

# THE FASTENER SOLUTION FOR THERMOPLASTICS

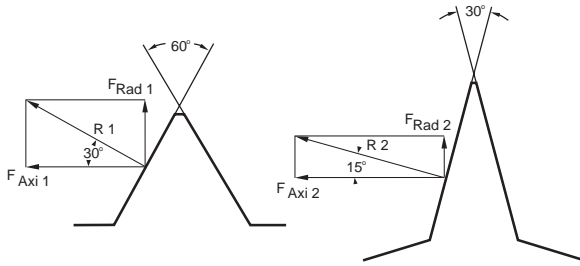
## 30° THREAD ANGLE

Reduces radial stresses

Provides increased thread depth

Lower installation torque

Improves material flow due to high axial component.



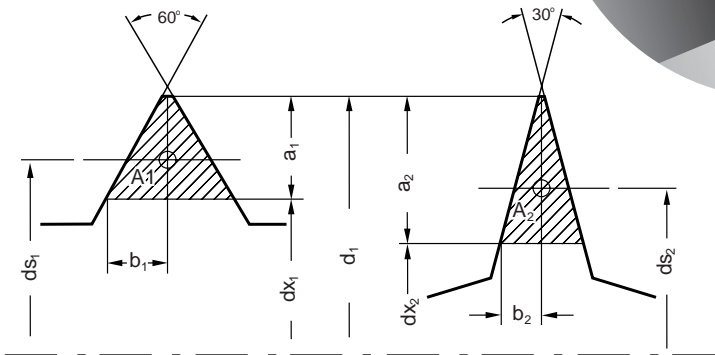
Resolution of Resultant Forces for the Same Volume Displacement

