

# KORLOY<sup>®</sup>

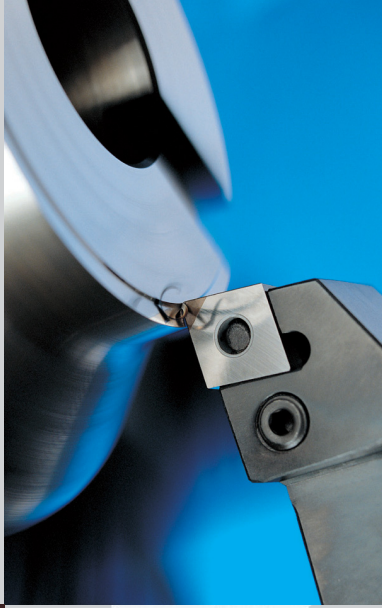
## Threading Solution



THE CUTTING TOOL PIONEER  
*We Create, You Feel!*







## Introduction

**KORLOY INC.** is a total cutting tool manufacturer who makes carbide, coated carbide and etc. Since 1966, constant innovation has led **KORLOY INC.** to be the best carbide cutting tool manufacturer in Korea, who tries to be one of the world top class in the field of cutting tool manufacture.

**KORLOY INC.** is exporting to over 52 nations through out the world. The products of **KORLOY INC.** have been getting better and better reputation by virtue of creative, progressive and technical human-resource with up-to-date manufacturing machines as well as Technology Oriented and Market Oriented Management Philosophy.

**KORLOY INC.** will do the best to be a World best cutting-tool Manufacturer hoping constant interest and support from our generous customers.



**Type of Insert**

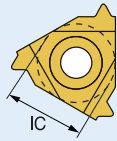
**1** E : External  
I : Internal

**Hand of Insert**

**2** R : Right Hand Insert  
L : Left Hand Insert

**Insert Size**

**3** 11 - IC 6.35  
16 - IC 9.525  
22 - IC 12.7  
27 - IC 15.875



**E** **R** **16** - **1.5** **ISO**

**1** **2** **3** **4** **5**

**Pitch**

**4**

| Full profile |        |  |
|--------------|--------|--|
| mm           | TPI    |  |
| 0.35 - 6.0   | 72 - 4 |  |

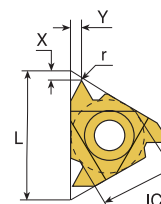
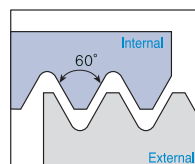
| Partial profile |            |         |
|-----------------|------------|---------|
| Code            | mm         | TPI     |
| A               | 0.5 - 1.5  | 48 - 16 |
| AG              | 0.5 - 3.0  | 48 - 8  |
| G               | 1.75 - 3.0 | 14 - 8  |
| N               | 3.5 - 5.0  | 7 - 5   |
| Q               | 5.5 - 6.0  | 4.5 - 4 |

**Thread Standard**

**5**

**60°** - Partial profile 60°  
**55°** - Partial profile 55°  
**ISO** - ISO Metric  
**UN** - American UN  
**W** - Whitworth for BSW, BSP  
**NPT** - NPT

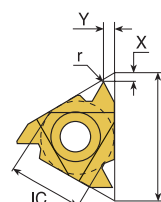
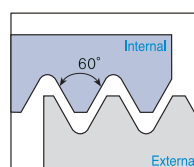
## Partial profile 60° External



| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | Pitch (mm) | TPI   | Dimensions (mm) |    |      |     |     |
|-------------------|-----------------|---------|-----------------|---------|------------|-------|-----------------|----|------|-----|-----|
|                   |                 |         |                 |         |            |       | I.C             | L  | r    | X   | Y   |
| ER(L)H□□-11(C)    | ER11-A60        | ○       | EL11-A60        | ○       | 0.5-1.5    | 48-16 | 6.35            | 11 | 0.05 | 0.8 | 0.9 |
|                   | ER16-A60        | ●       | EL16-A60        | ○       | 0.5-1.5    | 48-16 |                 |    | 0.05 | 0.8 | 0.9 |
| ER(L)H□□-16(C)    | ER16-G60        | ●       | EL16-G60        | ○       | 1.75-3.0   | 14-8  | 9.525           | 16 | 0.27 | 1.2 | 1.7 |
|                   | ER16-AG60       | ●       | EL16-AG60       | ○       | 0.5-3.0    | 48-8  |                 |    | 0.08 | 1.2 | 1.7 |
| ER(L)H□□-22(C)    | ER22-N60        | ●       | EL22-N60        | ○       | 3.5-5.0    | 7-5   | 12.7            | 22 | 0.53 | 1.7 | 2.5 |
| ER(L)H□□-27(C)    | ER27-Q60        | ○       | EL27-Q60        | ○       | 5.5-6.0    | 4.5-4 | 15.875          | 27 | 0.64 | 2.1 | 3.1 |

● : Stock Item ○ : Under preparing for stock

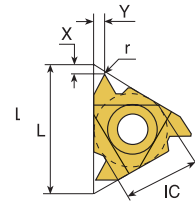
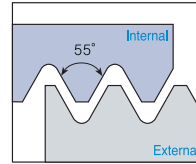
## Partial profile 60° Internal



| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | Pitch (mm) | TPI   | Dimensions (mm) |    |      |     |     |
|-------------------|-----------------|---------|-----------------|---------|------------|-------|-----------------|----|------|-----|-----|
|                   |                 |         |                 |         |            |       | I.C             | L  | r    | X   | Y   |
| IR(L)H□□-N-11     | IR11-A60        | ●       | IL11-A60        | ○       | 0.5-1.5    | 48-16 | 6.35            | 11 | 0.05 | 0.8 | 0.9 |
|                   | IR16-A60        | ●       | IL16-A60        | ○       | 0.5-1.5    | 48-16 |                 |    | 0.05 | 0.8 | 0.9 |
| IR(L)H□□-16(C)    | IR16-G60        | ●       | IL16-G60        | ○       | 1.75-3.0   | 14-8  | 9.525           | 16 | 0.16 | 1.2 | 1.7 |
|                   | IR16-AG60       | ●       | IL16-AG60       | ○       | 0.5-3.0    | 48-8  |                 |    | 0.05 | 1.2 | 1.7 |
| IR(L)H□□-22(C)    | IR22-N60        | ●       | IL22-N60        | ○       | 3.5-5.0    | 7-5   | 12.7            | 22 | 0.30 | 1.7 | 2.5 |
| IR(L)H□□-27(C)    | IR27-Q60        | ○       | IL27-Q60        | ○       | 5.5-6.0    | 4.5-4 | 15.875          | 27 | 0.30 | 1.8 | 2.7 |

● : Stock Item ○ : Under preparing for stock

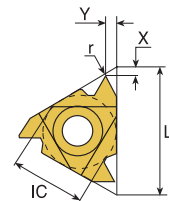
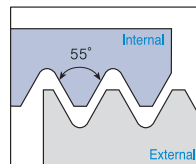
## Partial profile 55° External



| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | Pitch (mm) | TPI   | Dimensions (mm) |    |      |     |     |
|-------------------|-----------------|---------|-----------------|---------|------------|-------|-----------------|----|------|-----|-----|
|                   |                 |         |                 |         |            |       | IC              | L  | r    | X   | Y   |
| ER(L)H□□N-11      | ER11-A55        | ○       | EL11-A55        | ○       | 0.5-1.5    | 48-16 | 6.35            | 11 | 0.05 | 0.8 | 0.9 |
|                   | ER16-A55        | ●       | EL16-A55        | ○       | 0.5-1.5    | 48-16 |                 |    | 0.05 | 0.8 | 0.9 |
| ER(L)H□□16(C)     | ER16-G55        | ●       | EL16-G55        | ○       | 1.75-3.0   | 14-8  | 9.525           | 16 | 0.21 | 1.2 | 1.7 |
|                   | ER16-AG55       | ●       | EL16-AG55       | ○       | 0.5-3.0    | 48-8  |                 |    | 0.07 | 1.2 | 1.7 |
| ER(L)H□□22(C)     | ER22-N55        | ●       | EL22-N55        | ○       | 3.5-5.0    | 7-5   | 12.7            | 22 | 0.43 | 1.7 | 2.5 |
| ER(L)H□□27(C)     | ER27-Q55        | ○       | EL27-Q55        | ○       | 5.5-6.0    | 4.5-4 | 15.875          | 27 | 0.6  | 2   | 2.9 |

● : Stock Item ○ : Under preparing for stock

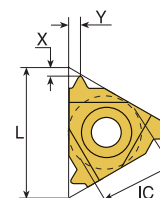
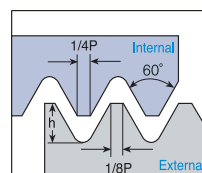
## Partial profile 55° Internal



| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | Pitch (mm) | TPI   | Dimensions (mm) |    |      |     |     |
|-------------------|-----------------|---------|-----------------|---------|------------|-------|-----------------|----|------|-----|-----|
|                   |                 |         |                 |         |            |       | IC              | L  | r    | X   | Y   |
| IR(L)H□□N-11      | IR11-A55        | ●       | IL11-A55        | ○       | 0.5-1.5    | 48-16 | 6.35            | 11 | 0.05 | 0.8 | 0.9 |
|                   | IR16-A55        | ●       | IL16-A55        | ○       | 0.5-1.5    | 48-16 |                 |    | 0.05 | 0.8 | 0.9 |
| IR(L)H□□16(C)     | IR16-G55        | ●       | IL16-G55        | ○       | 1.75-3.0   | 14-8  | 9.525           | 16 | 0.21 | 1.2 | 1.7 |
|                   | IR16-AG55       | ●       | IL16-AG55       | ○       | 0.5-3.0    | 48-8  |                 |    | 0.07 | 1.2 | 1.7 |
| IR(L)H□□22(C)     | IR22-N55        | ●       | IL22-N55        | ○       | 3.5-5.0    | 7-5   | 12.7            | 22 | 0.43 | 1.7 | 2.5 |
| IR(L)H□□27(C)     | IR27-Q55        | ○       | IL27-Q55        | ○       | 5.5-6.0    | 4.5-4 | 15.875          | 27 | 0.60 | 2.0 | 2.9 |

● : Stock Item ○ : Under preparing for stock

## ISO Metric External



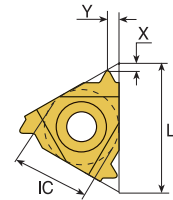
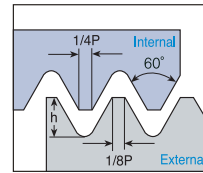
| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | Pitch (mm) | Dimensions (mm) |    |                   |     |     |
|-------------------|-----------------|---------|-----------------|---------|------------|-----------------|----|-------------------|-----|-----|
|                   |                 |         |                 |         |            | IC              | L  | h <sub>min.</sub> | X   | Y   |
| ER(L)H□□N-11      | ER11-0.35ISO    | ○       | EL11-0.35ISO    | ○       | 0.35       | 6.35            | 11 | 0.21              | 0.8 | 0.4 |
|                   | ER11-0.4ISO     | ○       | EL11-0.4ISO     | ○       | 0.4        |                 |    | 0.25              | 0.7 | 0.4 |
|                   | ER11-0.45ISO    | ○       | EL11-0.45ISO    | ○       | 0.45       |                 |    | 0.28              | 0.7 | 0.4 |
|                   | ER11-0.5ISO     | ○       | EL11-0.5ISO     | ○       | 0.5        |                 |    | 0.31              | 0.6 | 0.4 |
|                   | ER11-0.6ISO     | ○       | EL11-0.6ISO     | ○       | 0.6        |                 |    | 0.37              | 0.6 | 0.6 |
|                   | ER11-0.7ISO     | ○       | EL11-0.7ISO     | ○       | 0.7        |                 |    | 0.43              | 0.6 | 0.6 |
|                   | ER11-0.75ISO    | ○       | EL11-0.75ISO    | ○       | 0.75       |                 |    | 0.46              | 0.6 | 0.6 |
|                   | ER11-0.8ISO     | ○       | EL11-0.8ISO     | ○       | 0.8        |                 |    | 0.49              | 0.6 | 0.6 |
|                   | ER11-1.0ISO     | ○       | EL11-1.0ISO     | ○       | 1.0        |                 |    | 0.61              | 0.7 | 0.7 |
|                   | ER11-1.25ISO    | ○       | EL11-1.25ISO    | ○       | 1.25       |                 |    | 0.77              | 0.8 | 0.9 |
|                   | ER11-1.5ISO     | ○       | EL11-1.5ISO     | ○       | 1.5        |                 |    | 0.92              | 0.8 | 1.0 |
|                   | ER11-1.75ISO    | ○       | EL11-1.75ISO    | ○       | 1.75       |                 |    | 1.07              | 0.8 | 1.1 |
| ER(L)H□□16(C)     | ER16-0.35ISO    | ○       | EL16-0.35ISO    | ○       | 0.35       | 9.525           | 16 | 0.21              | 0.8 | 0.4 |
|                   | ER16-0.4ISO     | ○       | EL16-0.4ISO     | ○       | 0.4        |                 |    | 0.25              | 0.7 | 0.4 |
|                   | ER16-0.45ISO    | ○       | EL16-0.45ISO    | ○       | 0.45       |                 |    | 0.28              | 0.7 | 0.4 |
|                   | ER16-0.5ISO     | ●       | EL16-0.5ISO     | ○       | 0.5        |                 |    | 0.31              | 0.6 | 0.4 |
|                   | ER16-0.6ISO     | ○       | EL16-0.6ISO     | ○       | 0.6        |                 |    | 0.37              | 0.6 | 0.6 |
|                   | ER16-0.7ISO     | ○       | EL16-0.7ISO     | ○       | 0.7        |                 |    | 0.43              | 0.6 | 0.6 |
|                   | ER16-0.75ISO    | ●       | EL16-0.75ISO    | ○       | 0.75       |                 |    | 0.46              | 0.6 | 0.6 |
|                   | ER16-0.8ISO     | ○       | EL16-0.8ISO     | ○       | 0.8        |                 |    | 0.49              | 0.6 | 0.6 |
|                   | ER16-1.0ISO     | ●       | EL16-1.0ISO     | ○       | 1.0        |                 |    | 0.61              | 0.7 | 0.7 |
|                   | ER16-1.25ISO    | ●       | EL16-1.25ISO    | ○       | 1.25       |                 |    | 0.77              | 0.8 | 0.9 |
|                   | ER16-1.5ISO     | ●       | EL16-1.5ISO     | ○       | 1.5        |                 |    | 0.92              | 0.8 | 1.0 |
|                   | ER16-1.75ISO    | ●       | EL16-1.75ISO    | ○       | 1.75       |                 |    | 1.07              | 0.9 | 1.2 |
| ER(L)H□□22(C)     | ER22-3.5ISO     | ●       | EL22-3.5ISO     | ○       | 3.5        | 12.7            | 22 | 2.15              | 1.6 | 2.3 |
|                   | ER22-4.0ISO     | ○       | EL22-4.0ISO     | ○       | 4.0        |                 |    | 2.45              | 1.6 | 2.3 |
|                   | ER22-4.5ISO     | ●       | EL22-4.5ISO     | ○       | 4.5        |                 |    | 2.76              | 1.7 | 2.4 |
|                   | ER22-5.0ISO     | ●       | EL22-5.0ISO     | ○       | 5.0        |                 |    | 3.07              | 1.7 | 2.5 |
| ER(L)H□□27(C)     | ER27-5.5ISO     | ○       | EL27-5.5ISO     | ○       | 5.5        | 15.875          | 27 | 3.37              | 1.9 | 2.7 |
|                   | ER27-6.0ISO     | ○       | EL27-6.0ISO     | ○       | 6.0        |                 |    | 3.68              | 2.0 | 2.9 |

