OPERACE by PB Swiss Tools

Procedure 1
Screw Sheet Overview
Removal of Intact Screws

Table 1 Compatibility Matrix Based on Screw Diameter

∅	HEX 1.3	HEX 1.5	HEX 1.8	HEX 2.0	HEX 2.5	HEX 3.0	HEX 3.5	HEX 4.0	HEX 5/16"	HEX 5.0
OPERACE REF	80196	80046	80051	80054	80048	80197	80050	80052	80053	80168
0.9	■									
1.0										
1.2										
1.3										
1.4										
1.5	■									
1.6										
1.7	■									
1.8	■									
1.9										
2.0	■				■					
2.1										
2.3	■	■			■					
2.4	■	■			■					
2.5	■	■	■		■					
2.6	■									
2.7	■					■		■		
2.8	■					■				
3.0	■	■	■			■				
3.2	■									
3.3	■									
3.4	■							■		
3.5	■					■				
3.7			■			■				
3.8			■							
3.9			■				■			
4.0						■		■		■
4.2								■		
4.3										
4.5								■		■
4.6										
4.7										
4.8										
4.9										
5.0										■
5.3										
5.5								■		
5.7										
6.0								■		■
6.4										
6.5								■	■	■
6.8										
7.0									■	
7.3									■	
7.5									■	
8.0										■

∅	T4	T5	T6	T7	T8	T9	T10	T15	T20	T25	T30	T40
OPERACE REF	80069	80070	80071	80178	80073	80198	80078	80075	80077	80079	80081	80083
0.9												
1.0												
1.2												
1.3												
1.4	■			■								
1.5	■	■		■								
1.6	■											
1.7		■										
1.8		■		■								
1.9												
2.0		■		■								
2.1												
2.3		■		■								
2.4		■		■								
2.5		■		■								
2.6		■		■								
2.7		■		■	■	■	■					
2.8		■		■								
3.0		■		■	■	■	■					
3.2		■										
3.3					■							
3.4												
3.5					■	■	■	■	■			
3.7									■			
3.8												
3.9					■	■	■	■	■			
4.0					■	■	■	■	■	■		
4.2												
4.3								■				
4.5						■	■	■	■			
4.6												
4.7												
4.8					■							
4.9												
5.0								■	■	■		
5.3												
5.5									■			
5.7												
6.0									■			
6.4												
6.5									■	■		
6.8												
7.0								■				
7.3												
7.5												
8.0								■				

∅	SQR 0.7	SQR 1.0	SQR 1.2	SQR 1.5	SQR 1.8	SQR 2.2	SQR 2.3
OPERACE REF	80036	80037	80044	80194	80039	80195	80041
0.9	■						
1.0							
1.2							
1.3	■						
1.4	■	■					
1.5		■					
1.6		■					
1.7		■					
1.8		■					
1.9		■					
2.0		■	■				
2.1							
2.3			■				
2.4			■				
2.5			■				
2.6			■				
2.7		■	■		■		
2.8			■				
3.0		■	■		■		
3.2							
3.3							
3.4							
3.5						■	■
3.7							
3.8							
3.9							
4.0							
4.2							
4.3							
4.5							
4.6							
4.7							
4.8							
4.9							
5.0							
5.3							
5.5							
5.7							
6.0							
6.4							
6.5							
6.8							
7.0							
7.3							
7.5							
8.0							

∅	CR 0.3	CR 0.4	CR 0.5	CR 0.6	CR 0.8	CR 1.0
OPERACE REF	80055	80056	80060	80057	80058	80059
0.9	■					
1.0	■					
1.2	■	■				
1.3	■	■				
1.4	■	■				
1.5	■	■				
1.6	■	■				
1.7	■	■				
1.8	■	■				
1.9	■	■				
2.0	■	■				
2.1	■	■				
2.3	■	■				
2.4	■	■				
2.5	■	■				
2.6	■	■				
2.7	■	■				
2.8	■	■				
3.0	■	■				
3.2	■	■				
3.3	■	■				
3.4	■	■				
3.5	■	■				
3.7	■	■				
3.8	■	■				
3.9	■	■				
4.0	■	■				
4.2	■	■				
4.3	■	■				
4.5	■	■				
4.6	■	■				
4.7	■	■				
4.8	■	■				
4.9	■	■				
5.0	■	■				
5.3	■	■				
5.5	■	■				
5.7	■	■				
6.0	■	■				
6.4	■	■				
6.5	■	■				
6.8	■	■				
7.0	■	■				
7.3	■	■				
7.5	■	■				
8.0	■	■				