$$F_{Rad 1} = 0,500 R$$

$$F_{Axi 1} = 0,867 R$$

$$F_{Rad 2} = 0,259 R$$

$$F_{Axi 2} = 0,966 R$$



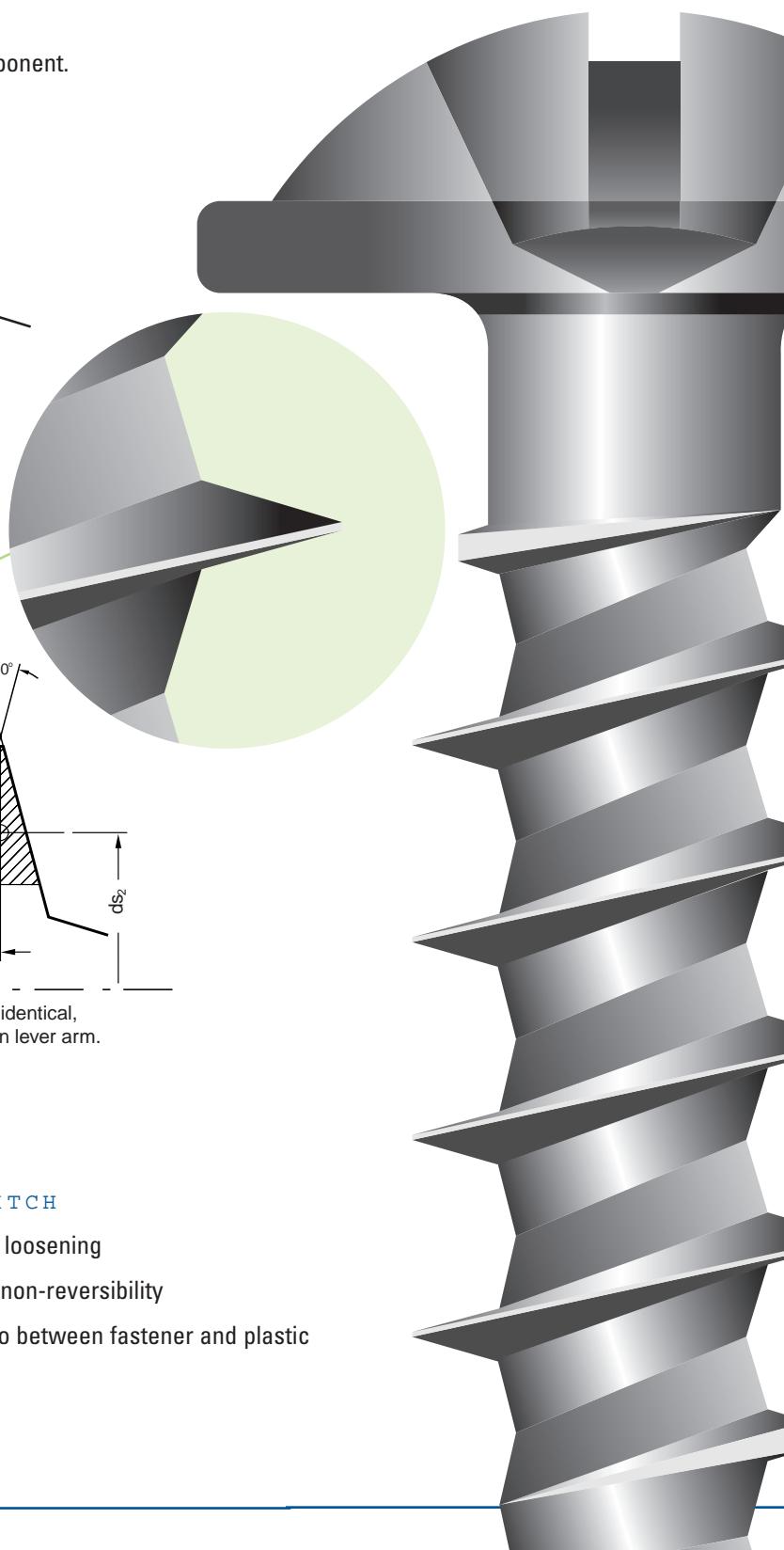
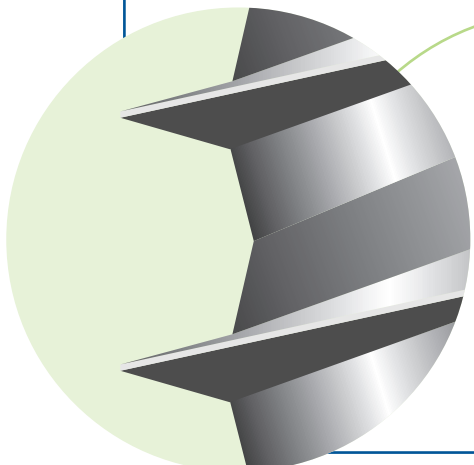
Although the volume displacement of both thread forms is identical, the installation torque of PT is lower, due to the reduction in lever arm.