● : Stock Item ○ : Under preparing for stock



## ISO Metric

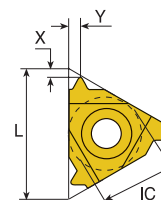
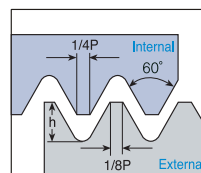
## Internal



| Applicable Holder | Designation (R) | PC3030T     | Designation (L) | PC3030T | Pitch (mm) | Dimensions (mm) |     |                   |     |     |
|-------------------|-----------------|-------------|-----------------|---------|------------|-----------------|-----|-------------------|-----|-----|
|                   |                 |             |                 |         |            | IC              | L   | h <sub>min.</sub> | X   | Y   |
| IR(L)H□□N-11      | IR11-0.35ISO    | ○           | IL11-0.35ISO    | ○       | 0.35       | 6.35            | 11  | 0.20              | 0.8 | 0.3 |
|                   | IR11-0.4ISO     | ○           | IL11-0.4ISO     | ○       | 0.4        |                 |     | 0.23              | 0.8 | 0.4 |
|                   | IR11-0.45ISO    | ○           | IL11-0.45ISO    | ○       | 0.45       |                 |     | 0.26              | 0.8 | 0.4 |
|                   | IR11-0.5ISO     | ●           | IL11-0.5ISO     | ○       | 0.5        |                 |     | 0.29              | 0.6 | 0.4 |
|                   | IR11-0.6ISO     | ○           | IL11-0.6ISO     | ○       | 0.6        |                 |     | 0.35              | 0.6 | 0.6 |
|                   | IR11-0.7ISO     | ○           | IL11-0.7ISO     | ○       | 0.7        |                 |     | 0.40              | 0.6 | 0.6 |
|                   | IR11-0.75ISO    | ●           | IL11-0.75ISO    | ○       | 0.75       |                 |     | 0.43              | 0.6 | 0.6 |
|                   | IR11-0.8ISO     | ○           | IL11-0.8ISO     | ○       | 0.8        |                 |     | 0.46              | 0.6 | 0.6 |
|                   | IR11-1.0ISO     | ●           | IL11-1.0ISO     | ○       | 1.0        |                 |     | 0.58              | 0.6 | 0.7 |
|                   | IR11-1.25ISO    | ●           | IL11-1.25ISO    | ○       | 1.25       |                 |     | 0.72              | 0.8 | 0.9 |
|                   | IR11-1.5ISO     | ●           | IL11-1.5ISO     | ○       | 1.5        |                 |     | 0.87              | 0.8 | 1.0 |
|                   | IR11-1.75ISO    | ●           | IL11-1.75ISO    | ○       | 1.75       |                 |     | 1.01              | 0.9 | 1.1 |
|                   | IR11-2.0ISO     | ○           | IL11-2.0ISO     | ○       | 2.0        |                 |     | 1.15              | 0.9 | 1.1 |
|                   | IR11-2.5ISO     | ○           | IL11-2.5ISO     | ○       | 2.5        |                 |     | 1.44              | 0.8 | 1.1 |
| IR(L)H□□16(C)     | IR16-0.35ISO    | ○           | IL16-0.35ISO    | ○       | 0.35       | 9.525           | 16  | 0.20              | 0.8 | 0.3 |
|                   | IR16-0.4ISO     | ○           | IL16-0.4ISO     | ○       | 0.4        |                 |     | 0.23              | 0.8 | 0.4 |
|                   | IR16-0.45ISO    | ○           | IL16-0.45ISO    | ○       | 0.45       |                 |     | 0.26              | 0.8 | 0.4 |
|                   | IR16-0.5ISO     | ●           | IL16-0.5ISO     | ○       | 0.5        |                 |     | 0.29              | 0.6 | 0.4 |
|                   | IR16-0.6ISO     | ○           | IL16-0.6ISO     | ○       | 0.6        |                 |     | 0.35              | 0.6 | 0.6 |
|                   | IR16-0.7ISO     | ○           | IL16-0.7ISO     | ○       | 0.7        |                 |     | 0.40              | 0.6 | 0.6 |
|                   | IR16-0.75ISO    | ●           | IL16-0.75ISO    | ○       | 0.75       |                 |     | 0.43              | 0.6 | 0.6 |
|                   | IR16-0.8ISO     | ○           | IL16-0.8ISO     | ○       | 0.8        |                 |     | 0.46              | 0.6 | 0.6 |
|                   | IR16-1.0ISO     | ●           | IL16-1.0ISO     | ○       | 1.0        |                 |     | 0.58              | 0.6 | 0.7 |
|                   | IR16-1.25ISO    | ●           | IL16-1.25ISO    | ○       | 1.25       |                 |     | 0.72              | 0.8 | 0.9 |
|                   | IR16-1.5ISO     | ●           | IL16-1.5ISO     | ○       | 1.5        |                 |     | 0.87              | 0.8 | 1.0 |
|                   | IR16-1.75ISO    | ●           | IL16-1.75ISO    | ○       | 1.75       |                 |     | 1.01              | 0.9 | 1.2 |
|                   | IR16-2.0ISO     | ●           | IL16-2.0ISO     | ○       | 2.0        |                 |     | 1.15              | 1.0 | 1.3 |
|                   | IR16-2.5ISO     | ●           | IL16-2.5ISO     | ○       | 2.5        |                 |     | 1.44              | 1.1 | 1.5 |
| IR16-3.0ISO       | ●               | IL16-3.0ISO | ○               | 3.0     | 1.73       | 1.1             | 1.5 |                   |     |     |
| IR(L)H□□22(C)     | IR22-3.5ISO     | ●           | IL22-3.5ISO     | ○       | 3.5        | 12.7            | 22  | 2.02              | 1.6 | 2.3 |
|                   | IR22-4.0ISO     | ●           | IL22-4.0ISO     | ○       | 4.0        |                 |     | 2.31              | 1.6 | 2.3 |
|                   | IR22-4.5ISO     | ●           | IL22-4.5ISO     | ○       | 4.5        |                 |     | 2.60              | 1.6 | 2.4 |
|                   | IR22-5.0ISO     | ●           | IL22-5.0ISO     | ○       | 5.0        |                 |     | 2.89              | 1.6 | 2.3 |
| IR(L)H□□27(C)     | IR27-5.5ISO     | ○           | IL27-5.5ISO     | ○       | 5.5        | 15.875          | 27  | 3.17              | 1.6 | 2.3 |
|                   | IR27-6.0ISO     | ○           | IL27-6.0ISO     | ○       | 6.0        |                 |     | 3.46              | 1.8 | 2.5 |

● : Stock Item ○ : Under preparing for stock

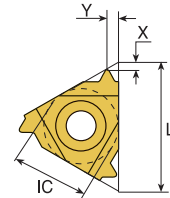
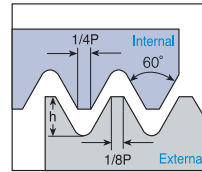
## American UN External



| Applicable Holder | Designation (R) | PC3030T     | Designation (L) | PC3030T | TPI  | Dimensions (mm) |     |                   |     |     |
|-------------------|-----------------|-------------|-----------------|---------|------|-----------------|-----|-------------------|-----|-----|
|                   |                 |             |                 |         |      | IC              | L   | h <sub>min.</sub> | X   | Y   |
| ER(L)H□□N-11      | ER11-72UN       | ○           | EL11-72UN       | ○       | 72   | 6.35            | 11  | 0.22              | 0.8 | 0.4 |
|                   | ER11-64UN       | ○           | EL11-64UN       | ○       | 64   |                 |     | 0.24              | 0.8 | 0.4 |
|                   | ER11-56UN       | ○           | EL11-56UN       | ○       | 56   |                 |     | 0.28              | 0.7 | 0.4 |
|                   | ER11-48UN       | ○           | EL11-48UN       | ○       | 48   |                 |     | 0.32              | 0.6 | 0.6 |
|                   | ER11-44UN       | ○           | EL11-44UN       | ○       | 44   |                 |     | 0.35              | 0.6 | 0.6 |
|                   | ER11-40UN       | ○           | EL11-40UN       | ○       | 40   |                 |     | 0.39              | 0.6 | 0.6 |
|                   | ER11-36UN       | ○           | EL11-36UN       | ○       | 36   |                 |     | 0.43              | 0.6 | 0.6 |
|                   | ER11-32UN       | ○           | EL11-32UN       | ○       | 32   |                 |     | 0.49              | 0.6 | 0.6 |
|                   | ER11-28UN       | ○           | EL11-28UN       | ○       | 28   |                 |     | 0.56              | 0.6 | 0.7 |
|                   | ER11-27UN       | ○           | EL11-27UN       | ○       | 27   |                 |     | 0.58              | 0.7 | 0.8 |
|                   | ER11-24UN       | ○           | EL11-24UN       | ○       | 24   |                 |     | 0.65              | 0.7 | 0.8 |
|                   | ER11-20UN       | ○           | EL11-20UN       | ○       | 20   |                 |     | 0.78              | 0.8 | 0.9 |
|                   | ER11-18UN       | ○           | EL11-18UN       | ○       | 18   |                 |     | 0.87              | 0.8 | 1.0 |
|                   | ER11-16UN       | ○           | EL11-16UN       | ○       | 16   |                 |     | 0.97              | 0.9 | 1.1 |
|                   | ER11-14UN       | ○           | EL11-14UN       | ○       | 14   |                 |     | 1.11              | 0.9 | 1.1 |
| ER(L)H□□16(C)     | ER16-72UN       | ○           | EL16-72UN       | ○       | 72   | 9.525           | 16  | 0.22              | 0.8 | 0.4 |
|                   | ER16-64UN       | ○           | EL16-64UN       | ○       | 64   |                 |     | 0.24              | 0.8 | 0.4 |
|                   | ER16-56UN       | ○           | EL16-56UN       | ○       | 56   |                 |     | 0.28              | 0.7 | 0.4 |
|                   | ER16-48UN       | ○           | EL16-48UN       | ○       | 48   |                 |     | 0.32              | 0.6 | 0.6 |
|                   | ER16-44UN       | ○           | EL16-44UN       | ○       | 44   |                 |     | 0.35              | 0.6 | 0.6 |
|                   | ER16-40UN       | ○           | EL16-40UN       | ○       | 40   |                 |     | 0.39              | 0.6 | 0.6 |
|                   | ER16-36UN       | ○           | EL16-36UN       | ○       | 36   |                 |     | 0.43              | 0.6 | 0.6 |
|                   | ER16-32UN       | ○           | EL16-32UN       | ○       | 32   |                 |     | 0.49              | 0.6 | 0.6 |
|                   | ER16-28UN       | ●           | EL16-28UN       | ○       | 28   |                 |     | 0.56              | 0.6 | 0.7 |
|                   | ER16-27UN       | ○           | EL16-27UN       | ○       | 27   |                 |     | 0.58              | 0.7 | 0.8 |
|                   | ER16-24UN       | ●           | EL16-24UN       | ○       | 24   |                 |     | 0.65              | 0.7 | 0.8 |
|                   | ER16-20UN       | ●           | EL16-20UN       | ○       | 20   |                 |     | 0.78              | 0.8 | 0.9 |
|                   | ER16-18UN       | ●           | EL16-18UN       | ○       | 18   |                 |     | 0.87              | 0.8 | 1.0 |
|                   | ER16-16UN       | ●           | EL16-16UN       | ○       | 16   |                 |     | 0.97              | 0.9 | 1.1 |
|                   | ER16-14UN       | ●           | EL16-14UN       | ○       | 14   |                 |     | 1.11              | 1.0 | 1.2 |
|                   | ER16-13UN       | ○           | EL16-13UN       | ○       | 13   |                 |     | 1.20              | 1.0 | 1.3 |
|                   | ER16-12UN       | ●           | EL16-12UN       | ○       | 12   |                 |     | 1.30              | 1.1 | 1.4 |
| ER16-11.5UN       | ○               | EL16-11.5UN | ○               | 11.5    | 1.35 | 1.1             | 1.5 |                   |     |     |
| ER16-11UN         | ●               | EL16-11UN   | ○               | 11      | 1.42 | 1.1             | 1.5 |                   |     |     |
| ER16-10UN         | ●               | EL16-10UN   | ○               | 10      | 1.56 | 1.1             | 1.5 |                   |     |     |
| ER16-9UN          | ●               | EL16-9UN    | ○               | 9       | 1.73 | 1.2             | 1.7 |                   |     |     |
| ER16-8UN          | ●               | EL16-8UN    | ○               | 8       | 1.95 | 1.2             | 1.6 |                   |     |     |
| ER(L)H□□22(C)     | ER22-7UN        | ○           | EL22-7UN        | ○       | 7    | 12.7            | 22  | 2.22              | 1.6 | 2.3 |
|                   | ER22-6UN        | ○           | EL22-6UN        | ○       | 6    |                 |     | 2.60              | 1.6 | 2.3 |
|                   | ER22-5UN        | ○           | EL22-5UN        | ○       | 5    |                 |     | 3.12              | 1.7 | 2.5 |
| ER(L)H□□27(C)     | ER27-4.5UN      | ○           | EL27-4.5UN      | ○       | 4.5  | 15.875          | 27  | 3.46              | 1.9 | 2.7 |
|                   | ER27-4UN        | ○           | EL27-4UN        | ○       | 4    |                 |     | 3.89              | 2.1 | 3.0 |

