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SURGICAL TECHNIQUE

DURALOC®

CEMENTLESS ACETABULAR RECONSTRUCTION

CONTENTS

TEMPLATING AND PRE–OPERATIVE PLANNING

The primary goal of total hip arthroplasty is the anatomic reconstruction of the hip joint, resulting in favourable prosthetic joint load and function. Mechanically, the goals are to create a stable articulation with an optimised range of motion, restore biomechanics for muscular efficiency and equalise limb lengths. Meeting these goals begins with a thorough analysis of the hip with comparison to the contralateral side in anteroposterior (A/P) and lateral projections.

The desired magnification for all imaging should be 15 percent, which corresponds to the templates provided for the DURALOC Acetabular Cup (Figure 1). Magnification markers taped to the patient's leg at the level of the trochanter will assist in determining actual magnification.

For the A/P projection, place both extremities in 15° of internal rotation to position the head and neck parallel to the coronal plane. Centre the beam on the symphysis pubis and ensure the proximal femoral shaft is included in the radiograph.

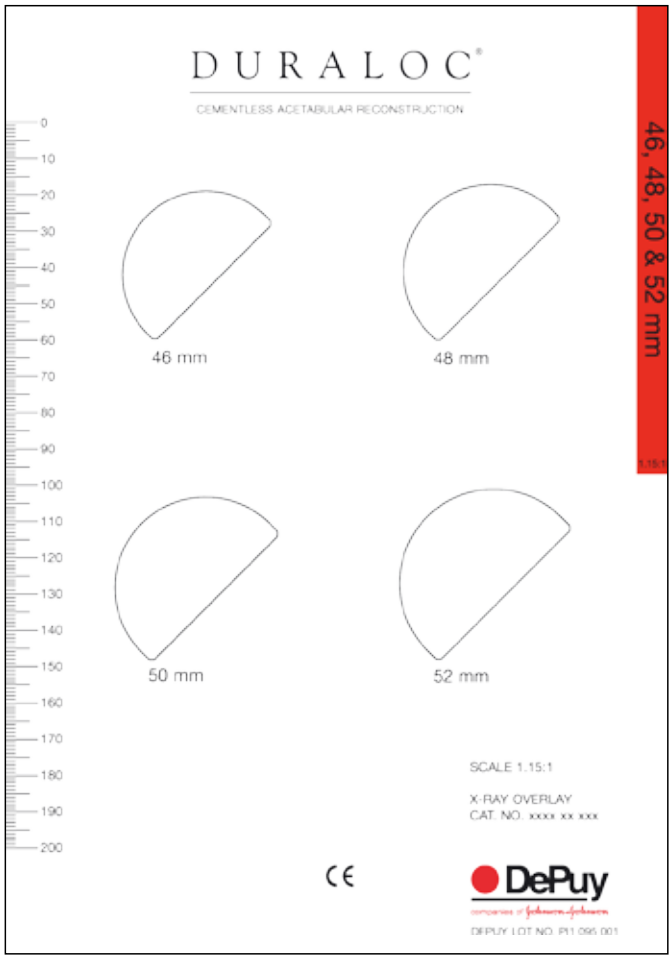

Figure 1

The radiographs should clearly demonstrate the acetabular configuration and the endosteal and periosteal contours of the femoral head, neck and proximal femur (Figure 2).

DURALOC templates allow assessment of the most likely size of cup to be implanted. The acetabular component should be placed on structurally sound bone to optimise the opportunity for bone ingrowth.

The cup should be placed so that the head centre is as near to the anatomical position as possible and the most inferior part of the cup should normally be at the level of the bottom of the teardrop (Figure 3).

