



## **ETP 45**

**(EXTERNAL TECHNICAL PAPER NUMBER 45)**

### **TPX Thread Forming Screws.**

The Tappex TPX thread forming screws are designed to be used in most thermoplastic materials. Tappex has a limited standard range but other sizes and finishes are available. Please contact Tappex to discuss your requirements.

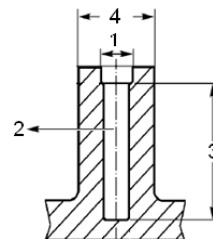
### **Features**

- Range of diameters and thread lengths (see table).
- Philips or Recessed Star Drive.
- Hardened steel with a zinc and clear passivate.
- Stainless steel 304 grade.
- 30 degree thread flank angle offers the following benefits:
  - Reduced installation torque.
  - Reduced potential for over tightening.
  - Reduced stress induced in the plastic.
- With care, the TPX screw can be re-installed multiple times.

### **Design Considerations**

For successful installation and application, a number of factors should be taken into consideration.

- Hole size and design.
- Type and grade of Plastic.
- Wall thickness.
- Installation depth.





## Hole Design Features

### **1. Counter-bore.**

Helps with the correct alignment of the screw and assists where repeated installation is required.

Also the stress induced where the screw thread first bites into the plastic is transferred away from the surface of the plastic moulding.

### **2. Hole Diameter.**

The diameter of the hole must be carefully selected based upon the screw diameter and plastic material grade. (See table)

This helps to ensure consistent installation and maximise performance.

### **3. Hole Depth.**

The hole depth should be such that there is no possibility of the screw reaching the bottom.

In addition, the hole depth can be designed to help in preventing sinkage marks at the moulding 'A' surface.

The installation depth is independent of the hole depth and should be at least 1.75 times the diameter of the screw ( $D_y$ ).

### **4. Boss Diameter.**

The boss diameter is important for withstanding the installation forces and maximising performance.

Effects of larger installation depths:

For a given pull out load the force taken by each thread flank reduces with increased installation depth.

The potential for repeated installation increases.

The difference between installation torque and failure torque increases.

Changing the installation depth can compensate for wall thickness variation.

The maximum installation depth should be no more than 3.5 times the diameter of the screw ( $D_y$ ).





## TPX Screws – Hole Dimensions

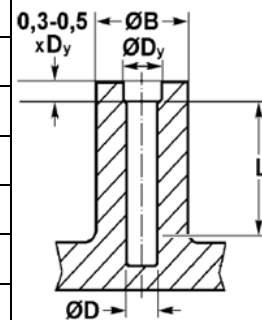


For use in thermoplastics

Part number 069....

Dimensions in mm

Material	Hole Dia. D	Boss Dia. B	Recommended Installation Length. L
ABS	0.78 X Dy	2.0 x Dy	2.0 x Dy
ABS/PC	0.80 x Dy	2.0 x Dy	2.0 x Dy
PA6	0.75 x Dy	1.9 x Dy	1.8 x Dy
PA6 GF	0.80 x Dy	2.0 x Dy	1.9 x Dy
PA6.6	0.75 x Dy	1.9 x Dy	1.8 x Dy
PA6.6 GF	0.81 x Dy	2.1 x Dy	1.9 x Dy
PBT	0.75 x Dy	1.9 x Dy	1.9 x Dy
PBT GF	0.80 x Dy	1.85 x Dy	1.8 x Dy
PC *	0.85 x Dy	2.5 x Dy	2.2 x Dy
PE	0.70 x Dy	2.0 x Dy	2.5 x Dy
PET	0.75 x Dy	1.9 x Dy	1.9 x Dy
PET GF	0.80 x Dy	1.85 x Dy	1.8 x Dy
PMMA	0.85 x Dy	2.0 x Dy	2.0 x Dy
POM	0.75 x Dy	1.9 x Dy	2.0 x Dy
PP	0.73 x Dy	2.2 x Dy	2.2 x Dy
PPO *	0.85 x Dy	2.5 x Dy	2.2 x Dy
PS	0.84 x Dy	2.3 x Dy	2.3 x Dy
PVC (hard)	0.80 x Dy	2.1 x Dy	2.0 x Dy
SAN	0.78 x Dy	2.0 x Dy	1.9 x Dy



\* These materials are notch sensitive and it is advisable to carry out accelerated stress tests to ensure the suitability of the hole design for the particular application and mould conditions.

The table above shows the recommended hole dimensions. The first few parts should be tested under controlled conditions to assess the effects of:

Local surface finish, fillers, mould flow, meld and welds lines.



