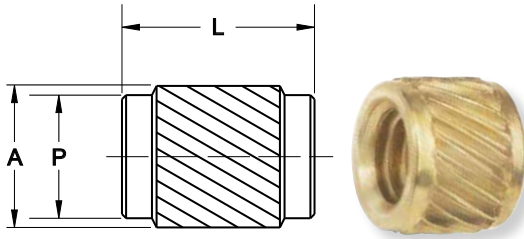
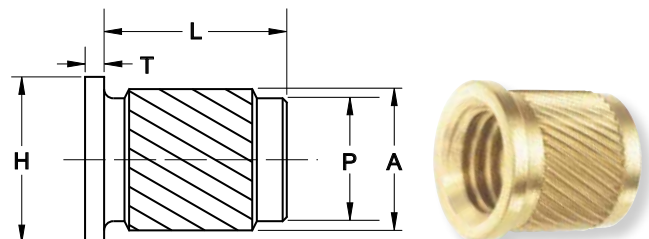


## Series 50



## Series 51



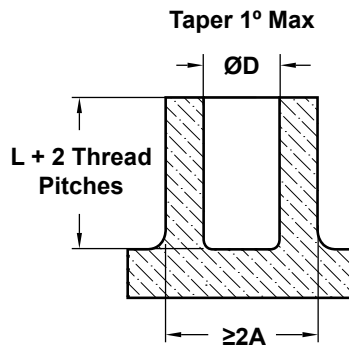
### DIMENSIONAL DATA

### LEGEND

Inch
Metric Conversion

Thread Size		A Overknurl Ø		P Pilot Ø		L Length		T Head Thickness		H Head Ø		D* Rec. Hole Ø	
Tolerance ▶		Ref.		±.003	±0.08	±.005	±0.13	±.003	±0.08	±.003	±0.08	+0.03	+0.08
2-56	M2 x 0.4	.134	3.40	.121	3.07	.125	3.18	.018	0.46	.185	4.70	.124	3.15
4-40	M2.5 x 0.45 M3 x 0.5	.165	4.19	.152	3.86	.140	3.56	.021	0.53	.216	5.49	.155	3.94
6-32	M3.5 x 0.6	.196	4.98	.183	4.65	.150	3.81	.027	0.69	.247	6.27	.186	4.72
8-32	M4 x 0.7	.227	5.77	.214	5.44	.185	4.70	.033	0.84	.278	7.06	.217	5.51
10-24 10-32	M5 x 0.8	.259	6.58	.246	6.25	.250	6.35	.040	1.02	.310	7.87	.249	6.32
1/4-20	M6 x 1.0	.321	8.15	.308	7.82	.312	7.92	.050	1.27	.372	9.45	.311	7.90
5/16-18	M8 x 1.25	.384	9.75	.371	9.42	.375	9.53	.050	1.27	.435	11.05	.374	9.50

### Recommended Hole Design\*

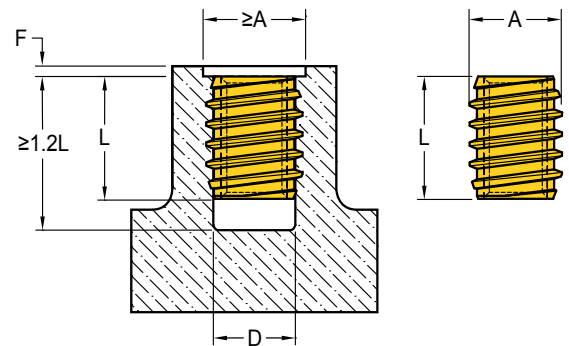


\* See following pages for more information on recommended hole design and design guidelines

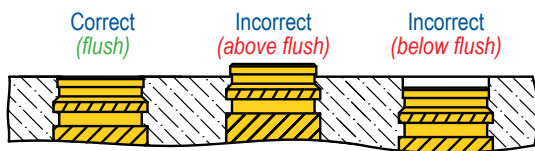
**To Order:** INS (Series #)/Thread Size / Length, Material, Finish  
**Example:** INS 51/M4 / .185 EK

- **Holes** for post-mold installed Inserts should always be deeper than the length of the Insert. For Self-Tapping Inserts, a minimum depth of 1.2 times the Insert length is recommended. For other Inserts, the recommended minimum depth is the Insert length plus two (2) Insert thread pitches. The assembly screw should never bottom out in the hole, as jack-out would result.

