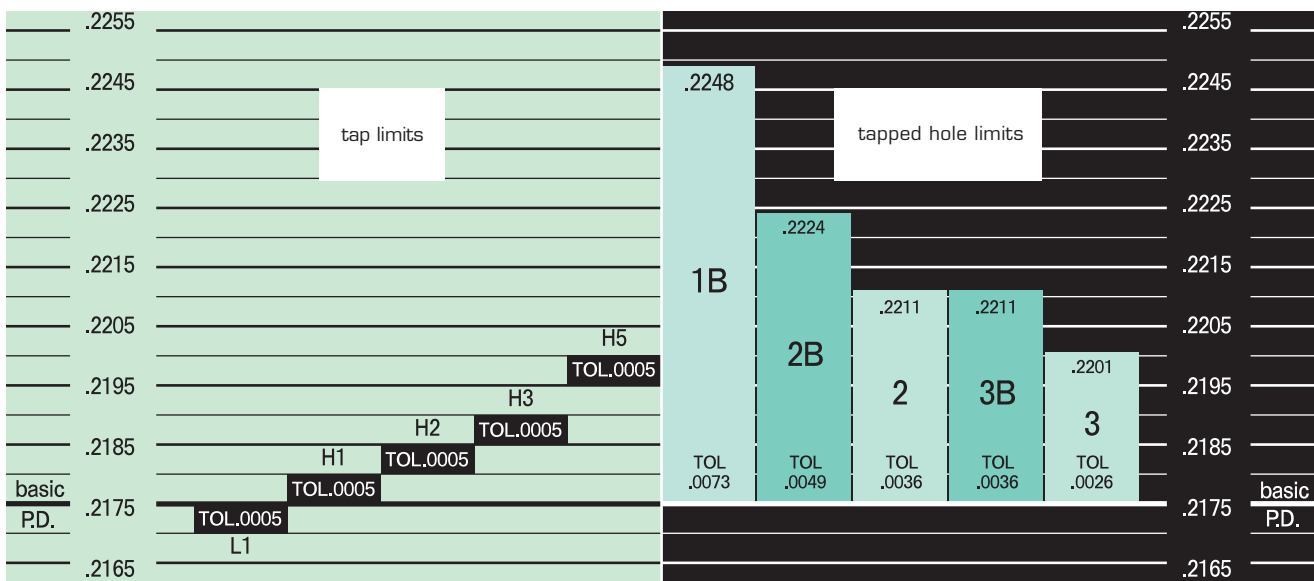
**Figure 2** illustrates the positioning of the tap limits in relation to the various classes of threads for a 1/4-20 size

**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.

UNJ screw thread (MIL-S-8879, AS8879 and ISO3161) is one of the Unified screw threads standard 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 ensure that air-fasteners are securely fastened for excessive loads.

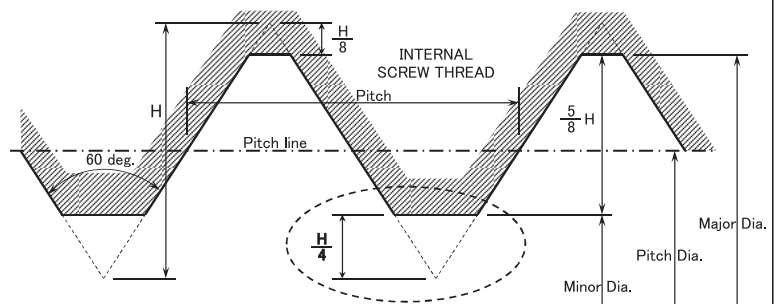
The external screw threads of a UNJ have rounded root with radius of specific tolerance for added strength. Yamawa (YMW) taps manufactured for UN threads can be used to produce internal UNJ threads per MIL-S-8879, AS 8879 and ISO 3161.

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

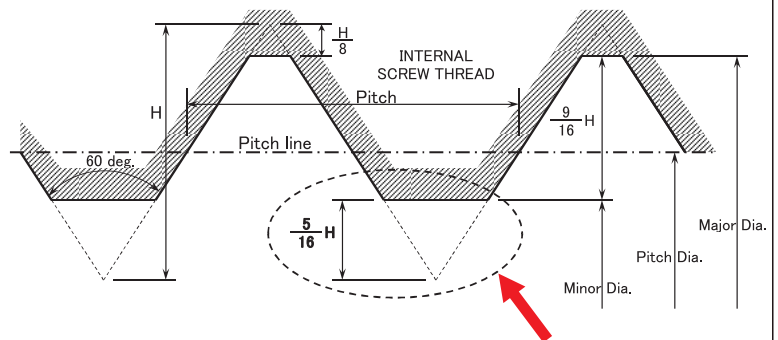
Tapping conditions must be highly accurate to produce an internal screw thread within a 3B class of thread. Thread results can be influenced by tapping conditions such as feed mechanism of tapping, machine, etc.

Tapping machines with synchronized tapping attachment are strongly recommended.