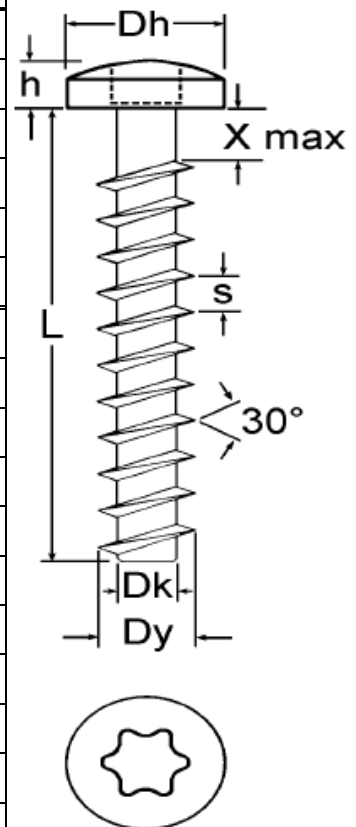
## TPX Screws - Recessed star drive

For use in thermoplastics  
Part number 069....



Dimensions in mm

Dy	2.5 <sup>+0.14</sup> <sub>0.00</sub>	3.0 <sup>+0.14</sup> <sub>0.00</sub>	3.5 <sup>+0.14</sup> <sub>0.00</sub>	4.0 <sup>+0.18</sup> <sub>0.00</sub>	5.0 <sup>+0.20</sup> <sub>0.00</sub>	6.0 <sup>+0.20</sup> <sub>0.00</sub>
Dh	4.2	5.6	6.9	7.5	8.2	10.8
H	1.8	2.2	2.6	2.8	3.05	3.95
Dk	1.4	1.8	2.0	2.3	2.8	3.3
S	1.12	1.34	1.57	1.79	2.24	2.69
X	2.5	3.0	3.0	3.0	3.0	4.0
Size Tx	T7	T10	T15	T20	T20	T25
Length L						
6 +/-0.6	+					
8 +/-0.75	+ s	+ s	+ s	+		
10 +/-0.75	+ s	+ s	+	+		
12 +/-0.9	+	+ *	+ *	+		
14 +/-0.9	s		+	+ s	+ *	
16 +/-0.9		+ s *	s			
18 +/-0.9						
20 +/-1.05			*	+	+	+
22 +/-1.05						
25 +/-1.05				+ *		
30 +/-1.05						
35 +/-1.05						
40 +/-1.05						
50 +/-1.05						



Part No. example: 0694x12 - 4mm diameter x 12mm long  
 + Recessed star drive, hardened steel, zinc and clear passivated  
 s Available in Stainless Steel – e.g. Part No. 0693x8-303

\* Other variants and finishes are available depending upon stock and customer requirement please contact the Tappex Sales Department.

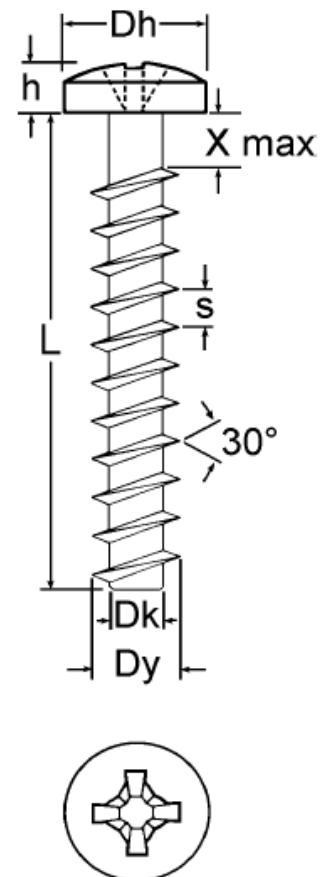
## TPX Screws - Phillips drive

For use in thermoplastics  
Part number 069....



### Dimensions in mm

Dy	2.5 <sup>+0.14</sup> / <sub>0.00</sub>	3.0 <sup>+0.14</sup> / <sub>0.00</sub>	3.5 <sup>+0.14</sup> / <sub>0.00</sub>	4.0 <sup>+0.18</sup> / <sub>0.00</sub>	5.0 <sup>+0.20</sup> / <sub>0.00</sub>	6.0 <sup>+0.20</sup> / <sub>0.00</sub>
Dh	4.2	5.6	6.9	7.5	8.2	10.8
h	1.8	2.2	2.6	2.8	3.05	3.95
Dk	1.4	1.8	2.0	2.3	2.8	3.3
S	1.12	1.34	1.57	1.79	2.24	2.69
X	2.5	3.0	3.0	3.0	3.0	4.0
Size Ph	1	1	2	2	2	3
Length L						
6 +/-0.6		+				
8 +/-0.75		+ *				
10 +/-0.75	+	+		+	+	
12 +/-0.9		+	*			
14 +/-0.9		+				
16 +/-0.9						+
18 +/-0.9						
20 +/-1.05		S		+		
22 +/-1.05						
25 +/-1.05						
30 +/-1.05						
35 +/-1.05						
40 +/-1.05						
50 +/-1.05						



Part No. example: 0693x10-PH - 3mm diameter x 10mm long  
+ Phillips drive, hardened steel, zinc and clear passivated.

\* Other variants and finishes are available depending upon stock and customer requirement please contact the Tappex Sales Department.