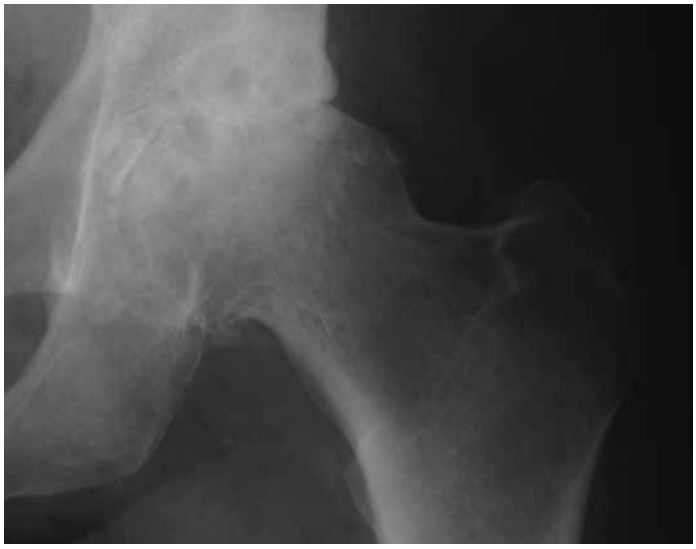

Figure 2

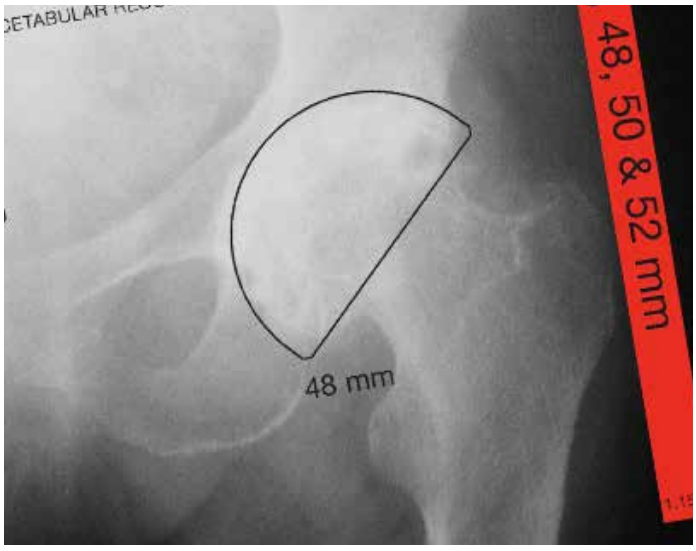

Figure 3

PREPARATION OF THE ACETABULUM

After removal of the femoral head, a capsulectomy is performed. The surgeon should ensure complete exposure of the entire acetabular rim. Any excess soft tissues and osteophytes should be removed from the rim and bed of the acetabulum.

The acetabulum may now be reamed starting with the smallest reamer to remove soft tissues in the bed. A range of reamers are available in 1 mm increments.

The reamers should be introduced in either 35° – 40° or 45° of abduction (Figure 4), depending on the cup selected and 15° – 20° of anteversion (Figure 5). In a lateral decubitus position, the pelvis may be slightly flexed and a 30° – 35° anteversion is recommended.

Progressively increase the reamer size to remove cartilage and medial osteophytes until healthy, bleeding subchondral bone is exposed and a symmetrical, hemispherical dome is obtained.

Care should be taken to avoid penetration of the medial wall of the acetabulum and to maintain as much of the sub-chondral plate as possible, removing only sclerotic bone.

If adequate healthy bone is not obtained, larger reamers should be used. Only the periphery should be reamed and further medialisation should be avoided. The anterior and posterior columns should be regularly assessed for thickness and strength. To achieve optimal press-fit, under-reaming of 1 to 2 mm to the templated acetabular cup size is required. Usually a cup of 54 mm or smaller requires 1 mm under-reaming.

A cup of 56 mm or larger mostly requires 2 mm under-reaming to obtain adequate stability. The quality of the bone should be taken into account when determining the actual amount of under-reaming. If the component does not appear to achieve adequate stability, adjunctive fixation is recommended.