- **Counterbores** are not recommended for any Insert types *except* Self-Tapping and Headed Inserts. Counterbores are recommended for Self-Tapping Inserts to reduce the risk of flaking. The outside diameter of the counterbore should be equal to or larger than the outside diameter of the Self-Tapping Insert. Reference page 11 for the recommended mean counterbore depth "F" that corresponds to each Insert size.



Counterbores are also recommended for Headed Inserts so that the top of the Insert will be flush with the surface of the plastic after installation. The diameter of the counterbore should be 0.5mm (.02") to 1.3mm (.05") larger than the head diameter of the Insert. The minimum depth of the counterbore should be specified as the thickness of the head. Insert heads are sometimes left above flush to reduce jack-out or improve match-up with the mating component.



Top of the Insert should be installed as close to flush as possible with the surface of the plastic.

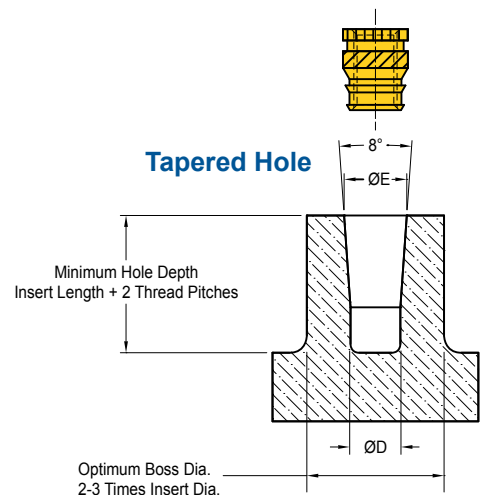
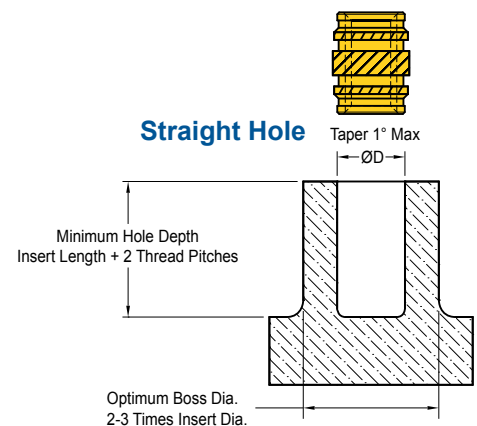
The top of the installed Insert should be flush with the surface of the plastic part with maximum protrusion from the host of 0.13mm (.005"). Additional installation depth tolerance may be assigned so the Insert is slightly below flush. Care should be taken to install the top bearing surface of the Insert as close to flush as possible since a subflush installation presents a jack-out condition.

- **Correct hole size** is critical. Larger holes decrease performance, while smaller holes induce undesirable stresses and potential cracks in the plastic. Undersized holes may also result in flash at the hole edge and make the Insert more difficult to install. The recommended holes need to be reviewed if fillers are used. If the filler content is equal to or greater than 15%, it is suggested to increase the hole 0.08mm (.003"), and if the content is equal to or greater than 35%, the suggested hole increase is 0.15mm (.006"). For intermediate contents interpolation is suggested. Due to the great variety of fillers and plastics and combinations thereof, consultation with **SPIROL** Engineering is strongly recommended.

- **Molded holes** are preferred over drilled holes. The strong, denser surface of the molded hole increases performance. Core pins should be large enough to allow for shrinkage. For straight holes, the taper should not exceed a 1° included angle. Tapered holes should have an 8° included angle.