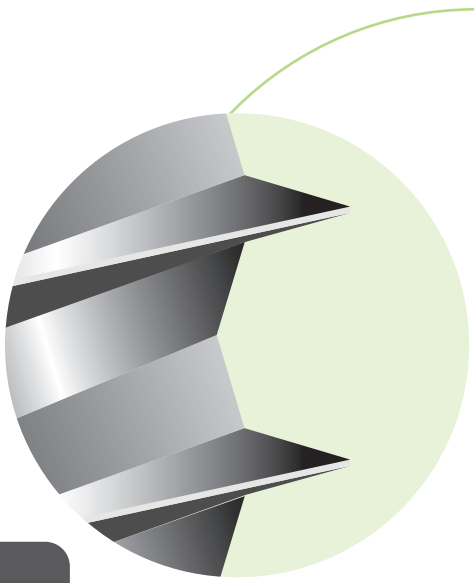
## OPTIMUM PITCH

Resists vibrational loosening

Provides optimum non-reversibility

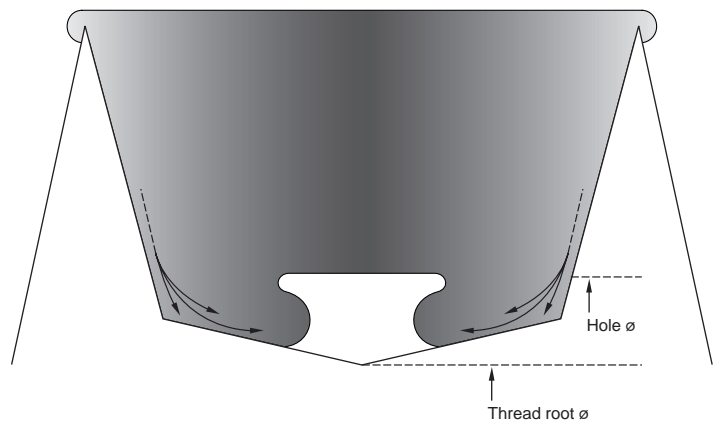
Balances load ratio between fastener and plastic





**PROFILED THREAD ROOT**

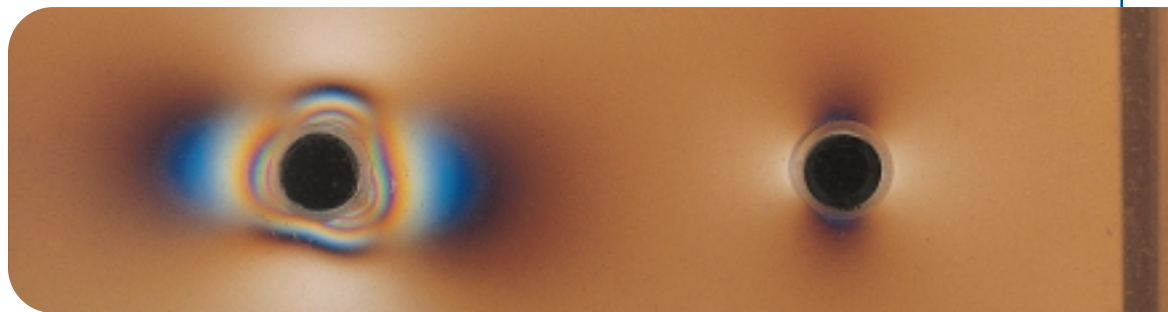
- Maximum resistance to relaxation
- Improved retention of clamp load
- Prevents material jam



**ROUND CROSS SECTION**

- Even distribution of forces
- Elimination of high stress concentrations
- Improved resistance to stripping

The ability of the Semblex PT® Screw to reduce and control stresses greatly increases the performance over conventional thread forming screws for plastics.