● : Stock Item ○ : Under preparing for stock

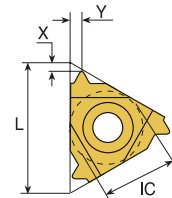
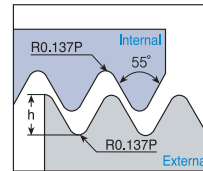
## American UN Internal



| Applicable Holder | Designation (R) | PC3030T   | Designation (L) | PC3030T | TPI  | Dimensions (mm) |     |                   |     |     |
|-------------------|-----------------|-----------|-----------------|---------|------|-----------------|-----|-------------------|-----|-----|
|                   |                 |           |                 |         |      | IC              | L   | h <sub>min.</sub> | X   | Y   |
| IR(L)H□□N-11      | IR11-72UN       | ○         | IL11-72UN       | ○       | 72   | 6.35            | 11  | 0.20              | 0.8 | 0.3 |
|                   | IR11-64UN       | ○         | IL11-64UN       | ○       | 64   |                 |     | 0.23              | 0.8 | 0.4 |
|                   | IR11-56UN       | ○         | IL11-56UN       | ○       | 56   |                 |     | 0.26              | 0.7 | 0.4 |
|                   | IR11-48UN       | ○         | IL11-48UN       | ○       | 48   |                 |     | 0.31              | 0.6 | 0.6 |
|                   | IR11-44UN       | ○         | IL11-44UN       | ○       | 44   |                 |     | 0.33              | 0.6 | 0.6 |
|                   | IR11-40UN       | ○         | IL11-40UN       | ○       | 40   |                 |     | 0.37              | 0.6 | 0.6 |
|                   | IR11-36UN       | ○         | IL11-36UN       | ○       | 36   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | IR11-32UN       | ○         | IL11-32UN       | ○       | 32   |                 |     | 0.46              | 0.6 | 0.6 |
|                   | IR11-28UN       | ○         | IL11-28UN       | ○       | 28   |                 |     | 0.52              | 0.6 | 0.7 |
|                   | IR11-27UN       | ○         | IL11-27UN       | ○       | 27   |                 |     | 0.54              | 0.7 | 0.8 |
|                   | IR11-24UN       | ○         | IL11-24UN       | ○       | 24   |                 |     | 0.61              | 0.7 | 0.8 |
|                   | IR11-20UN       | ○         | IL11-20UN       | ○       | 20   |                 |     | 0.73              | 0.8 | 0.9 |
|                   | IR11-18UN       | ○         | IL11-18UN       | ○       | 18   |                 |     | 0.81              | 0.8 | 1.0 |
|                   | IR11-16UN       | ○         | IL11-16UN       | ○       | 16   |                 |     | 0.92              | 0.9 | 1.1 |
|                   | IR11-14UN       | ○         | IL11-14UN       | ○       | 14   |                 |     | 1.05              | 0.9 | 1.1 |
| IR11-12UN         | ○               | IL11-12UN | ○               | 12      | 1.22 | 0.8             | 1.1 |                   |     |     |
| IR11-11UN         | ○               | IL11-11UN | ○               | 11      | 1.33 | 0.8             | 1.1 |                   |     |     |
| IR(L)H□□16(C)     | IR16-72UN       | ○         | IL16-72UN       | ○       | 72   | 9.525           | 16  | 0.20              | 0.8 | 0.3 |
|                   | IR16-64UN       | ○         | IL16-64UN       | ○       | 64   |                 |     | 0.23              | 0.8 | 0.4 |
|                   | IR16-56UN       | ○         | IL16-56UN       | ○       | 56   |                 |     | 0.26              | 0.7 | 0.4 |
|                   | IR16-48UN       | ○         | IL16-48UN       | ○       | 48   |                 |     | 0.31              | 0.6 | 0.6 |
|                   | IR16-44UN       | ○         | IL16-44UN       | ○       | 44   |                 |     | 0.33              | 0.6 | 0.6 |
|                   | IR16-40UN       | ○         | IL16-40UN       | ○       | 40   |                 |     | 0.37              | 0.6 | 0.6 |
|                   | IR16-36UN       | ○         | IL16-36UN       | ○       | 36   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | IR16-32UN       | ○         | IL16-32UN       | ○       | 32   |                 |     | 0.51              | 0.6 | 0.6 |
|                   | IR16-28UN       | ○         | IL16-28UN       | ○       | 28   |                 |     | 0.52              | 0.6 | 0.7 |
|                   | IR16-27UN       | ○         | IL16-27UN       | ○       | 27   |                 |     | 0.54              | 0.7 | 0.8 |
|                   | IR16-24UN       | ○         | IL16-24UN       | ○       | 24   |                 |     | 0.61              | 0.7 | 0.8 |
|                   | IR16-20UN       | ●         | IL16-20UN       | ○       | 20   |                 |     | 0.73              | 0.8 | 0.9 |
|                   | IR16-18UN       | ●         | IL16-18UN       | ○       | 18   |                 |     | 0.81              | 0.8 | 1.0 |
|                   | IR16-16UN       | ●         | IL16-16UN       | ○       | 16   |                 |     | 0.92              | 0.9 | 1.1 |
|                   | IR16-14UN       | ●         | IL16-14UN       | ○       | 14   |                 |     | 1.05              | 0.9 | 1.2 |
|                   | IR16-13UN       | ○         | IL16-13UN       | ○       | 13   |                 |     | 1.13              | 1.0 | 1.3 |
|                   | IR16-12UN       | ●         | IL16-12UN       | ○       | 12   |                 |     | 1.22              | 1.1 | 1.4 |
|                   | IR16-11.5UN     | ○         | IL16-11.5UN     | ○       | 11.5 |                 |     | 1.28              | 1.1 | 1.5 |
| IR16-11UN         | ○               | IL16-11UN | ○               | 11      | 1.33 | 1.1             | 1.5 |                   |     |     |
| IR16-10UN         | ○               | IL16-10UN | ○               | 10      | 1.47 | 1.1             | 1.5 |                   |     |     |
| IR16-9UN          | ○               | IL16-9UN  | ○               | 9       | 1.63 | 1.2             | 1.7 |                   |     |     |
| IR16-8UN          | ●               | IL16-8UN  | ○               | 8       | 1.83 | 1.1             | 1.5 |                   |     |     |
| IR(L)H□□22(C)     | IR22-7UN        | ○         | IL22-7UN        | ○       | 7    | 12.7            | 22  | 2.09              | 1.6 | 2.3 |
|                   | IR22-6UN        | ○         | IL22-6UN        | ○       | 6    |                 |     | 2.44              | 1.6 | 2.3 |
|                   | IR22-5UN        | ○         | IL22-5UN        | ○       | 5    |                 |     | 2.93              | 1.6 | 2.3 |
| IR(L)H□□27(C)     | IR27-4.5UN      | ○         | IL27-4.5UN      | ○       | 4.5  | 15.875          | 27  | 3.26              | 1.7 | 2.4 |
|                   | IR27-4UN        | ○         | IL27-4UN        | ○       | 4    |                 |     | 3.67              | 1.8 | 2.7 |

● : Stock Item ○ : Under preparing for stock

## Whitworth for BSW, BSP External

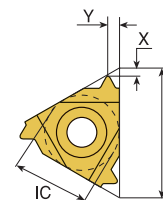
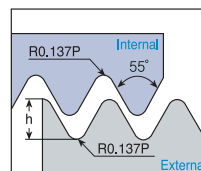


| Applicable Holder | Designation (R) | PC3030T  | Designation (L) | PC3030T | TPI  | Dimensions (mm) |     |                   |     |     |
|-------------------|-----------------|----------|-----------------|---------|------|-----------------|-----|-------------------|-----|-----|
|                   |                 |          |                 |         |      | I.C.            | L   | h <sub>min.</sub> | X   | Y   |
| ER(L)H□□N-11      | ER11-72W        | ○        | EL11-72W        | ○       | 72   | 6.35            | 11  | 0.23              | 0.7 | 0.4 |
|                   | ER11-60W        | ○        | EL11-60W        | ○       | 60   |                 |     | 0.27              | 0.7 | 0.4 |
|                   | ER11-56W        | ○        | EL11-56W        | ○       | 56   |                 |     | 0.29              | 0.7 | 0.4 |
|                   | ER11-48W        | ○        | EL11-48W        | ○       | 48   |                 |     | 0.34              | 0.6 | 0.6 |
|                   | ER11-40W        | ○        | EL11-40W        | ○       | 40   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | ER11-36W        | ○        | EL11-36W        | ○       | 36   |                 |     | 0.45              | 0.6 | 0.6 |
|                   | ER11-32W        | ○        | EL11-32W        | ○       | 32   |                 |     | 0.51              | 0.6 | 0.6 |
|                   | ER11-28W        | ○        | EL11-28W        | ○       | 28   |                 |     | 0.58              | 0.6 | 0.7 |
|                   | ER11-26W        | ○        | EL11-26W        | ○       | 26   |                 |     | 0.63              | 0.7 | 0.8 |
|                   | ER11-24W        | ○        | EL11-24W        | ○       | 24   |                 |     | 0.68              | 0.7 | 0.8 |
|                   | ER11-22W        | ○        | EL11-22W        | ○       | 22   |                 |     | 0.74              | 0.8 | 0.9 |
|                   | ER11-20W        | ○        | EL11-20W        | ○       | 20   |                 |     | 0.81              | 0.8 | 0.9 |
|                   | ER11-19W        | ○        | EL11-19W        | ○       | 19   |                 |     | 0.86              | 0.8 | 1.0 |
|                   | ER11-18W        | ○        | EL11-18W        | ○       | 18   |                 |     | 0.90              | 0.8 | 1.0 |
|                   | ER11-16W        | ○        | EL11-16W        | ○       | 16   |                 |     | 1.02              | 0.9 | 1.1 |
|                   | ER11-14W        | ○        | EL11-14W        | ○       | 14   |                 |     | 1.16              | 1.0 | 1.2 |
| ER(L)H□□16(C)     | ER16-72W        | ○        | EL16-72W        | ○       | 72   | 9.525           | 16  | 0.23              | 0.7 | 0.4 |
|                   | ER16-60W        | ○        | EL16-60W        | ○       | 60   |                 |     | 0.27              | 0.7 | 0.4 |
|                   | ER16-56W        | ○        | EL16-56W        | ○       | 56   |                 |     | 0.29              | 0.7 | 0.4 |
|                   | ER16-48W        | ○        | EL16-48W        | ○       | 48   |                 |     | 0.34              | 0.6 | 0.6 |
|                   | ER16-40W        | ○        | EL16-40W        | ○       | 40   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | ER16-36W        | ○        | EL16-36W        | ○       | 36   |                 |     | 0.45              | 0.6 | 0.6 |
|                   | ER16-32W        | ○        | EL16-32W        | ○       | 32   |                 |     | 0.51              | 0.6 | 0.6 |
|                   | ER16-30W        | ○        | EL16-30W        | ○       | 30   |                 |     | 0.55              | 0.6 | 0.7 |
|                   | ER16-28W        | ●        | EL16-28W        | ○       | 28   |                 |     | 0.58              | 0.6 | 0.7 |
|                   | ER16-26W        | ○        | EL16-26W        | ○       | 26   |                 |     | 0.63              | 0.7 | 0.8 |
|                   | ER16-24W        | ○        | EL16-24W        | ○       | 24   |                 |     | 0.68              | 0.7 | 0.8 |
|                   | ER16-22W        | ○        | EL16-22W        | ○       | 22   |                 |     | 0.74              | 0.8 | 0.9 |
|                   | ER16-20W        | ●        | EL16-20W        | ○       | 20   |                 |     | 0.81              | 0.8 | 0.9 |
|                   | ER16-19W        | ●        | EL16-19W        | ○       | 19   |                 |     | 0.86              | 0.8 | 1.0 |
|                   | ER16-18W        | ○        | EL16-18W        | ○       | 18   |                 |     | 0.90              | 0.8 | 1.0 |
|                   | ER16-16W        | ●        | EL16-16W        | ○       | 16   |                 |     | 1.02              | 0.9 | 1.1 |
| ER16-14W          | ●               | EL16-14W | ○               | 14      | 1.16 | 1.0             | 1.2 |                   |     |     |
| ER16-12W          | ○               | EL16-12W | ○               | 12      | 1.36 | 1.1             | 1.4 |                   |     |     |
| ER16-11W          | ●               | EL16-11W | ○               | 11      | 1.48 | 1.1             | 1.5 |                   |     |     |
| ER16-10W          | ○               | EL16-10W | ○               | 10      | 1.63 | 1.1             | 1.5 |                   |     |     |
| ER16-9W           | ○               | EL16-9W  | ○               | 9       | 1.81 | 1.2             | 1.7 |                   |     |     |
| ER16-8W           | ○               | EL16-8W  | ○               | 8       | 2.03 | 1.2             | 1.5 |                   |     |     |
| ER(L)H□□22(C)     | ER22-7W         | ○        | EL22-7W         | ○       | 7    | 12.7            | 22  | 3.32              | 1.6 | 2.3 |
|                   | ER22-6W         | ○        | EL22-6W         | ○       | 6    |                 |     | 2.71              | 1.6 | 2.3 |
|                   | ER22-5W         | ○        | EL22-5W         | ○       | 5    |                 |     | 3.25              | 1.7 | 2.4 |
| ER(L)H□□27(C)     | ER27-4.5W       | ○        | EL27-4.5W       | ○       | 4.5  | 15.875          | 27  | 3.61              | 1.8 | 2.6 |
|                   | ER27-4W         | ○        | EL27-4W         | ○       | 4    |                 |     | 4.07              | 2.0 | 2.9 |