Basic profile of UNC, UNF Internal screw thread



Basic profile of UNJC, UNJF Internal screw thread



**Please Note: external threads shall be Unified form, in accordance with ASME B1.1 (Class 3A), altered at the root so that the flanks of the adjacent threads are joined by a continuous smoothly blended curve tangent to the flanks. The root radius tangent to the flanks shall be within specific values determined by the AS8879 norm**

## (1) Feature of UNJ threads:

Larger minor diameter (larger core diameter) and rounded root make the external screw threads of a UNJ stronger than a UN thread. Internal UNJ threads require a minor diameter bore larger 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 4.979 mm) - Max: 0.2070" (or 5.257 mm)

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

# 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 cut off 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 ISO9001 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 ISO9001 before any other cutting tool manufacturers 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 taps and die production equipments. 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)

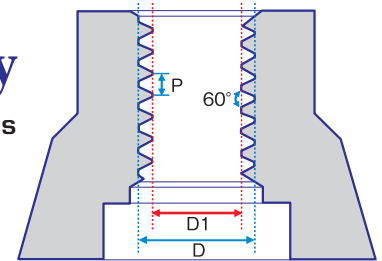


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Quality, Consistency, Performance and Product Development. All of the 800 Yamawa employees are committed to these principles and these are reflected in each tool we produce.

# Threads for the aerospace industry

## Recommended Drill Sizes for Tapping Internal UN/UNJ Threads



Size	UNC/UNF (ANSI B 1.1)					UNJC/UNJF (SAE AS8879D)				
	Minor diameter D1		Drill size	GH* tap class suitable for 2B thread tolerance		Minor diameter D1		Drill size	GH* tap class suitable for 3B thread tolerance	
	Max.	Min.				Max.	Min.			
No. 2 - 56 UNC/UNJC	1.871	1.695	1.80	GH2		1.859	1.743	1.81	GH2	
No. 2 - 64 UNF/UNJF	1.912	1.756	1.85	GH2		1.902	1.799	1.86	GH2	
No. 3 - 48 UNC/UNJC	2.146	1.941	2.10	GH2		2.136	1.999	2.10	GH2	
No. 3 - 56 UNF/UNJF	2.197	2.025	2.10	GH2		2.189	2.073	2.10	GH2	
No. 4 - 40 UNC/UNJC	2.385	2.157	2.30	GH3	GH4	2.392	2.228	2.30	GH2	GH3
No. 4 - 48 UNF/UNJF	2.458	2.271	2.40	GH2		2.466	2.330	2.40	GH2	
No. 5 - 40 UNC/UNJC	2.697	2.487	2.60	GH2		2.722	2.558	2.60	GH2	
No. 5 - 44 UNF/UNJF	2.740	2.551	2.70	GH2		2.763	2.614	2.70	GH2	
No. 6 - 32 UNC/UNJC	2.895	2.642	2.80	GH3	GH4	2.938	2.734	2.85	GH2	GH3
No. 6 - 40 UNF/UNJF	3.022	2.820	2.90	GH2		3.053	2.888	3.00	GH2	
No. 8 - 32 UNC/UNJC	3.530	3.302	3.40	GH3	GH4	3.599	3.394	3.50	GH2	GH3
No. 8 - 36 UNF/UNJF	3.606	3.404	3.50	GH3		3.662	3.480	3.60	GH2	GH3
No. 10 - 24 UNC/UNJC	3.962	3.683	3.90	GH3	GH5	4.064	3.795	4.00	GH2	GH3
No. 10 - 32 UNF/UNJF	4.165	3.963	4.10	GH3	GH4	4.254	4.054	4.20	GH2	GH3
No. 12 - 24 UNC/UNJC	4.597	4.344	4.50	GH3		4.704	4.456	4.60	GH3	
No. 12 - 28 UNF/UNJF	4.724	4.496	4.60	GH3		4.815	4.603	4.70	GH3	
1/4 - 20 UNC/UNJC	5.257	4.979	5.10	GH3	GH5	5.387	5.114	5.30	GH3	
1/4 - 28 UNF/UNJF	5.588	5.360	5.50	GH3	GH4	5.661	5.467	5.60	GH3	
5/16 - 18 UNC/UNJC	6.731	6.401	6.60	GH3	GH5	6.832	6.564	6.70	GH3	
5/16 - 24 UNF/UNJF	7.035	6.782	6.90	GH3	GH4	7.109	6.907	7.00	GH3	
3/8 - 16 UNC/UNJC	8.153	7.798	8.00	GH5		8.255	7.979	8.10	GH3	
3/8 - 24 UNF/UNJF	8.636	8.382	8.50	GH4	GH5	8.679	8.494	8.60	GH3	GH4
7/16 - 14 UNC/UNJC	9.550	9.144	9.40	GH5		9.639	9.348	9.50	GH3	
7/16 - 20 UNF/UNJF	10.033	9.729	9.90	GH5		10.083	9.876	10.00	GH3	
1/2 - 13 UNC/UNJC	11.023	10.592	10.90	GH5		11.094	10.798	11.00	GH3	
1/2 - 20 UNF/UNJF	11.607	11.329	11.50	GH5		11.661	11.464	11.60	GH3	
9/16 - 12 UNC/UNJC	12.446	11.989	12.20	GH3		12.481	12.228	12.40	GH3	
9/16 - 18 UNF/UNJF	13.081	12.751	12.90	GH3		13.121	12.914	13.00	GH3	
5/8 - 11 UNC/UNJC	13.868	13.386	13.60	GH5		13.903	13.628	13.80	GH3	
5/8 - 18 UNF/UNJF	14.681	14.351	14.50	GH5		14.701	14.501	14.60	GH3	
3/4 - 10 UNC/UNJC	16.840	16.307	16.60	GH5		16.880	16.577	16.70	GH3	
3/4 - 16 UNF/UNJF	17.678	17.323	17.50	GH5		17.721	17.506	17.60	GH3	

\* the most suitable GH tap class to cut accurate threads with 2B or 3B tolerance, depends on application condition and work-piece material. Yamawa GH class system offers a wide range of alternative tap classes allowing each customer to select the most suitable one according to application requirement.



Think threads with  
**YAMAWA**