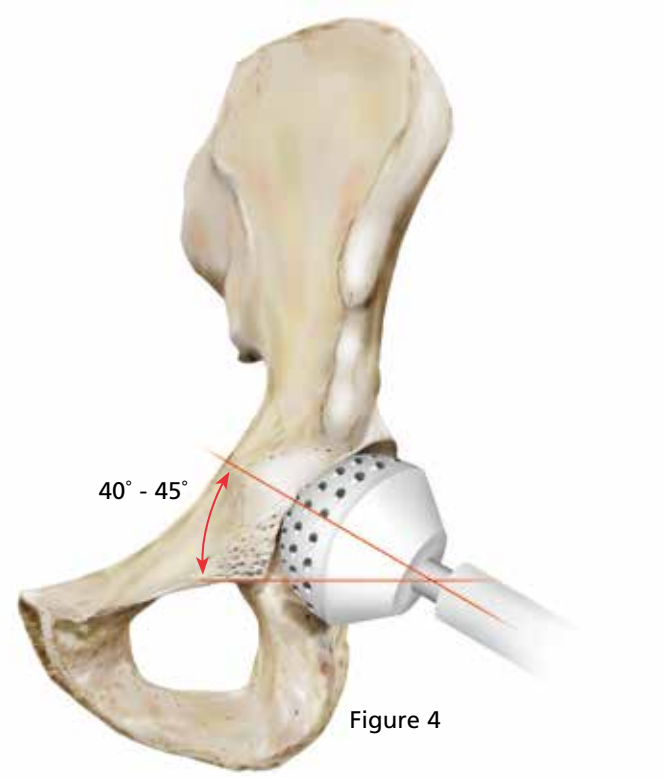

Figure 4

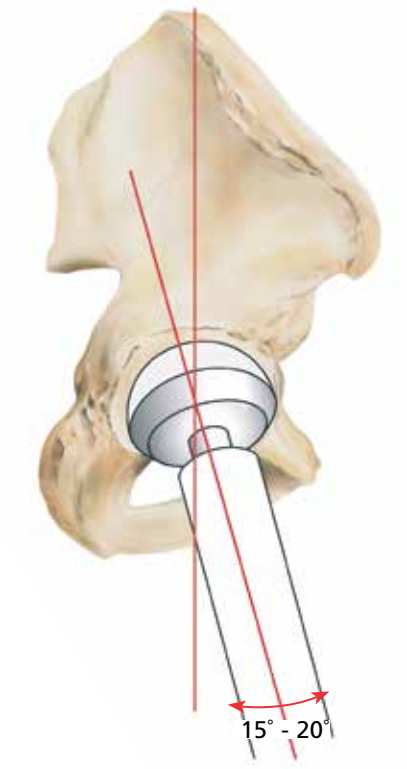

Figure 5

TRIAL SIZING AND IMPACTION OF THE SHELL

Following preparation of the acetabulum, a Cup Trial of 1 – 2 mm larger in diameter than the last reamer is inserted to assess the coverage of the acetabular component and gauging the seating depth of the actual cup. The rim fit of the fully seated trial should be tight enough to make it difficult to alter its position.

The inferior rim of the trial should be level with the bottom of the teardrop and its position should match the templated position.

The DURALOC Cup Trials have indicators marked on the rim that match those marked on the definitive shell. These indicate the approximate position of the posterior aspect of the cup, when the screw holes are aligned with the roof of the acetabulum.

The final implant is screwed onto the Impactor Handle. The cup is then impacted at the desired angle of abduction and anteversion into the prepared acetabulum. The Version Guide, indicating the desired angle of abduction, may be connected to the Impactor and the desired anteversion selected (Figure 6, 7 & 8).

The guide rod should be horizontal and parallel to the patient's long axis to obtain 45° abduction.

In a lateral decubitus position, the pelvis may be slightly flexed requiring additional anteversion of the cup.