∅	SL 0.3	SL 0.4	SL 0.5	SL 0.6	SL 0.8	SL 1.0
OPERACE REF	80061	80062	80065	80063	80064	80066
0.9	■					
1.0	■					
1.2	■	■				
1.3	■	■				
1.4	■	■				
1.5	■	■				
1.6	■	■				
1.7	■	■				
1.8	■	■				
1.9	■	■				
2.0	■	■				
2.1	■	■				
2.3	■	■				
2.4	■	■				
2.5	■	■				
2.6	■	■				
2.7	■	■				
2.8	■	■				
3.0	■	■				
3.2	■	■				
3.3	■	■				
3.4	■	■				
3.5	■	■				
3.7	■	■				
3.8	■	■				
3.9	■	■				
4.0	■	■				
4.2	■	■				
4.3	■	■				
4.5	■	■				
4.6	■	■				
4.7	■	■				
4.8	■	■				
4.9	■	■				
5.0	■	■				
5.3	■	■				
5.5	■	■				
5.7	■	■				
6.0	■	■				
6.4	■	■				
6.5	■	■				
6.8	■	■				
7.0	■	■				
7.3	■	■				
7.5	■	■				
8.0	■	■				

∅	PH 1
OPERACE REF	80086
0.9	
1.0	
1.2	
1.3	
1.4	
1.5	
1.6	
1.7	
1.8	
1.9	
2.0	
2.1	
2.3	
2.4	
2.5	
2.6	
2.7	
2.8	
3.0	
3.2	
3.3	
3.4	
3.5	
3.7	
3.8	
3.9	
4.0	
4.2	
4.3	
4.5	
4.6	
4.7	
4.8	
4.9	
5.0	
5.3	
5.5	
5.7	
6.0	
6.4	
6.5	
6.8	
7.0	
7.3	
7.5	
8.0	

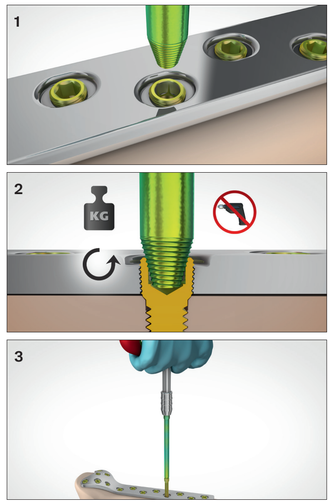
○	HEX 1.3, HEX 1.5, HEX 1.8, HEX 2.0, HEX 2.5, HEX 3.0, HEX 3.5, HEX 4.0, HEX 3/16" (4.7), HEX 5.0
✪	T4, T5, T6, T7, T8, T9, T10, T15, T20, T25, T30, T40
▢	SQR 0.7, SQR 1.0, SQR 1.2, SQR 1.5, SQR 1.8, SQR 2.2, SQR 2.3
✣	CR 0.3, CR 0.4, CR 0.5, CR 0.6, CR 0.8, CR 1.0
⊖	SL 0.3, SL 0.4, SL 0.5, SL 0.6, SL 0.8, SL 1.0
⊕	PH1

■ Most commonly used screw recess
■ Other possible screw recesses

Instruments Used
- Screwdriver insert of the appropriate size and shape according to Table 1.
- Handle and cross-handle of the appropriate size.

Procedure
1. Carefully clean screw recess. Engage screwdriver insert in the handle coupling.
2. Insert the screwdriver insert into the screw recess.
3. Loosen screw manually by turning counterclockwise.

Procedure 2
Removal of Screws with Damaged Recess



Instruments Used
- Extraction screw of the appropriate size according to Table 2.
- Handle or cross-handle of the appropriate size.

Procedure
1. Insert extraction screw in the handle coupling Start turning the extraction screw counter-clockwise, in the same axis as the screw to be removed.
2. Continue turning, applying constant pressure, until the conical left-handed thread is securely seated in the damaged recess and until sufficient torque is applied to loosen the screw.
3. Then unscrew turning counterclockwise.

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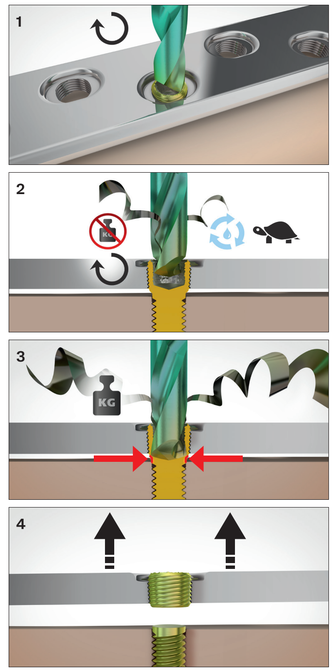
Table 2 Screw Recess Size

∅ mm	○	✪	▢	OPERACE REF	Extraction Screw
1.5 – 3.2	Hex 1.5	T6, T7	SQR 1.0, 1.2, 1.5	80018	1.6
2.0 – 4.3	Hex 1.8, 2.0	T8, T9	SQR 1.8	80170	2.0
2.3 – 6.0	Hex 2.5, 3.0	T10, T15	SQR 1.8, 2.2	80020	2.6
3.5 – 8.0	Hex 3.5, 4.0	T20, T25	SQR 2.3	80022	3.5