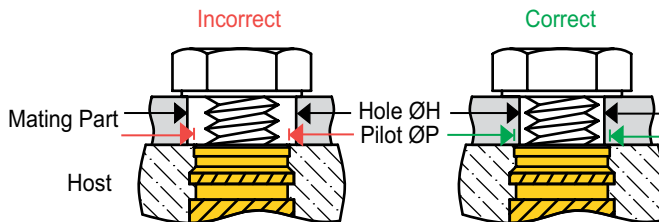
- **Tapered holes** reduce installation time and ensure proper alignment of the Insert to the hole. Only tapered Inserts should be used in tapered holes. Easier release from the core pin is an additional benefit.

- Insert performance is affected by the plastic boss diameter and/or wall thickness. Generally the **optimum wall thickness** or **boss diameter** is two (2) to three (3) times the Insert diameter with the relative multiple decreasing as the Insert diameter increases. The wall thickness has to be enough to avoid bulging during installation, and for boss diameters to be strong enough for the recommended assembly screw installation torque. Poor knit lines will cause failures and reduced Insert performance. Ribs can be added to the boss for added strength.



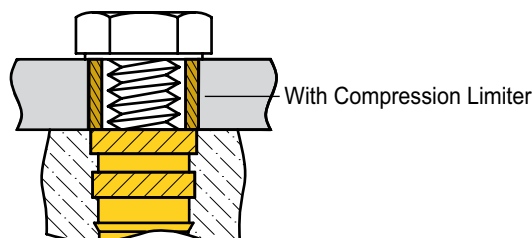
- Post-mold installed Inserts that are **cold-pressed** into the hole require larger boss diameters and/or wall thickness to withstand the greater stresses induced during installation. Installing the Inserts while the plastic is still warm from the molding process generally eliminates this need.

- The **diameter of the clearance hole in the mating component** is very important. The Insert and not the plastic must carry the load. The hole in the mating component must be larger than the outside diameter of the assembly screw but smaller than the pilot or face diameter of the Insert. This prevents **jack-out**. If a larger hole in the mating component is required for alignment purposes, a headed Insert should be considered. Inserts should be installed flush (or no more than 0.13mm (.005”) above the hole).

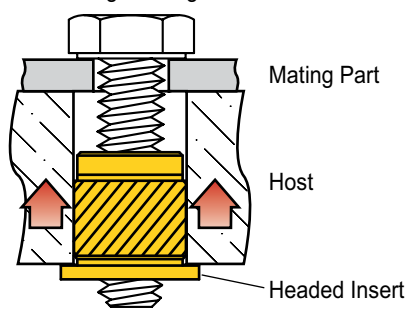


Hole In Mating Part Must Be Smaller Than Insert Pilot Diameter In Host To Prevent The Insert From Pulling Through The Assembly – Known As “Jack-Out”.

- If the mating component is plastic, the use of a **Compression Limiter** should be considered to maintain the preload of the threaded joint. In order for the Compression Limiter to work properly, it should abut the Insert so that the Insert, and not the plastic, carries the load. *For additional information see page 19.*

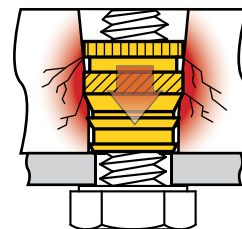


Pull-Through Configuration



- **Insert heads** provide a larger bearing surface and a conductive surface if this is a requirement. The head also facilitates plastic flow into the upper knurls and grooves for Heat/Ultrasonic Inserts. In high load applications, locating the head opposite the load in a **pull-through configuration** warrants design consideration.

**Tapered Inserts** should **NOT** be used in pull-through applications or in thin walled bosses as this will cause cracking of the plastic.



The **SPIROL Application Engineering Center** can provide impartial advice relative to specifically defined requirements based on extensive experience in the field of Insert design and application. Testing facilities are available, and testing and a report of the results is a free service provided to our customers.

### STANDARD MATERIALS

Type	Grade
<b>A</b> - Aluminum High Strength Aluminum Alloy	ASTM B211 2024 ISO AlCu4Mg1
<b>E</b> - Brass Free-Cutting Brass	ASTM B16 UNS C36000 EN 12164 CW603N CuZn36Pb3
RoHS compliant	

### ORDER DESCRIPTION

**INS (Series #) / Thread Size / Length Material Finish**  
**Example:** INS 29/8-32 / .321L EK



**Innovative fastening solutions.  
Lower assembly costs.**



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