● : Stock Item ○ : Under preparing for stock



## Whitworth for BSW, BSP Internal

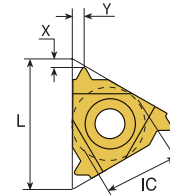
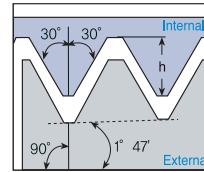


| Applicable Holder | Designation (R) | PC3030T  | Designation (L) | PC3030T | TPI  | Dimensions (mm) |     |                   |     |     |
|-------------------|-----------------|----------|-----------------|---------|------|-----------------|-----|-------------------|-----|-----|
|                   |                 |          |                 |         |      | I.C.            | L   | h <sub>min.</sub> | X   | Y   |
| IR(L)H□□N-11      | IR11-72W        | ○        | IL11-72W        | ○       | 72   | 6.35            | 11  | 0.23              | 0.7 | 0.4 |
|                   | IR11-60W        | ○        | IL11-60W        | ○       | 60   |                 |     | 0.27              | 0.7 | 0.4 |
|                   | IR11-56W        | ○        | IL11-56W        | ○       | 56   |                 |     | 0.29              | 0.7 | 0.4 |
|                   | IR11-48W        | ○        | IL11-48W        | ○       | 48   |                 |     | 0.34              | 0.6 | 0.6 |
|                   | IR11-40W        | ○        | IL11-40W        | ○       | 40   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | IR11-36W        | ○        | IL11-36W        | ○       | 36   |                 |     | 0.45              | 0.6 | 0.6 |
|                   | IR11-32W        | ○        | IL11-32W        | ○       | 32   |                 |     | 0.51              | 0.6 | 0.6 |
|                   | IR11-28W        | ○        | IL11-28W        | ○       | 28   |                 |     | 0.58              | 0.6 | 0.7 |
|                   | IR11-26W        | ○        | IL11-26W        | ○       | 26   |                 |     | 0.63              | 0.7 | 0.8 |
|                   | IR11-24W        | ○        | IL11-24W        | ○       | 24   |                 |     | 0.68              | 0.7 | 0.8 |
|                   | IR11-22W        | ○        | IL11-22W        | ○       | 22   |                 |     | 0.74              | 0.8 | 0.9 |
|                   | IR11-20W        | ○        | IL11-20W        | ○       | 20   |                 |     | 0.81              | 0.8 | 0.9 |
|                   | IR11-19W        | ●        | IL11-19W        | ○       | 19   |                 |     | 0.86              | 0.8 | 1.0 |
|                   | IR11-18W        | ○        | IL11-18W        | ○       | 18   |                 |     | 0.90              | 0.8 | 1.0 |
|                   | IR11-16W        | ○        | IL11-16W        | ○       | 16   |                 |     | 1.02              | 0.9 | 1.1 |
| IR11-14W          | ●               | IL11-14W | ○               | 14      | 1.16 | 0.9             | 1.1 |                   |     |     |
| IR11-12W          | ○               | IL11-12W | ○               | 12      | 1.32 | 0.9             | 1.2 |                   |     |     |
| IR(L)H□□16(C)     | IR16-72W        | ○        | IL16-72W        | ○       | 72   | 9.525           | 16  | 0.23              | 0.7 | 0.4 |
|                   | IR16-60W        | ○        | IL16-60W        | ○       | 60   |                 |     | 0.27              | 0.7 | 0.4 |
|                   | IR16-56W        | ○        | IL16-56W        | ○       | 56   |                 |     | 0.29              | 0.7 | 0.4 |
|                   | IR16-48W        | ○        | IL16-48W        | ○       | 48   |                 |     | 0.34              | 0.6 | 0.6 |
|                   | IR16-40W        | ○        | IL16-40W        | ○       | 40   |                 |     | 0.41              | 0.6 | 0.6 |
|                   | IR16-36W        | ○        | IL16-36W        | ○       | 36   |                 |     | 0.45              | 0.6 | 0.6 |
|                   | IR16-32W        | ○        | IL16-32W        | ○       | 32   |                 |     | 0.51              | 0.6 | 0.6 |
|                   | IR16-30W        | ○        | IL16-30W        | ○       | 30   |                 |     | 0.55              | 0.6 | 0.7 |
|                   | IR16-28W        | ○        | IL16-28W        | ○       | 28   |                 |     | 0.58              | 0.6 | 0.7 |
|                   | IR16-26W        | ○        | IL16-26W        | ○       | 26   |                 |     | 0.63              | 0.7 | 0.8 |
|                   | IR16-24W        | ○        | IL16-24W        | ○       | 24   |                 |     | 0.68              | 0.7 | 0.8 |
|                   | IR16-22W        | ○        | IL16-22W        | ○       | 22   |                 |     | 0.74              | 0.8 | 0.9 |
|                   | IR16-20W        | ○        | IL16-20W        | ○       | 20   |                 |     | 0.81              | 0.8 | 0.9 |
|                   | IR16-19W        | ●        | IL16-19W        | ○       | 19   |                 |     | 0.86              | 0.8 | 1.0 |
|                   | IR16-18W        | ○        | IL16-18W        | ○       | 18   |                 |     | 0.90              | 0.8 | 1.0 |
|                   | IR16-16W        | ●        | IL16-16W        | ○       | 16   |                 |     | 1.02              | 0.9 | 1.1 |
|                   | IR16-14W        | ●        | IL16-14W        | ○       | 14   |                 |     | 1.16              | 1.0 | 1.2 |
| IR16-12W          | ○               | IL16-12W | ○               | 12      | 1.36 | 1.1             | 1.4 |                   |     |     |
| IR16-11W          | ●               | IL16-11W | ○               | 11      | 1.48 | 1.1             | 1.5 |                   |     |     |
| IR16-10W          | ○               | IL16-10W | ○               | 10      | 1.63 | 1.1             | 1.5 |                   |     |     |
| IR16-9W           | ○               | IL16-9W  | ○               | 9       | 1.81 | 1.2             | 1.7 |                   |     |     |
| IR16-8W           | ○               | IL16-8W  | ○               | 8       | 2.03 | 1.2             | 1.5 |                   |     |     |
| IR(L)H□□22(C)     | IR22-7W         | ○        | IL22-7W         | ○       | 7    | 12.7            | 22  | 3.32              | 1.6 | 2.3 |
|                   | IR22-6W         | ○        | IL22-6W         | ○       | 6    |                 |     | 2.71              | 1.6 | 2.3 |
|                   | IR22-5W         | ○        | IL22-5W         | ○       | 5    |                 |     | 3.25              | 1.7 | 2.4 |
| IR(L)H□□27(C)     | IR27-4.5W       | ○        | IL27-4.5W       | ○       | 4.5  | 15.875          | 27  | 3.61              | 1.8 | 2.6 |
|                   | IR27-4W         | ○        | IL27-4W         | ○       | 4    |                 |     | 4.07              | 2.0 | 2.9 |

● : Stock Item ○ : Under preparing for stock

## NPT

### External

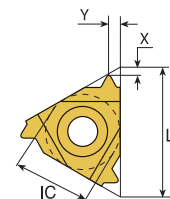
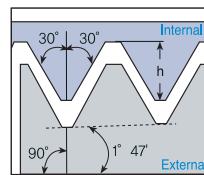


| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | TPI  | Dimensions (mm) |    |            |     |     |
|-------------------|-----------------|---------|-----------------|---------|------|-----------------|----|------------|-----|-----|
|                   |                 |         |                 |         |      | IC              | L  | $h_{min.}$ | X   | Y   |
| ER(L)H□□N-11      | ER11-27NPT      | ○       | EL11-27NPT      | ○       | 27   | 6.35            | 11 | 0.66       | 0.7 | 0.8 |
|                   | ER11-18NPT      | ○       | EL11-18NPT      | ○       | 18   |                 |    | 1.01       | 0.8 | 1.0 |
|                   | ER11-14NPT      | ○       | EL11-14NPT      | ○       | 14   |                 |    | 1.33       | 0.8 | 1.0 |
| ER(L)H□□16(C)     | ER16-27NPT      | ○       | EL16-27NPT      | ○       | 27   | 9.525           | 16 | 0.66       | 0.7 | 0.8 |
|                   | ER16-18NPT      | ●       | EL16-18NPT      | ○       | 18   |                 |    | 1.01       | 0.8 | 1.0 |
|                   | ER16-14NPT      | ●       | EL16-14NPT      | ○       | 14   |                 |    | 1.33       | 0.9 | 1.2 |
|                   | ER16-11.5NPT    | ●       | EL16-11.5NPT    | ○       | 11.5 |                 |    | 1.64       | 1.1 | 1.5 |
|                   | ER16-8NPT       | ●       | EL16-8NPT       | ○       | 8    |                 |    | 2.42       | 1.3 | 1.8 |

● : Stock Item ○ : Under preparing for stock

## NPT

### Internal



| Applicable Holder | Designation (R) | PC3030T | Designation (L) | PC3030T | TPI  | Dimensions (mm) |    |            |     |     |
|-------------------|-----------------|---------|-----------------|---------|------|-----------------|----|------------|-----|-----|
|                   |                 |         |                 |         |      | IC              | L  | $h_{min.}$ | X   | Y   |
| IR(L)H□□N-11      | IR11-27NPT      | ○       | IL11-27NPT      | ○       | 27   | 6.35            | 11 | 0.66       | 0.7 | 0.8 |
|                   | IR11-18NPT      | ○       | IL11-18NPT      | ○       | 18   |                 |    | 1.01       | 0.8 | 1.0 |
|                   | IR11-14NPT      | ○       | IL11-14NPT      | ○       | 14   |                 |    | 1.33       | 0.8 | 1.0 |
| IR(L)H□□16(C)     | IR16-27NPT      | ○       | IL16-27NPT      | ○       | 27   | 9.525           | 16 | 0.66       | 0.7 | 0.8 |
|                   | IR16-18NPT      | ○       | IL16-18NPT      | ○       | 18   |                 |    | 1.01       | 0.8 | 1.0 |
|                   | IR16-14NPT      | ●       | IL16-14NPT      | ○       | 14   |                 |    | 1.33       | 0.9 | 1.2 |
|                   | IR16-11.5NPT    | ●       | IL16-11.5NPT    | ○       | 11.5 |                 |    | 1.64       | 1.1 | 1.5 |
|                   | IR16-8NPT       | ●       | IL16-8NPT       | ○       | 8    |                 |    | 2.42       | 1.3 | 1.8 |

● : Stock Item ○ : Under preparing for stock

# Threading Holder & Boring Bar

KORLOY Code System (Tool Holder & Boring Bar)

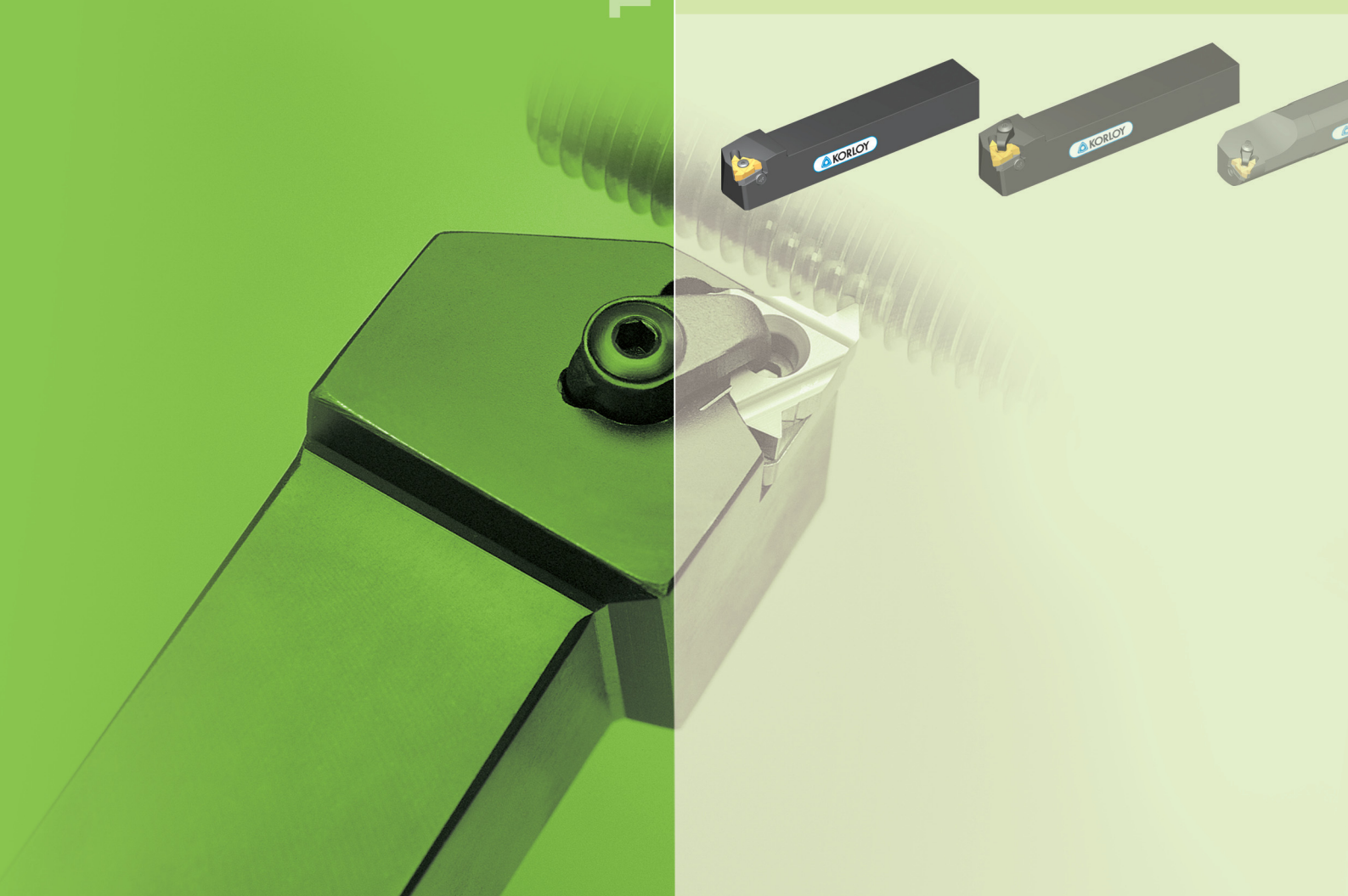
Tool Holder, Screw on system

Tool Holder, Clamp on system

Boring Bar, Screw on system

Boring Bar, Clamp on system

## Thread Turning Tool Holder



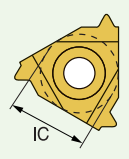
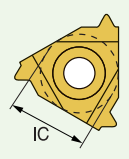
# KORLOY Code System (Tool Holder)



| Type of Insert |                            | Hand of Tool |                                 | Name |            |
|----------------|----------------------------|--------------|---------------------------------|------|------------|
| 1              | E : External threading I/S | 2            | R : Right Hand<br>L : Left Hand | 3    | H : Holder |