Non-Round Thread Forming Screw

Semblex PT® Screw



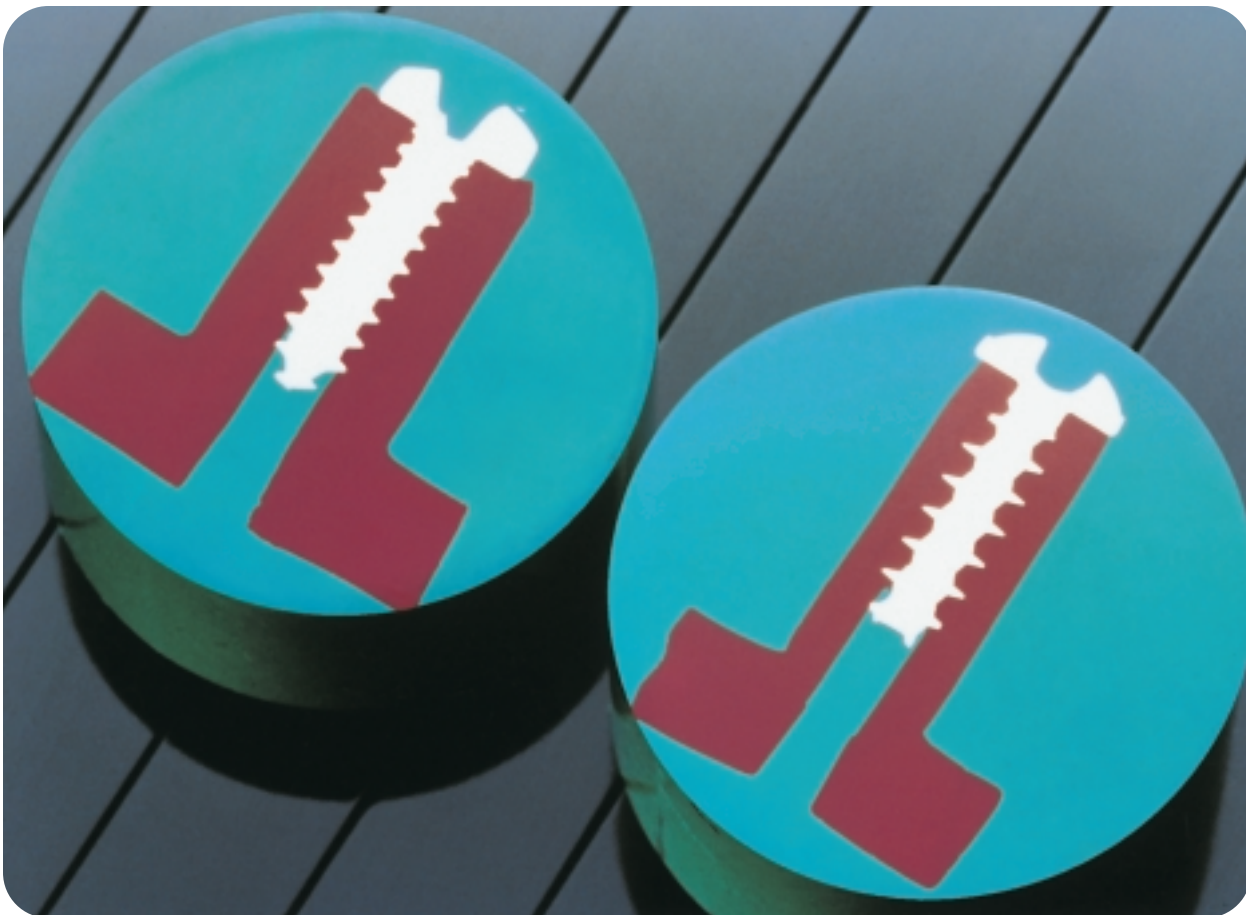
## DESIGN FOR MANUFACTURING DESIGN FOR ASSEMBLY

### BENEFITS

- Reduces radial stresses
- Lower installation torque
- Natural resistance to relaxation
- Minimizes clamp load loss
- High Resistance to pullout forces
- Provides repeat assembly
- Allows for elimination of threaded inserts
- Allows for thinner boss design
- Reduces molded material required
- Shorter injection mold cycle times



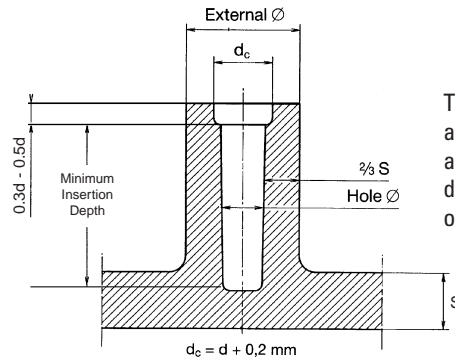
Sleek thread profile minimizes assembly stresses and cracking.



Thinner bosses translate into lower overall product costs.

# BOSS DESIGN RECOMMENDATIONS

Through a series of laboratory tests and field service feedback, some general recommendations can be made. For specific application concerns, contact Semblex Engineering.