Procedure 3
Removal of Locking Screws Stuck in Plate



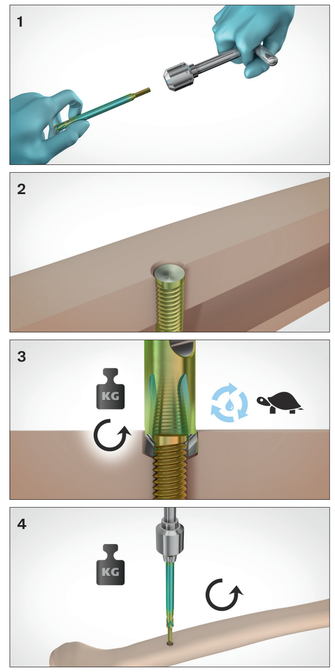
Instruments Used
- Extraction drill bit of the appropriate size according to Table 3.
- Power tool with a drill chuck.

Procedure
1. Position the drill bit alredy rotating clockwise in the screw recess.
2. Applying very little pressure in the same axis as the screw to be removed.
3. Drill until the far side of the plate is reached . The screw head will be loosened from the shaft and weakened to cause it to break off when the plate is lifted.
4. Remove the plate. Continue to Procedure 4 to remove embedded screw shafts.

Table 3
Screw Diameter in mm

∅	OPERACE REF	Extraction Drill Bit
1.0 – 1.5	80023	1.5
1.6 – 2.0	80123	2.0
2.1 – 2.5	80024	2.5
2.6 – 3.2	80025	3.2
3.3 – 4.0	80019	4.0
4.1 – 5.0	80026	5.0
5.1 – 6.5	80027	6.5
6.6 – 7.5	80021	7.5

Procedure 4a
Removal of Broken, Projecting Screws or Screws Processed According to Procedure 3



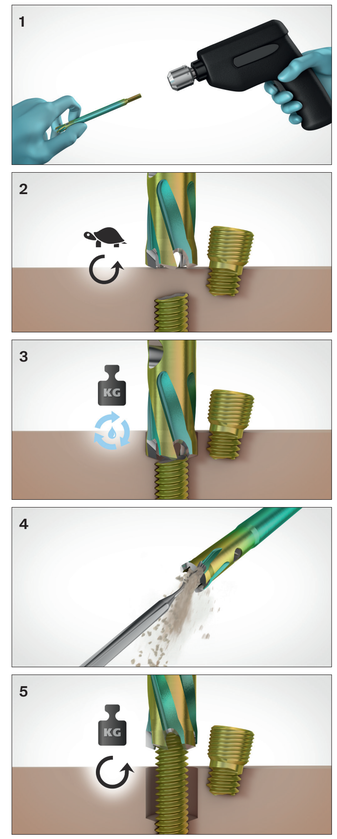
Instruments Used
- Extraction reamer of the appropriate size according to Table 4.
- Small Universal Chuck with T-Handle or Power Tool with a drill chuck.

Procedure
1. Use the T-handle.
2. Remove the screw shaft remaining in the bone.
3. Apply slight pressure initially, counterclockwise. As soon as the reamer grips the screw shaft, continue reaming with increased pressure until the conical thread is securely seated on the screw shaft.
4. When unscrewing the screw do not relieve the pressure, but maintain the constant axial pressure and direction of rotation.

Table 4
Screw Diameter in mm

∅	OPERACE REF	Extraction Reamer
1.4 – 2.0	80009	2.0
2.1 – 2.5	80028	2.5
2.6 – 3.2	80029	3.2
3.3 – 4.0	80030	4.0
4.1 – 4.5	80033	4.5
4.6 – 5.8	80035	5.8
5.9 – 7.5	80015	7.5

Procedure 4b
Removal of Buried Broken Screw Shafts



Instruments Used
- Extraction reamer of the appropriate size according to Table 4.
- Small Universal Chuck with T-Handle or Power Tool with drill chuck.

Procedure
1. Use the T-handle or power tool.
2. Ream the buried screw shaft free. Position the stationary extraction reamer perpendicular to the bone so that the teeth evenly against the surface.
3. Apply slight pressure initially, turning counterclockwise. As soon as the reamer grips, ream in the direction of the screw axis under image intensifier control until it has been guided through the screw shaft.
4. Remove reamer at regular intervals and free it of accumulated bone material.
5. Continue reaming with increased pressure until the thread is securely seated on the screw shaft. When extracting the screw do not relieve the pressure. Maintain constant axial pressure and direction of rotation.

■ Notes:
- Avoid blowing and bending loads as they can lead to instrument damage or breakage.
- The use of incorrect sizes leads to improper functioning and an increased risk of instrument breakage.

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