**E** **R** **H** **10** **(N)** - **11** **(C)**

1 2 3 4 5 6 7

| Shank Size(Height and Width) (mm)   |   | Insert Size |  | Clamping System |  |  |
|---|---|-------------|--|-----------------|--|--|
| 4   | 8, 10, 12, 16,<br>20, 25, 32, 40, 50              | 6           | 11 - IC 6.35<br>16 - IC 9.525<br>22 - IC 12.7<br>27 - IC 15.875                    | 7               | Not shown : Screw-on system<br>C : Clamp-on system |  |
| <th>Shim</th> <td colspan="2" rowspan="2">  </td> <td colspan="2" rowspan="2"></td> |   | Shim        |  |                 |  |  |
| 5   | N : No shim required<br>Not shown : Shim required |             |  |                 |  |  |

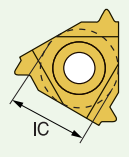
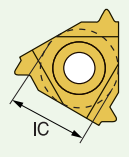
# KORLOY Code System(Boring Bar)



| Type of Insert |                            | Hand of Tool |                                 | Name |            |
|----------------|----------------------------|--------------|---------------------------------|------|------------|
| 1              | I : Internal threading I/S | 2            | R : Right Hand<br>L : Left Hand | 3    | H : Holder |

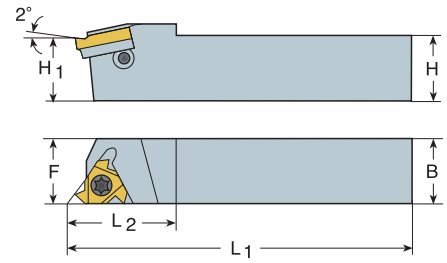
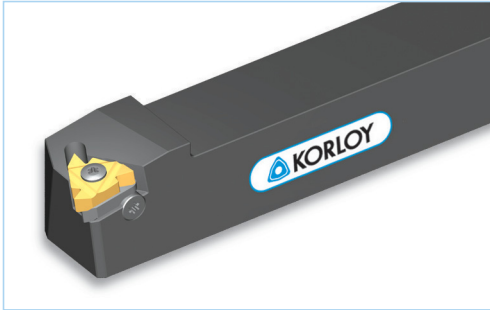
**I** **R** **H** **10** **(N)** - **11** **(C)**

1 2 3 4 5 6 7

| Shank Front Diameter(mm)   |   | Insert Size  |  | Clamping system |  |  |      |
|--|---|--|--|-----------------|--|--|------|
| 4  | 10, 12, 13, 16, 20,<br>25, 32, 40, 50, 60         | 6  | 11 - IC 6.35<br>16 - IC 9.525<br>22 - IC 12.7<br>27 - IC 15.875                      | 7               | Not shown : Screw-on system<br>C : Clamp-on system |  |      |
| <th>Shim</th> <td colspan="2" rowspan="2">  </td> <td colspan="2" rowspan="2"> <th>Note</th> </td> |   | Shim   |  |                 | <th>Note</th>                                      |  | Note |
| 5  | N : No shim required<br>Not shown : Shim required | Please note that 'Shank front diameter' and 'Shank diameter' can be differed. For more information about 'Shank diameter', see 'D size' in page 19 & 20. |  |                 |  |  |      |



## Screw on system

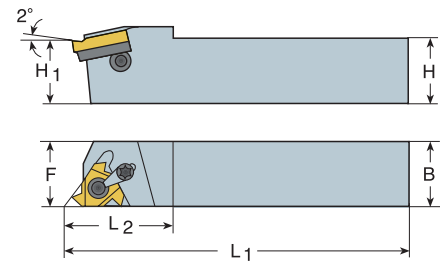
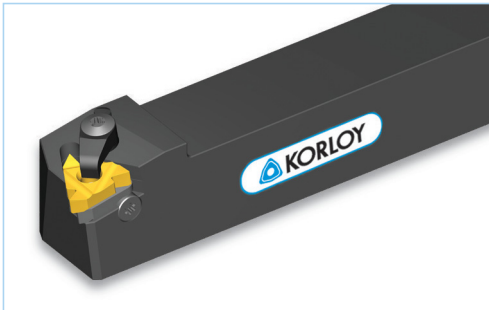


| Designation  | Stock |    | Dimensions (mm)  |        |    |       |      | Parts        |            |        |         |         |
|--------------|-------|----|------------------|--------|----|-------|------|--------------|------------|--------|---------|---------|
|              | RH    | LH | Inscribed circle | H=H1=B | F  | L1    | L2   | Insert Screw | Shim Screw | Wrench | Shim RH | Shim LH |
| ER(L)H08N-11 | ○     | ○  |                  | 8      | 11 | 136.4 | 17.5 |              |            |        |         |         |
| ER(L)H10N-11 | ○     | ○  | 6.35             | 10     | 11 | 70.0  | 17.5 | ST11N        | -          | TW08P  | -       | -       |
| ER(L)H12N-11 | ○     | ○  |                  | 12     | 12 | 80.0  | 17.5 |              |            |        |         |         |
| ER(L)H12N-16 | ○     | ○  |                  | 12     | 16 | 83.2  | 22   | ST16N        | -          | TW10P  | -       | -       |
| ER(L)H09-16  | ○     | ○  |                  | 9.52   | 16 | 63.6  | 20.5 |              |            |        |         |         |
| ER(L)H12-16  | ●     | ○  |                  | 12     | 16 | 83.2  | 22   |              |            |        |         |         |
| ER(L)H16-16  | ●     | ○  | 9.525            | 16     | 16 | 100.0 | 20.5 | ST16         | STA16      | TW10P  | ATE16   | ATI16   |
| ER(L)H20-16  | ●     | ○  |                  | 20     | 20 | 128.6 | 30   |              |            |        |         |         |
| ER(L)H25-16  | ●     | ○  |                  | 25     | 25 | 153.6 | 30   |              |            |        |         |         |
| ER(L)H32-16  | ●     | ○  |                  | 32     | 32 | 173.6 | 30   |              |            |        |         |         |
| ER(L)H25-22  | ●     | ○  |                  | 25     | 25 | 155.7 | 36   |              |            |        |         |         |
| ER(L)H32-22  | ●     | ○  | 12.7             | 32     | 32 | 175.7 | 36   | ST22         | STA22      | TW20P  | ATE22   | ATI22   |
| ER(L)H40-22  | ●     | ○  |                  | 40     | 40 | 205.7 | 36   |              |            |        |         |         |
| ER(L)H25-27  | ○     | ○  |                  | 25     | 32 | 151.6 | 35   |              |            |        |         |         |
| ER(L)H32-27  | ○     | ○  |                  | 32     | 32 | 176.6 | 40   |              |            |        |         |         |
| ER(L)H40-27  | ○     | ○  | 15.875           | 40     | 40 | 206.6 | 40   | ST27         | STA27      | TW25L  | ATE27   | ATI27   |
| ER(L)H50-27  | ○     | ○  |                  | 50     | 50 | 256.6 | 40   |              |            |        |         |         |

• No Shim needed for N type holder.  
 • Helix angle is 1.5° for all holders.

● : Stock Item ○ : Under preparing for stock

## Clamp on system

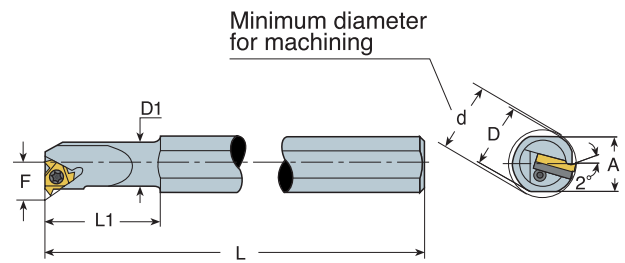
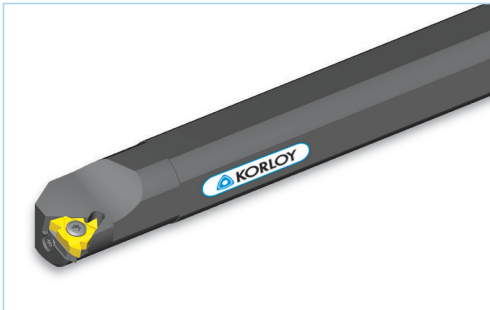


| Designation  | Stock |    | Dimensions (mm)  |                     |    |                |                | Parts      |                |       |         |         |
|--------------|-------|----|------------------|---------------------|----|----------------|----------------|------------|----------------|-------|---------|---------|
|              |       |    |                  |                     |    |                |                |            |                |       |         |         |
|              | RH    | LH | Inscribed circle | H=H <sub>1</sub> =B | F  | L <sub>1</sub> | L <sub>2</sub> | Shim Screw | Wrench         | Clamp | Shim RH | Shim LH |
| ER(L)H20-16C | ●     | ○  | 9.525            | 20                  | 20 | 128.6          | 30             | STA16      | TW10P<br>TW15P | CTH16 | ATE16   | ATI16   |
| ER(L)H25-16C | ●     | ○  |                  | 25                  | 25 | 153.6          | 30             |            |                |       |         |         |
| ER(L)H32-16C | ●     | ○  |                  | 32                  | 32 | 173.6          | 30             |            |                |       |         |         |
| ER(L)H25-22C | ●     | ○  | 12.7             | 25                  | 25 | 155.7          | 36             | STA22      | TW20P          | CTH22 | ATE22   | ATI22   |
| ER(L)H32-22C | ●     | ○  |                  | 32                  | 32 | 175.7          | 36             |            |                |       |         |         |
| ER(L)H40-22C | ●     | ○  |                  | 40                  | 40 | 205.7          | 36             |            |                |       |         |         |
| ER(L)H25-27C | ○     | ○  | 15.875           | 25                  | 32 | 151.6          | 35             | STA27      | TW25L          | CTH27 | ATE27   | ATI27   |
| ER(L)H32-27C | ○     | ○  |                  | 32                  | 32 | 176.6          | 40             |            |                |       |         |         |
| ER(L)H40-27C | ○     | ○  |                  | 40                  | 40 | 206.6          | 40             |            |                |       |         |         |
| ER(L)H50-27C | ○     | ○  |                  | 50                  | 50 | 256.6          | 40             |            |                |       |         |         |

• Helix angle is 1.5° for all holders.

● : Stock Item ○ : Under preparing for stock

## Screw on system

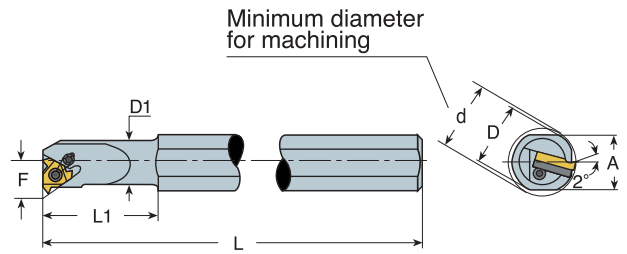
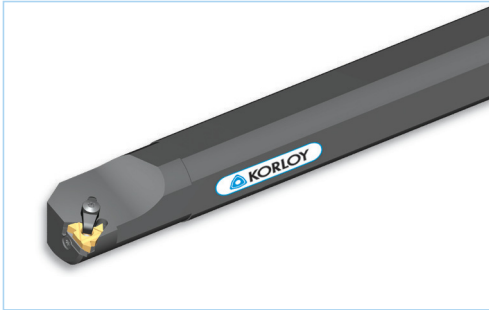


| Designation   | Stock |    | Dimensions (mm)  |      |     |    |      |      |      |    | Parts        |            |        |         |         |
|---------------|-------|----|------------------|------|-----|----|------|------|------|----|--------------|------------|--------|---------|---------|
|               | RH    | LH | Inscribed circle | A    | L   | L1 | D    | D1   | F    | d  | Insert Screw | Shim Screw | Wrench | Shim RH | Shim LH |
| IR(L)H10DN-11 | ●     | ○  | 6.35             | 18.0 | 100 | 25 | 20   | 10.0 | 7.3  | 13 | ST11N        | -          | TW08P  | -       | -       |
| IR(L)H10N-11  | ●     | ○  |                  | 18.0 | 180 | 32 | 20   | 13.0 | 8.9  | 16 |              |            |        |         |         |
| IR(L)H13N-11  | ●     | ○  |                  | 18.0 | 180 | 32 | 20   | 12.7 | 10.3 | 17 |              |            |        |         |         |
| IR(L)H13N-16  | ●     | ○  | 9.525            | 18.0 | 180 | 40 | 20   | 16.0 | 11.5 | 20 | ST16N        | -          | TW10P  | -       | -       |
| IR(L)H16N-16  | ●     | ○  |                  | 15.2 | 150 | 32 | 16   | 16.0 | 11.3 | 20 |              |            |        |         |         |
| IR(L)H16DN-16 | ●     | ○  |                  | 18.0 | 180 | 40 | 20   | 20.0 | 13.4 | 24 |              |            |        |         |         |
| IR(L)H20-16   | ●     | ○  |                  | 29.0 | 250 | 60 | 32   | 25.0 | 16.3 | 29 |              |            |        |         |         |
| IR(L)H25D-16  | ●     | ○  |                  | 22.6 | 200 | 45 | 25   | 24.6 | 16.1 | 29 | ST16         | STA16      | TW10P  | ATI16   | ATE16   |
| IR(L)H32-16   | ●     | ○  |                  | 29.0 | 250 | 60 | 32   | 32.0 | 19.6 | 36 |              |            |        |         |         |
| IR(L)H40-16   | ●     | ○  | 36.0             | 300  | 60  | 40 | 40.0 | 23.8 | 44   |    |              |            |        |         |         |
| IR(L)H20N-22  | ●     | ○  | 12.7             | 18.0 | 180 | 50 | 20   | 20.0 | 15.6 | 27 | ST22N        | -          | TW20P  | -       | -       |
| IR(L)H25-22   | ●     | ○  |                  | 29.0 | 250 | 60 | 32   | 25.0 | 17.4 | 32 |              |            |        |         |         |
| IR(L)H25D-22  | ●     | ○  |                  | 22.6 | 200 | 45 | 25   | 24.6 | 17.2 | 32 | ST22         | STA22      | TW20P  | ATI22   | ATE22   |
| IR(L)H32-22   | ●     | ○  |                  | 29.0 | 250 | 60 | 32   | 32.0 | 21.5 | 39 |              |            |        |         |         |
| IR(L)H40-22   | ●     | ○  |                  | 36.0 | 300 | 60 | 40   | 40.0 | 25.8 | 47 |              |            |        |         |         |
| IR(L)H32-27   | ○     | ○  | 15.875           | 29.0 | 250 | 60 | 32   | 32.0 | 22.4 | 40 |              |            |        |         |         |
| IR(L)H40-27   | ○     | ○  |                  | 36.0 | 300 | 60 | 40   | 40.0 | 26.4 | 48 |              |            |        |         |         |
| IR(L)H50-27   | ○     | ○  |                  | 45.0 | 350 | 75 | 50   | 50.0 | 31.4 | 58 | ST27         | STA27      | TW25L  | ATI27   | ATE27   |
| IR(L)H60-27   | ○     | ○  |                  | 54.0 | 400 | 75 | 60   | 60.0 | 36.4 | 69 |              |            |        |         |         |

- No Shim needed for N type holder.
- Helix angle is 1.5° for all holders.