The use of a counterbore, as shown is crucial to achieving a favorable distribution of stresses on the boss edges.

## DESIGN RECOMMENDATION

d = NOMINAL P T<sup>®</sup> DIAMETER

Material	Hole Ø	External Ø	Minimum Insertion depth
ABS (Acrylonitrile-Butadiene-Styrene)	0.80 x d	2.00 x d	2.00 x d
ABS/PC Blend	0.80 x d	2.00 x d	2.00 x d
ASA (Acrylic-Styrene-Acrylonitrile)	0.78 x d	2.00 x d	2.00 x d
PA 4.6 (Nylon 4/6)	0.73 x d	1.85 x d	1.80 x d
PA 4.6 – GF 30 (Nylon 4/6-30% Glass Filled)	0.78 x d	1.85 x d	1.80 x d
PA 6 (Nylon 6)	0.75 x d	1.85 x d	1.70 x d
PA 6– GF 30 (Nylon 6-30% Glass Filled)	0.80 x d	2.00 x d	1.90 x d
PA 6.6 (Nylon 6/6)	0.75 x d	1.85 x d	1.70 x d
PA 6.6 – GF 30 (Nylon 6/6-30% Glass Filled)	0.82 x d	2.00 x d	1.80 x d
PBT (Polybutylene-Terephthalate)	0.75 x d	1.85 x d	1.70 x d
PBT – GF 30 (Polybutylene-Terephthalate-30% Glass Filled)	0.80 x d	1.80 x d	1.70 x d
PC* (Polycarbonate)	0.85 x d	2.50 x d	2.20 x d*
PC – GF* (Polycarbonate-30% Glass Filled)	0.85 x d	2.20 x d	2.00 x d*
PE-LD (Polyethylene-Low Density)	0.70 x d	2.00 x d	2.00 x d
PE-HD (Polyethylene-High Density)	0.75 x d	1.80 x d	1.80 x d
PET (Polyethylene-Terephthalate)	0.75 x d	1.85 x d	1.70 x d
PET – GF 30 (Polyethylene-Terephthalate-30% Glass Filled)	0.80 x d	1.80 x d	1.70 x d
POM	0.75 x d	1.95 x d	2.00 x d
PP (Polypropylene)	0.70 x d	2.00 x d	2.00 x d
PP – GF 30 (Polypropylene-30% Glass Filled)	0.72 x d	2.00 x d	2.00 x d
PP – TF 20 (Polypropylene-20% Talc Filled)	0.72 x d	2.00 x d	2.00 x d
PPO* (Polypropylene-Oxide)	0.85 x d	2.50 x d	2.20 x d
PS (Polystyrene)	0.80 x d	2.00 x d	2.00 x d
PVC (hard)(Polyvinyl-Chloride)	0.80 x d	2.00 x d	2.00 x d
PEEK	0.85 x d	2.00 x d	2.00 x d
SAN (Styrene-Acrylonitrile)	0.77 x d	2.00 x d	1.90 x d

For Additional Materials Contact Semblex Engineering

\*Where materials are known to be sensitive to environmental stress cracking, ageing tests should be carried out, as recommended by the material manufacturer.

\*\*This information is provided and intended to be used only as a guideline, actual application conditions may vary.

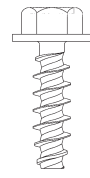
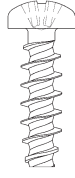
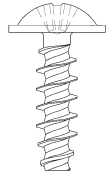
## WN 1411