● : Stock Item ○ : Under preparing for stock

## Clamp on system



| Designation   | Stock |    | Dimensions (mm)  |      |     |    |    |      |      |    | Parts      |       |                |         |         |
|---------------|-------|----|------------------|------|-----|----|----|------|------|----|------------|-------|----------------|---------|---------|
|               | RH    | LH | Inscribed circle | A    | L   | L1 | D  | D1   | F    | d  | Shim Screw | Clamp | Wrench         | Shim RH | Shim LH |
| IR(L)H20-16C  | ●     | ○  | 9.525            | 18.0 | 180 | 50 | 20 | 20.0 | 13.4 | 24 | STA16      | CTH16 | TW10P<br>TW15P | ATI16   | ATE16   |
| IR(L)H25-16C  | ●     | ○  |                  | 28.0 | 250 | 60 | 32 | 25.0 | 16.3 | 29 |            |       |                |         |         |
| IR(L)H25D-16C | ●     | ○  |                  | 22.6 | 200 | 45 | 25 | 24.6 | 16.1 | 29 |            |       |                |         |         |
| IR(L)H32-16C  | ●     | ○  |                  | 29.0 | 250 | 60 | 32 | 32.0 | 19.6 | 36 |            |       |                |         |         |
| IR(L)H40-16C  | ●     | ○  |                  | 36.0 | 300 | 60 | 40 | 40.0 | 23.8 | 44 |            |       |                |         |         |
| IR(L)H25-22C  | ●     | ○  | 12.7             | 29.0 | 250 | 60 | 32 | 25.0 | 17.4 | 32 | STA22      | CTH22 | TW20P          | ATI22   | ATE22   |
| IR(L)H25D-22C | ●     | ○  |                  | 22.6 | 200 | 45 | 25 | 24.6 | 17.2 | 32 |            |       |                |         |         |
| IR(L)H32-22C  | ●     | ○  |                  | 29.0 | 250 | 60 | 32 | 32.0 | 21.5 | 39 |            |       |                |         |         |
| IR(L)H40-22C  | ●     | ○  |                  | 36.0 | 300 | 60 | 40 | 40.0 | 25.8 | 47 |            |       |                |         |         |
| IR(L)H32-27C  | ○     | ○  | 15.875           | 29.0 | 250 | 60 | 32 | 32.0 | 22.4 | 40 | STA27      | CTH27 | TW25L          | ATI27   | ATE27   |
| IR(L)H40-27C  | ○     | ○  |                  | 36.0 | 300 | 60 | 40 | 40.0 | 26.4 | 48 |            |       |                |         |         |
| IR(L)H50-27C  | ○     | ○  |                  | 45.0 | 350 | 75 | 50 | 50.0 | 31.4 | 58 |            |       |                |         |         |
| IR(L)H60-27C  | ○     | ○  |                  | 54.0 | 400 | 75 | 60 | 60.0 | 36.4 | 69 |            |       |                |         |         |

• Helix angle is 1.5° for all holders.

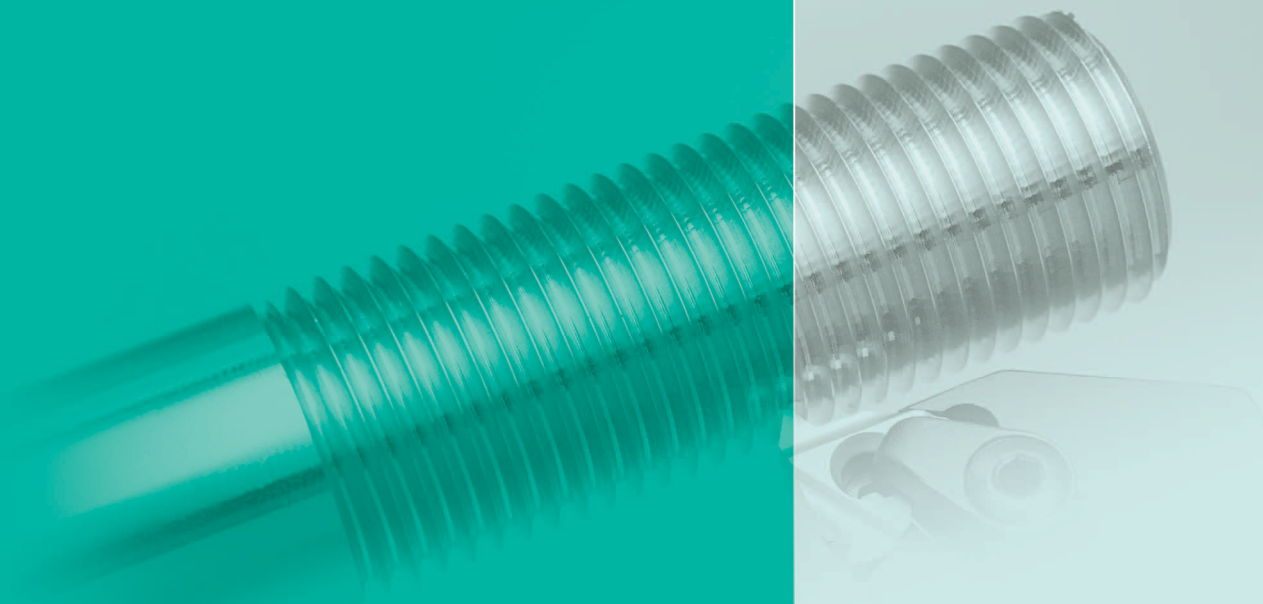
● : Stock Item ○ : Under preparing for stock



# Thread Turning Technical Data

- Special Features
- Machining a Multi-Start Thread
- Insert Profile Style
- Thread Turning Method
- Calculating the Helix Angle  $\beta$
- Helix Angle Diagram
- Thread Infeed Methods
- Shim
- Grade and Application
- Recommended Cutting Speed as per workpiece [Vc]
- Calculation of N [RPM]
- Number of Passes
- Cutting Condition Depends on
- Step by Step Thread Turning - Example
- Trouble Shooting

## TECHNICAL DATA



## Special Features

### External Thread

A thread on the external surface of a cylinder screw or cone

### Depth of Thread

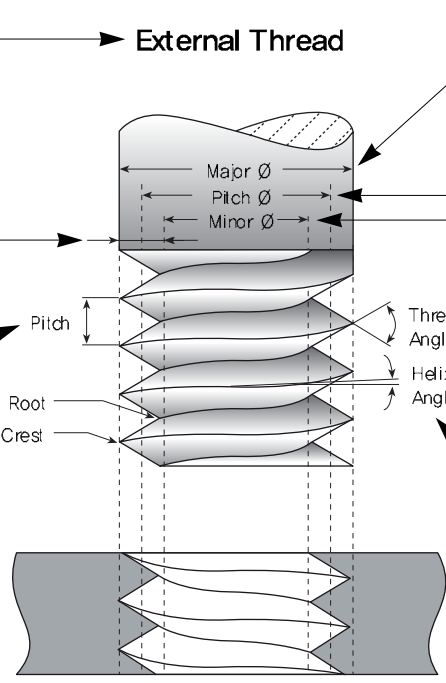
The distance between crest and root measured normal to the axis.

### Pitch

The distance between corresponding points on adjacent thread forms measured parallel to the axis. This distance can be defined in millimeters or by the *tpi* (threads per inch), which is the reciprocal of the pitch.

### Nominal Diameter

The diameter from which the diameter limits are derived by the application of deviation allowances and tolerances.



### Major Diameter

The largest diameter of a screw thread.

### Pitch Diameter

On a straight thread, the diameter of an imaginary cylinder, the surface of which cuts the thread forms where the width of the thread and groove are equal.

### Minor Diameter

The smallest diameter of a screw thread.

### Helix Angle

For a straight thread, where the lead of the thread and the pitch diameter circle circumference form a right angled triangle, the helix angle is the angle opposite the lead.

### Internal Thread

A thread on the internal surface of a cylinder or cone.

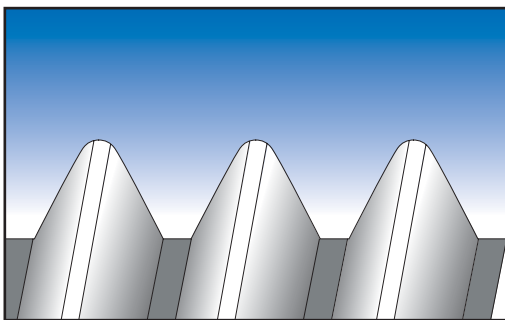
### Straight Thread

A thread formed on a cylinder

### Taper Thread

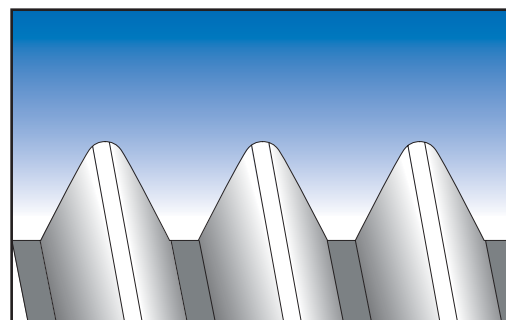
A thread formed on a cone

### ● Left-hand thread



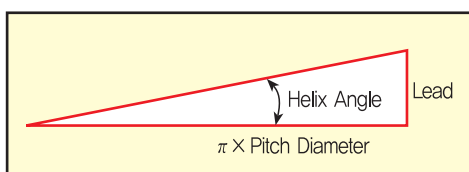
A thread which, when viewed axially, winds in a counterclockwise and receding direction. All left-hand threads are designated LH.

### ● Right-hand thread



A thread which, when viewed axially, winds in a clockwise and receding direction. Threads are always right-hand unless otherwise specified.

### ● The Helix Angle $\beta$



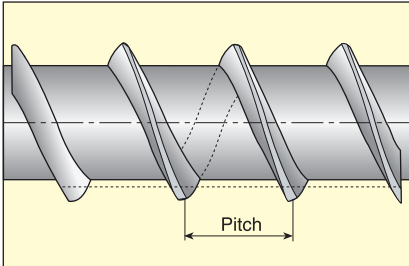
### Lead

The distance a threaded part moves axially, with respect to a fixed mating part, in one complete revolution. The lead is equal to the pitch multiplied by the number of thread starts.

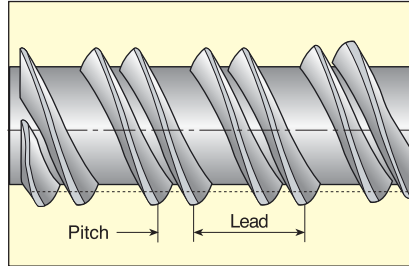
## Machining a Multi-Start Thread

A thread in which the lead is an integral multiple, greater than one, of the pitch. A multi-start thread permits a more rapid advance without a coarser (larger) thread form.

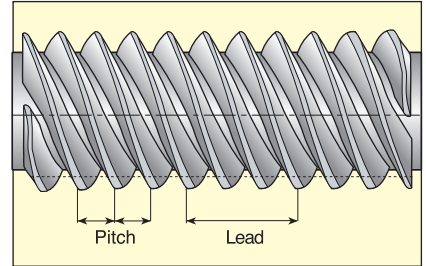
### ● First Start Machined



### ● Second Start Machined

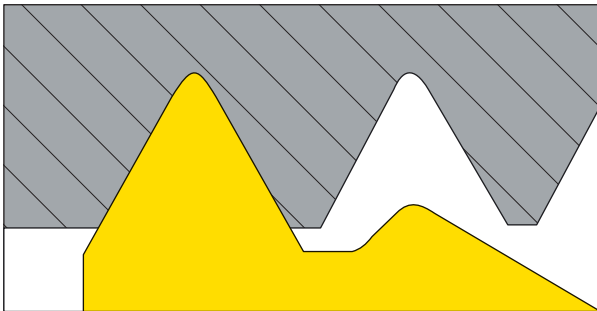


### ● Third Start Machined (Final, 3 Starts Thread)



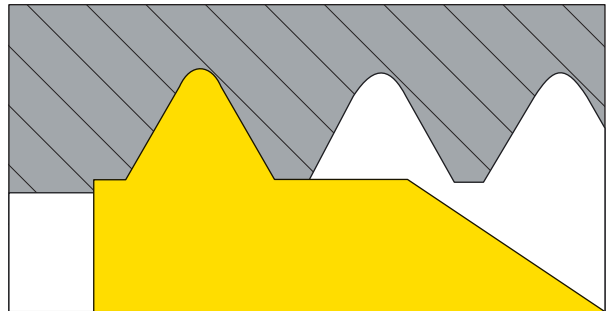
## Insert Profile Style

### ● Partial Profile



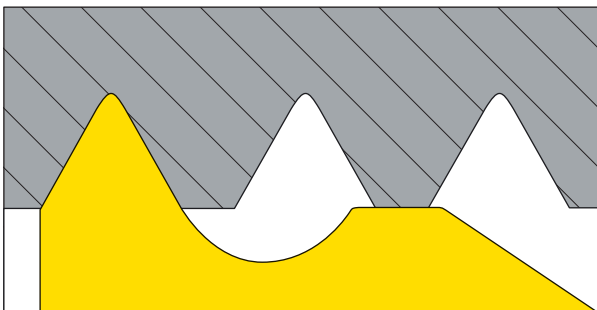
The V partial profile insert cuts without topping the outer diameter of the thread. The same insert can be used for a range of different thread pitches which have a common thread angle.

### ● Full Profile



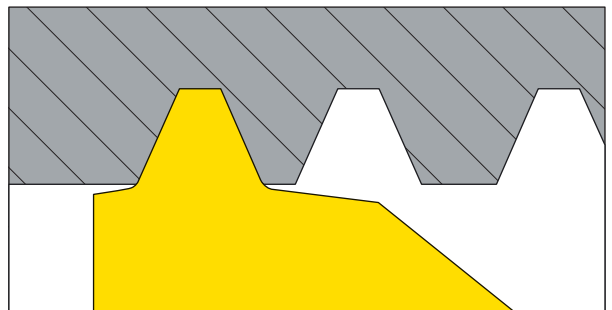
The full profile insert will form a complete thread profile including the crest. For every thread pitch and standard, a separate insert is required.

### ● Full Profile for Fine Pitches



The full profile for Fine Pitches will form a complete thread. The topping of the outer diameter is generated by second tooth.

### ● Semi Full

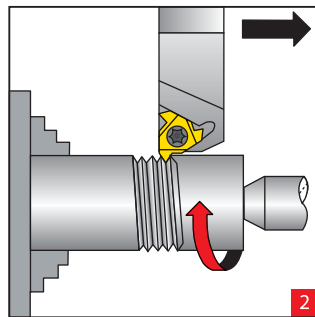
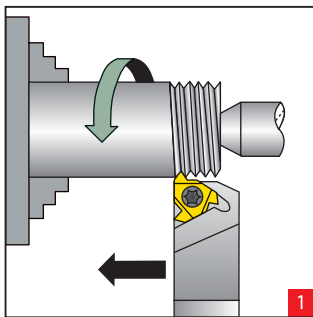


The Semi profile insert will form a complete thread including crest radius but without topping the outer diameter. Mainly used for trapezoidal profiles.

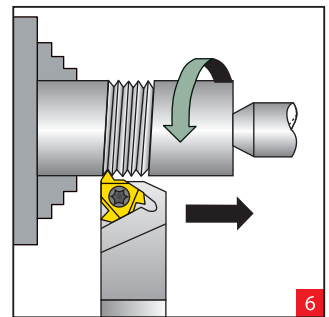
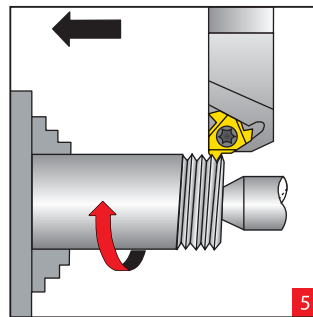
## Thread Turning Method

| Thread              | Inserts & Toolholder | Rotation         | Feed Direction | Helix Method | Drawing No. |
|---------------------|----------------------|------------------|----------------|--------------|-------------|
| Right Hand External | EX RH                | Counterclockwise | Towards chuck  | Regular      | 1           |
|                     | EX LH                | Clockwise        | From chuck     | Reversed     | 2           |
| Right Hand Internal | IN RH                | Counterclockwise | Towards chuck  | Regular      | 3           |
|                     | IN LH                | Clockwise        | From chuck     | Reversed     | 4           |
| Left Hand External  | EX LH                | Counterclockwise | Towards chuck  | Regular      | 5           |
|                     | EX RH                | Clockwise        | From chuck     | Reversed     | 6           |
| Left Hand Internal  | IN LH                | Counterclockwise | Towards chuck  | Regular      | 7           |
|                     | IN RH                | Clockwise        | From chuck     | Reversed     | 8           |

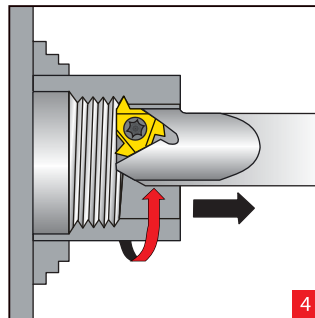
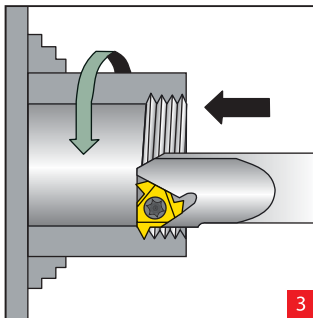
● External RH Thread



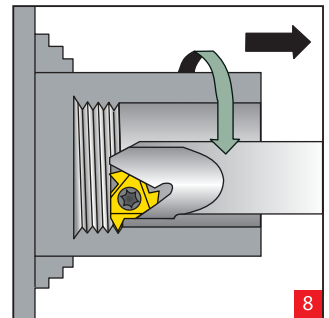
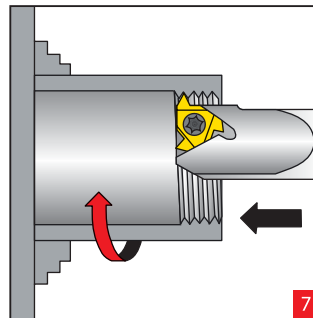
● External LH Thread



● Internal RH Thread

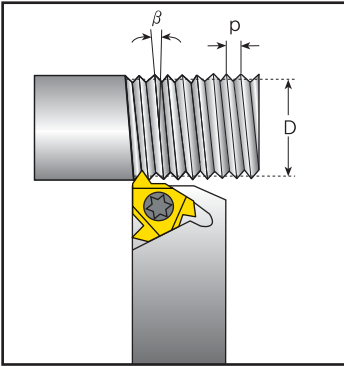


● Internal LH Thread





## Calculating the Helix Angle $\beta$



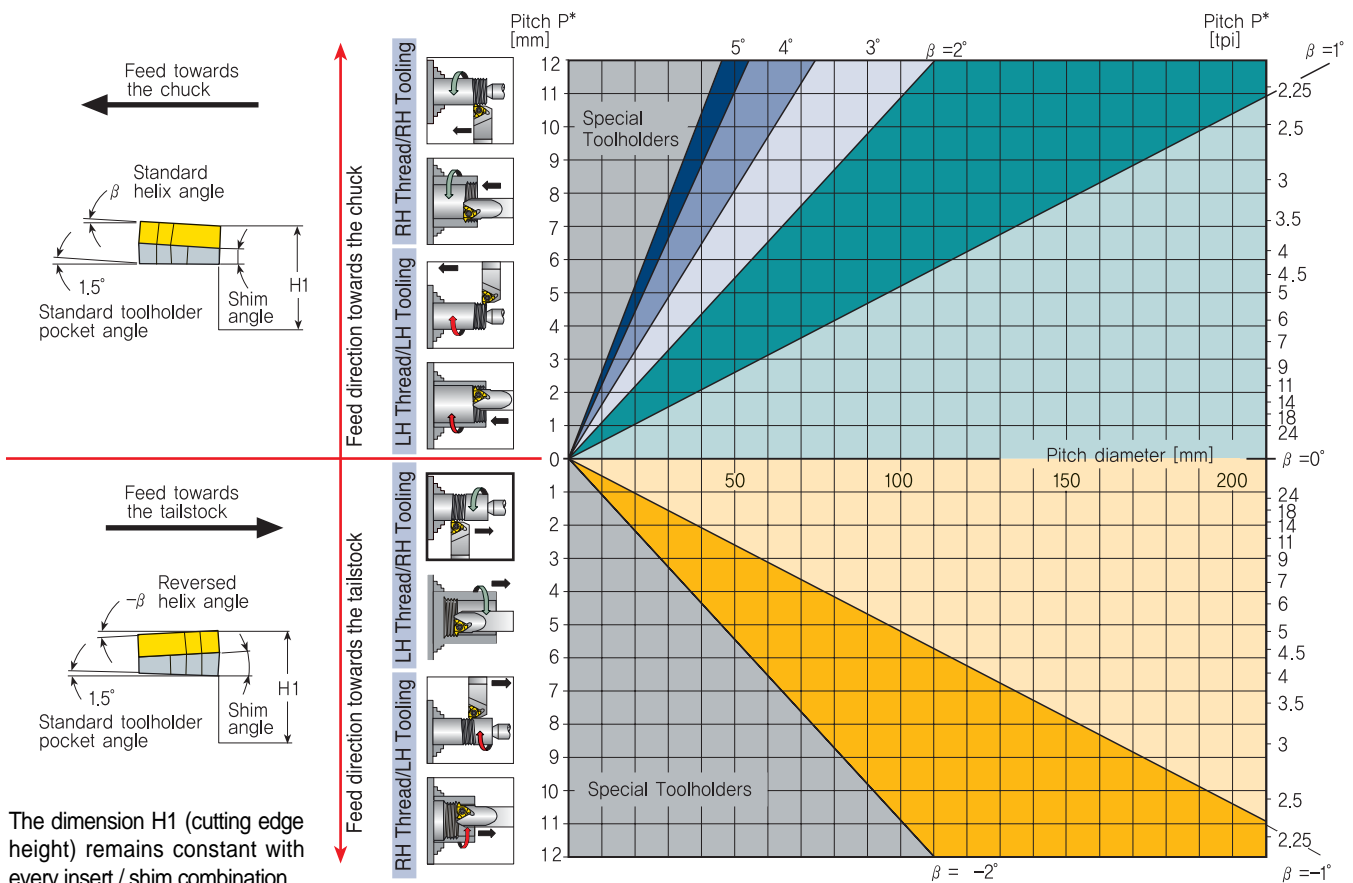
The helix angle is calculated by the following formula:

$$\beta = \tan^{-1} \frac{P \times N}{\pi \times D}$$

$\beta$  - Helix angle(°)  
 P - Pitch(mm)  
 N - No. of starts  
 D - Pitch diameter(mm)  
 Lead = P x N

The helix angle can also be found from the diagram below.

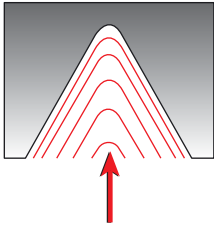
## Helix Angle Diagram



\* For Multi-start threads, use the lead value instead of the pitch

## Thread Infeed Method

### ● Radial Infeed



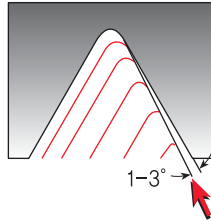
Radial infeed is the simplest and quickest method.

The feed is perpendicular to the turning axis, and both flanks of the insert perform the cutting operation.

Radial infeed is recommended in 3 cases:

- when the pitch is smaller than 16 tpi
- for material with short chips
- for work with hardened material

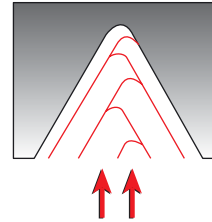
### ● Flank Infeed (modified)



Flank infeed is recommended in the following cases:

- when the thread pitch is greater than 16 tpi., using the radial method, the effective cutting edge length is too large, resulting in chatter.
- for TRAPEZ and ACME. The radial method result in three cutting edges, making chip flow very difficult.

### ● Alternate Flank Infeed



Use of the alternate flank method is recommended especially in large pitches and for materials with long chills.

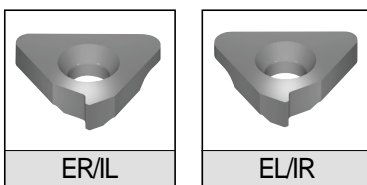
This method divides the load equally on both flanks, resulting in equal wear along the cutting edges.

Alternate flank infeed requires more complicated programming, and is not available on all lathes.

## Shim

| Resultant Helix Angle |       |        | 1.5°          |
|-----------------------|-------|--------|---------------|
| Insert Size           |       | Holder | Ordering Code |
| IC                    | L(mm) |        |               |
| 3/8"                  | 16    | ER/IL  | ATE16         |
|                       |       | EL/IR  | ATI16         |
| 1/2"                  | 22    | ER/IL  | ATE22         |
|                       |       | EL/IR  | ATI22         |
| 5/8"                  | 27    | ER/IL  | ATE27         |
|                       |       | EL/IR  | ATI27         |

### ● Standard Shim



## Grade and Application

| Grade   | Application   | Sample |
|---------|---|--------|
| PC3030T | A tough sub-micron substrate with TiAlN coating provides good fracture toughness and excellent wear resistance. |        |