## WN 1412

## WN 1413

## WN 1446

## WN 1447



		NOMINAL Ø		K 3 0	K 3 5	K 4 0	K 5 0	K 6 0	K 7 0	
WN 1411 ROUND WASHER HEAD	Major diameter, d			3.0	3.5	4.0	5.0	6.0	7.0	
	Core diameter			1.7	1.9	2.2	2.7	3.2	3.7	
	Thread pitch			1.34	1.57	1.79	2.24	2.69	3.14	
	Thread Run-Out	Length $L > 3 \cdot d$			3.0	3.5	4.0	5.0	6.0	7.0
		Length $L \leq 3 \cdot d$			1.5	1.8	2.0	2.5	3.0	3.5
	Head diameter			6.0	7.0	8.0	10.0	12.0	14.0	
	Total head height			2.1	2.4	2.5	3.2	4.0	4.6	
	Washer thickness			0.7	0.8	0.9	1.1	1.3	1.5	
	Type 1 Cross Recess	driver size			#1	#2	#2	#2	#3	#3
		penetration depth	min.		1.15	1.07	1.33	1.98	2.24	2.84
		max.		1.61	1.70	1.96	2.61	2.90	3.50	
Type 1A Cross Recess	driver size			#1	#2	#2	#2	#3	#3	
	penetration depth	min.		1.26	1.08	1.40	2.01	2.27	2.91	
		max.		1.51	1.54	1.86	2.47	2.73	3.37	
WN 1412 ROUND WASHER HEAD	Head diameter			5.3	6.1	7.0	8.8	10.5	12.3	
	Head height			2.0	2.5	2.7	3.4	4.0	4.5	
	Type 1 Cross Recess	driver size			#1	#2	#2	#2	#3	#3
		penetration depth	min.		1.19	1.23	1.51	2.12	2.44	3.00
			max.		1.65	1.86	2.14	2.75	3.10	3.66
	Type 1A Cross Recess	driver size			#1	#2	#2	#2	#3	#3
		penetration depth	min.		1.36	1.26	1.62	2.23	2.57	3.14
			max.		1.61	1.72	2.08	2.67	3.03	3.61
	WN 1413 FLAT HEAD	Head diameter			5.5	7.3	8.4	9.3	11.3	13.6
		Head height			1.3	1.9	2.2	2.2	2.7	3.3
Type 1 Cross Recess		driver size			#1	#2	#2	#2	#2	#3
		penetration depth	min.		1.10	1.33	1.59	2.04	2.59	3.02
			max.		1.56	1.96	2.22	2.67	3.22	3.68
Type 1A Cross Recess		driver size			#1	#2	#2	#2	#2	#3
		penetration depth	min.		1.20	1.47	1.70	2.06	2.60	3.01
			max.		1.45	1.93	2.16	2.52	3.06	3.47
WN 1446 HEX HEAD		Width across flats			5.0	5.5	7.0	8.0	10.0	10.0
		Hex height			1.5	2.3	2.3	3.0	3.5	4.8
WN 1447 HEX WASHER HEAD	Width across flats			5.0	5.5	5.5	7.0	8.0	8.0	
	Hex height			2.3	2.8	2.8	3.5	4.2	5.0	
	Washer diameter			6.5	7.0	8.0	10.0	12.0	14.0	
	Washer thickness			0.6	0.7	0.8	0.8	1.0	1.2	

d= Nominal PT® Diameter

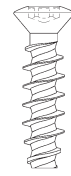
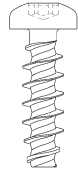
All Dimensions are for reference purposes only, unless otherwise specified.