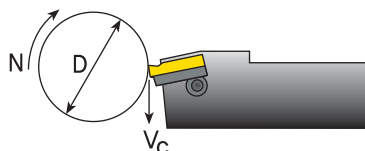
## Recommended Cutting Speed as per workpiece [Vc]

| Material                     |  |                                   | Hardness<br>Brinell HB | Vc          |          |
|------------------------------|--|-----------------------------------|------------------------|-------------|----------|
|                              |  |                                   |                        | PC3030T     |          |
|                              |  |                                   |                        | ISO(m/min.) | ASA(sfm) |
| P                            | Unalloyed steel                              | Low carbon (C=0.1-0.25 %)         | 125                    | 115-190     | 380-627  |
|                              |  | Medium carbon (C=0.25-0.55 %)     | 150                    | 100-175     | 330-578  |
|                              |  | High carbon (C=0.55-0.85 %)       | 170                    | 90-165      | 297-545  |
|                              | Low alloy steel<br>(alloying elements ≤ 5%)  | Non hardened                      | 180                    | 85-145      | 281-479  |
|                              |  | Hardened                          | 275                    | 75-140      | 248-462  |
|                              |  | Hardened                          | 350                    | 70-135      | 231-446  |
|                              | High alloy steel<br>(alloying elements > 5%) | Annealed                          | 200                    | 70-110      | 231-363  |
|                              |  | Hardened                          | 325                    | 50-100      | 165-330  |
| Cast steel                   | Low alloy (alloying elements <5%)            | 200                               | 75-140                 | 248-462     |          |
|                              | High alloy (alloying elements >5%)           | 225                               | 60-120                 | 198-396     |          |
| M                            | Stainless steel Ferritic                     | Non hardened                      | 200                    | 70-130      | 231-429  |
|                              |  | Hardened                          | 330                    | 60-115      | 198-380  |
|                              | Stainless steel Austenitic                   | Austenitic                        | 180                    | 90-140      | 297-462  |
|                              |  | Super austenitic                  | 200                    | 40-110      | 132-363  |
|                              | Stainless steel Cast ferritic                | Non hardened                      | 200                    | 90-120      | 297-396  |
|                              |  | Hardened                          | 330                    | 65-110      | 215-363  |
|                              | Stainless steel Cast austenitic              | Austenitic                        | 200                    | 85-110      | 281-363  |
|                              |  | Hardened                          | 330                    | 60-100      | 198-330  |
|                              | High temperature alloy                       | Annealed (Iron based)             | 200                    | 45-60       | 149-198  |
|                              |  | Aged (Iron based)                 | 280                    | 30-50       | 99-165   |
|                              |  | Annealed (Nickel or Cobalt based) | 250                    | 20-30       | 66-99    |
|                              |  | Aged (Nickel or Cobalt based)     | 350                    | 15-25       | 50-83    |
|                              | Titanium alloy                               | Pure 99.5 Ti                      | 400Rm                  | 140-170     | 462-561  |
|                              |  | a+b alloys                        | 1050Rm                 | 50-70       | 165-231  |
| K                            | Extra hard steel                             | Hardened & tempered               | 55HRc                  | 45-60       | 149-198  |
|                              | Malleable cast iron                          | Ferritic (short chips)            | 130                    | 70-160      | 231-528  |
|                              |  | Pearlitic (long chips)            | 230                    | 60-145      | 198-479  |
|                              | Grey cast iron                               | Low tensile strength              | 180                    | 70-130      | 231-429  |
|                              |  | High tensile strength             | 260                    | 60-115      | 198-380  |
|                              | Nodular SG iron                              | Ferritic                          | 160                    | 125-160     | 413-528  |
|                              |  | Pearlitic                         | 260                    | 90-120      | 297-396  |
|                              | Aluminum alloy Wrought                       | non aging                         | 60                     | 100-365     | 330-1205 |
|                              |  | Aged                              | 100                    | 80-220      | 264-726  |
|                              |  | Aluminum alloy                    | Cast                   | 75          | 200-400  |
|                              | Aluminum alloy                               | Cast & aged                       | 90                     | 200-280     | 660-924  |
|                              |  | Cast Si 13-22%                    | 130                    | 60-180      | 198-594  |
|                              |  | Copper and copper alloy           | Brass                  | 90          | 80-225   |
| Bronze and non leaded copper | 100  |                                   | 80-225                 | 264-743     |          |

## Calculation of N [RPM]

$$N = \frac{1000 \times Vc}{\pi \times D}$$

$$Vc = \frac{N \times \pi \times D}{1000}$$



N - Revolution Per Minute [RPM]  
 Vc - Cutting Speed [m/min]  
 D - Workpiece Diameter [mm]

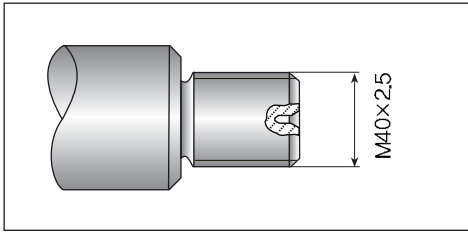
## Number of Passes

| Pitch         | (mm) | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50  | 4.00  | 4.50  | 5.00  | 5.50  | 6.00  | 8.00  |
|---------------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
|               | TPI  | 48   | 32   | 24   | 20   | 16   | 14   | 12   | 10   | 8    | 7     | 6     | 5.5   | 5     | 4.5   | 4     | 3     |
| No. of passes |      | 4-6  | 4-7  | 4-8  | 5-9  | 6-10 | 7-12 | 7-12 | 8-14 | 9-16 | 10-18 | 11-18 | 11-19 | 12-20 | 12-20 | 12-20 | 15-24 |

## Cutting Condition Depends on:

|                           |   |  |
|---------------------------|---|--|
| <b>Workpiece</b>          | Material Type                               |  |
|                           | Material Dimension: Diameter and Length     |  |
|                           | Chipflow Character                          |  |
|                           | Material Hardness                           |  |
| <b>Thread Application</b> | External or Internal                        |  |
|                           | Profile Shape                               |  |
|                           | Surface Finish                              |  |
| <b>Machine</b>            | Machine Stability                           |  |
|                           | Max. RPM                                    |  |
|                           | Clamping System Stability                   |  |
| <b>Coolant</b>            | Coolant Type                                |  |
| <b>Holders</b>            | Holder Cross Section Area                   |  |
|                           | Holder Overhang                             |  |
|                           | Through Coolant Option                      |  |
|                           | Shank Type: Carbide, Alloy, Carbide Implant |  |
| <b>Insert</b>             | Grade                                       |  |
|                           | Profile Shape: Pitch and Depth              |  |
|                           | Nose Radius                                 |  |
|                           | Chipbreaker Style                           |  |

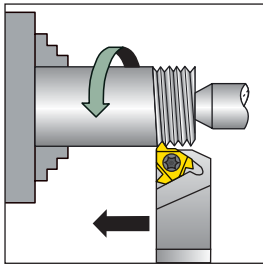
## Step by Step Thread Turning - Example



### Application:

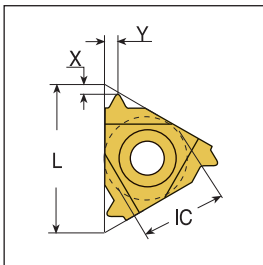
Thread : External Right Hand  
 ISO Metric M40x2.5  
 Material : 4140 (25 HRC)

### 1 Choose the Thread Turning Method



Feed direction towards the chuck was chosen.  
 Therefore an external right hand insert and an external right hand holder will be used.

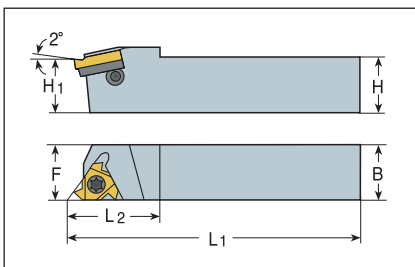
### 2 Choose the Insert Size



Chosen insert : **ER16 - 2.5 ISO**

| Insert | Size  | Pitch | Ordering Code | Shim  | Toolholder |
|--------|-------|-------|---------------|-------|------------|
| IC     | L(mm) | mm    | RH            | RH    |            |
| 9.525  | 16    | 2.5   | ER16-2.5 ISO  | ATE16 | ERH□□16    |

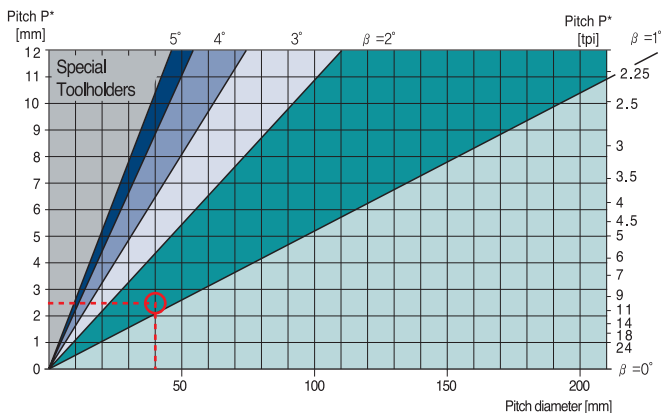
### 3 Choose the Toolholder



Chosen toolholder : **ERH 25 - 16**

| Insert Size | Ordering Code | Dimensions (mm) |    |                |                |
|-------------|---------------|-----------------|----|----------------|----------------|
| IC          | RH            | H=H1=B          | F  | L <sub>1</sub> | L <sub>2</sub> |
| 9.525       | ERH 25-16     | 25              | 25 | 153.6          | 30             |

### 4 Determine the Helix Angle



From the table, using a pitch of 2.5 mm (10 tpi) and a workpiece diameter of 40mm (1.57"), we find the helix angle to be 1.5°.



## 5 Choose the Correct Shim

Shim Chosen : **ATE16**

|                       |       |              |
|-----------------------|-------|--------------|
| Resultant Helix Angle |       | 1.5°         |
| Insert Size           |       | Odering Code |
| IC                    | L(mm) |              |
| 3/8"                  | 16    | ATE16        |

## 6 Choose the Carbide Grade and Cutting Speed

Carbide grade chosen : **PC3030T**

Cutting speed : **140 m /min**

: **460 sfm**

| Material |  | Hardness<br>Brinell<br>HB | Vc    |        |         |
|----------|--|---------------------------|-------|--------|---------|
|          |  |                           | m/min | sfm    |         |
| P        | Low alloy steel<br>(alloying elements ≤5%) | Non hardened              | 180   | 85-145 | 280-475 |
|          |  | Hardened                  | 275   | 75-140 | 245-460 |
|          |  | Hardened                  | 350   | 70-135 | 230-445 |

## 7 Determine the Number of Passes

Number of passes : 10

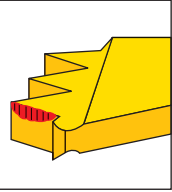
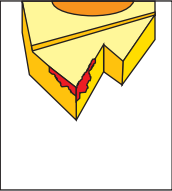
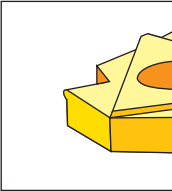
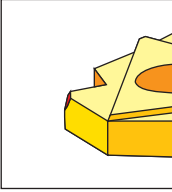
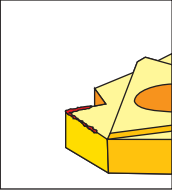
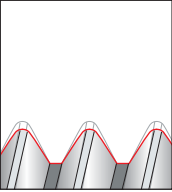
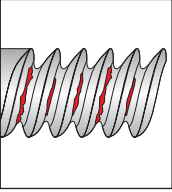
ISO External

| Pitch         | (mm) | 1.50 | 1.75 | 2.00 | 2.50 | 3.00 | 3.50  | 4.00  |
|---------------|------|------|------|------|------|------|-------|-------|
|               | TPI  | 16   | 14   | 12   | 10   | 8    | 7     | 6     |
| No. of passes |      | 6-10 | 7-12 | 7-12 | 8-14 | 9-16 | 10-18 | 11-18 |

## Summary

|                     |                                 |         |
|---------------------|---------------------------------|---------|
| Thread Type         | ISO M40x2.5 External Right Hand |         |
| 1 Feed Direction:   | Towards the chuck               |         |
| 2 Insert and Grade: | ER16-2.5ISO, PC3030T            |         |
| 3 Toolholder:       | ERH25-16                        |         |
| 4 Helix Angle:      | 1.5°                            |         |
| 5 Shim              | ATE16                           |         |
| 6 Cutting Speed:    | 140 m/min                       | 460 sfm |
| 7 Number of Passes: | 10                              |         |

## Trouble Shooting

| Problem   | Possible Cause   | Solution   |
|---|--|--|
|  <p><b>Increased flank wear</b></p>            | <ul style="list-style-type: none"> <li>Cutting speed too high .....▶</li> <li>Depth of cut too low/too many passes .....▶</li> <li>Unsuitable carbide grade .....▶</li> <li>Insufficient cooling .....▶</li> </ul>                         | <ul style="list-style-type: none"> <li>Reduce cutting speed/ use coated insert</li> <li>Increase the depth of cut per pass</li> <li>Use a coated carbide grade</li> <li>Increase coolant flow rate</li> </ul>  |
|  <p><b>Uneven cutting edge wear</b></p>        | <ul style="list-style-type: none"> <li>Incorrect helix angle .....▶</li> <li>Wrong infeed method .....▶</li> </ul>   | <ul style="list-style-type: none"> <li>Choose the correct shim</li> <li>Use the Alternating Flank Infeed method</li> </ul>   |
|  <p><b>Extreme plastic deformation</b></p>    | <ul style="list-style-type: none"> <li>Depth of cut too large .....▶</li> <li>Insufficient cooling .....▶</li> <li>Cutting speed too high .....▶</li> <li>Unsuitable carbide grade .....▶</li> <li>Nose radius too small .....▶</li> </ul> | <ul style="list-style-type: none"> <li>Decrease depth of cut/ increase number of passes</li> <li>Increase coolant flow rate</li> <li>Reduce cutting speed</li> <li>Use a tougher carbide</li> <li>Use an insert with a larger radius, if possible</li> </ul>       |
|  <p><b>Cutting edge breakage</b></p>         | <ul style="list-style-type: none"> <li>Depth of cut too large .....▶</li> <li>Extreme plastic deformation .....▶</li> <li>Insufficient cooling .....▶</li> <li>Unsuitable carbide grade .....▶</li> <li>Instability .....▶</li> </ul>      | <ul style="list-style-type: none"> <li>Decrease depth of cut/ increase number of passes</li> <li>Use a tougher carbide</li> <li>Increase flow rate and/ or correct flow direction</li> <li>Use a tougher carbide</li> <li>Check stability of the system</li> </ul> |
|  <p><b>Built-up edge</b></p>                 | <ul style="list-style-type: none"> <li>Incorrect cutting speed .....▶</li> <li>Unsuitable carbide grade .....▶</li> </ul>  | <ul style="list-style-type: none"> <li>Change the cutting speed</li> <li>Use a coated carbide</li> </ul>   |
|  <p><b>Thread profile is too shallow</b></p> | <ul style="list-style-type: none"> <li>The tool is not at the workpiece axis height .....▶</li> <li>Insert is not machining the thread crest .....▶</li> <li>Worn insert .....▶</li> </ul>   | <ul style="list-style-type: none"> <li>Change tool height</li> <li>Measure the workpiece diameter</li> <li>Change the cutting edge sooner</li> </ul>   |
|  <p><b>Poor surface quality</b></p>          | <ul style="list-style-type: none"> <li>Cutting speed too low .....▶</li> <li>Wrong shim .....▶</li> <li>Flank infeed method is not appropriate .....▶</li> </ul>   | <ul style="list-style-type: none"> <li>Increase cutting speed</li> <li>Choose correct shim</li> <li>Use the alternate flank or radial infeed method</li> </ul>   |