WN 1451

WN 1452

WN 1423

WN 1453



WN 1451  
ROUND WASHER HEAD

WN 1452  
PAN HEAD

WN 1423  
OVAL HEAD

WN 1453  
FLAT HEAD

NOMINAL Ø		K 3 0	K 3 5	K 4 0	K 5 0	K 6 0	K 7 0	K 8 0	K 1 0 0
Major diameter, d		3.0	3.5	4.0	5.0	6.0	7.0	8.0	10.0
Core diameter		1.7	1.9	2.2	2.7	3.2	3.7	4.2	5.2
Thread pitch		1.34	1.57	1.79	2.24	2.69	3.14	3.59	4.49
Thread Run-Out	Length L>3•D	3.0	3.5	4.0	5.0	6.0	7.0	8.0	10.0
	Length L≤3•D	1.5	1.8	2.0	2.5	3.0	3.5	4.0	5.0
Head diameter		6.0	7.0	8.0	10.0	12.0	14.0	16.0	20.0
Total head height		2.1	2.4	2.6	3.3	3.6	4.2	4.8	5.5
Washer thickness		0.60	0.70	0.80	1.00	1.20	1.40	1.60	2.00
	<b>TORXplus</b>	10 IP	15 IP	20 IP	20 IP	25 IP	30 IP	40 IP	40 IP
Recess diameter	ref.	2.82	3.35	3.94	3.94	4.52	5.61	6.76	6.76
Penetration depth	min.	1.00	1.10	1.30	1.50	1.75	2.20	2.60	2.60
		<b>TORX</b>	T 10	T 10	T 20	T 20	T 25	T 30	T 40
Recess diameter	ref.	2.82	2.82	3.94	3.94	4.52	5.61	6.76	6.76
Penetration depth	min.	1.00	1.10	1.25	1.40	1.60	2.00	2.70	2.70
Head diameter		5.6	6.9	7.5	8.2	10.8	12.5	14.0	16.0
Head height		2.1	2.3	2.6	2.9	3.8	4.4	5.0	6.0
	<b>TORXplus</b>	10 IP	15 IP	20 IP	20 IP	25 IP	30 IP	40 IP	40 IP
Recess diameter	ref.	2.82	3.35	3.94	3.94	4.52	5.61	6.76	6.76
Penetration depth	min.	1.00	1.10	1.30	1.50	1.75	2.20	2.60	2.60
		<b>TORX</b>	T 10	T 10	T 20	T 20	T 25	T 30	T 40
Recess diameter	ref.	2.82	2.82	3.94	3.94	4.52	5.61	6.76	6.76
Penetration depth	min	1.00	1.10	1.25	1.40	1.60	2.00	2.40	2.70
Head diameter		5.6	6.5	7.5	9.2	11.0	12.5	14.5	14.5
Head height	ref.	1.3	1.5	1.8	2.1	2.5	2.8	3.3	2.3
Crown height	ref.	0.75	0.90	1.00	1.25	1.50	1.80	2.00	2.00
		<b>TORXplus</b>	10 IP	15 IP	20 IP	25 IP	30 IP	40 IP	40 IP
Recess diameter	ref.	2.82	3.35	3.94	4.52	5.61	6.76	6.76	6.76
Penetration depth	min.	1.10	1.10	1.50	1.50	1.90	2.60	2.60	2.60
		<b>TORX</b>	T 10	T 15	T 20	T 25	T 30	T 40	T 40
Recess diameter	ref.	2.82	3.35	3.94	4.52	5.61	6.76	6.76	6.76
Penetration depth	min.	1.00	1.20	1.40	1.60	2.00	2.70	2.70	2.70
Head diameter		5.5	7.3	8.4	9.3	11.3	13.6	15.8	18.3
Head height		1.3	1.9	2.2	2.2	2.7	3.3	3.9	4.2
	<b>TORXplus</b>	8 IP	15 IP	20 IP	20 IP	30 IP	40 IP	40 IP	50 IP
Recess diameter	ref.	2.39	3.35	3.94	3.94	5.61	6.76	6.76	8.94
Penetration depth	min.	0.85	0.95	1.30	1.30	1.60	2.25	2.25	2.55
		<b>TORX</b>	T 8	T 15	T 20	T 20	T 30	T 40	T 40
Recess diameter	ref.	2.39	3.35	3.94	3.94	5.61	6.76	6.76	8.94
Penetration depth	min.	0.80	1.00	1.25	1.25	1.75	2.25	2.40	2.90

d= Nominal PT® Diameter

All Dimensions are for reference purposes only, unless otherwise specified.