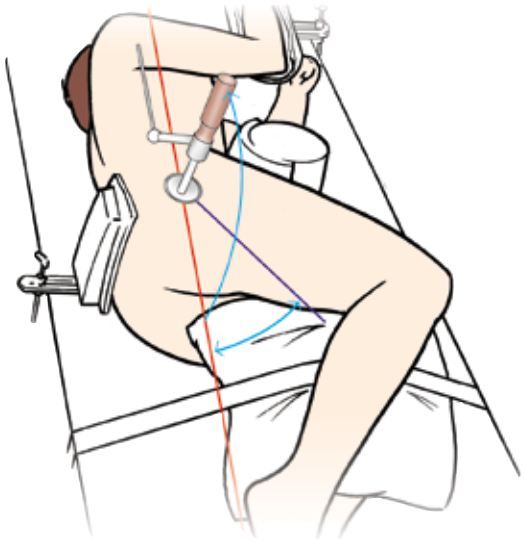

Figure 6

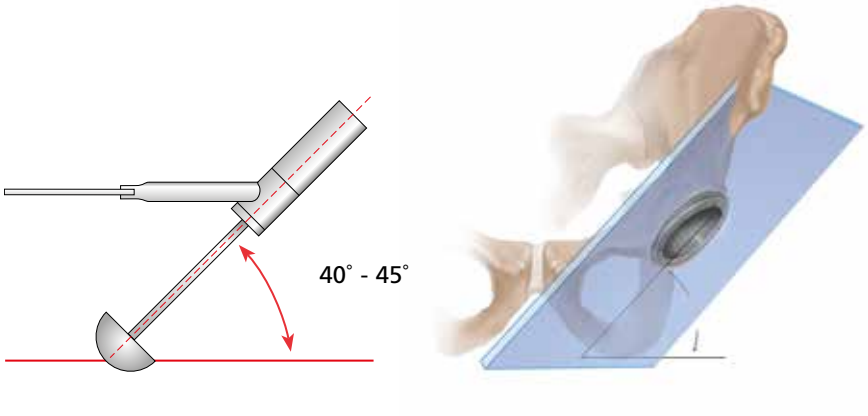

Figure 7

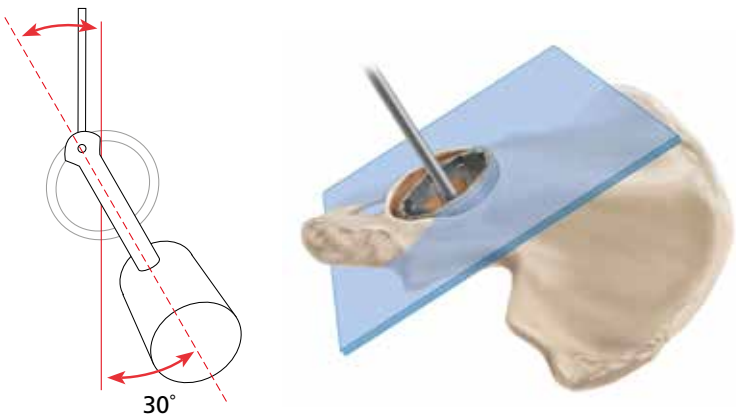

Figure 8

CUP POSITIONING

Peer reviewed publications highlight the importance of acetabular component positioning in relation to short and long term outcomes during total hip arthroplasty for all types of bearing materials.[1-4]

Cup positioning should be varied to optimise fixation, range of motion and dislocation resistance and minimise the likelihood of subluxation, impingement and edge loading. This may be assessed during pre-operative planning, acetabular preparation and cup trialling. Sub-optimal component positioning may lead to edge loading, dislocation, increased wear and polyethylene fracture.[1-4]

The target cup inclination (as measured on radiographs) should be 40-45° taking into account local soft tissue and anatomic landmarks. The target cup anteversion (as measured on radiographs) should be 15-20° taking into account local soft tissue and anatomic landmarks.

An alignment guide is provided to assist with cup positioning; however, cup orientation in the patient depends on patient position. The alignment guide does not allow for variation in patient position with respect to the operating table and it should be noted that patient orientation can vary throughout the procedure.

TRIAL SIZING AND IMPACTION OF THE SHELL

The cup is oriented so that the rim markers are correctly aligned to ensure the screw holes are positioned in the safe zone for screw fixation. (Figure 9).

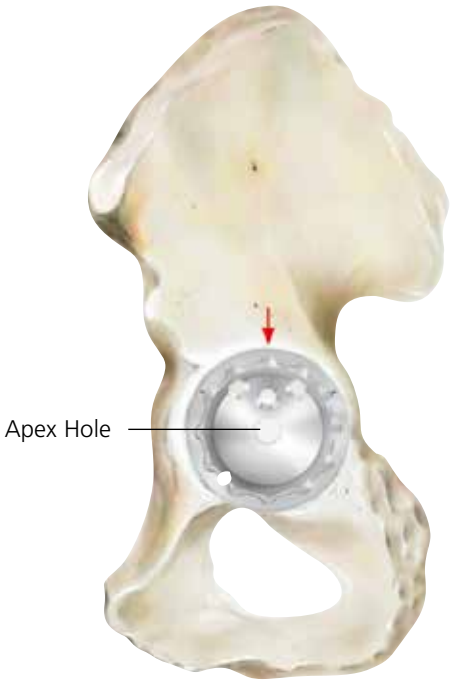

Figure 9

JOINT STABILITY

The seating level of the cup can be verified through the apex hole in the cup after removal of the Impactor (Figure 10).

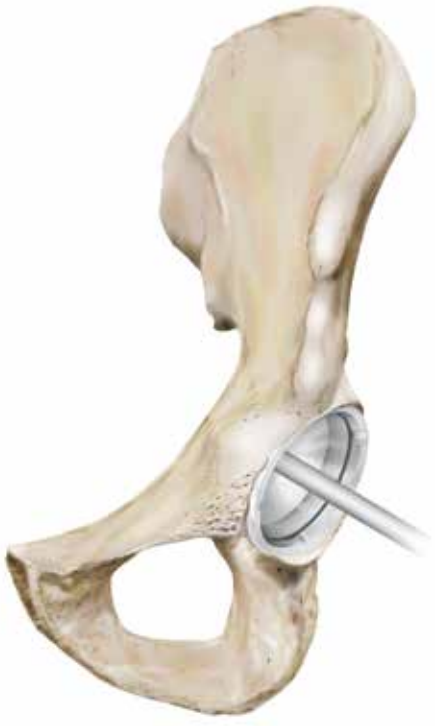

Figure 10

TRIAL SIZING AND IMPACTION OF THE POLYETHYLENE LINER

A trial liner is inserted and the femoral side is prepared. After completion of the femoral side, the screw-in trial liner can be used to assess joint stability and range of motion.

If the hip shows a tendency to dislocate, an angled or hooded trial liner can be chosen to provide additional coverage of the head. The optimum position of the hood may be marked with diathermy on the rim of the acetabulum for later reference. The trial liner is removed and the apex hole may be closed using an apex hole plug. Soft tissues at the acetabular rim may hamper the locking mechanism and should be removed.

If an angled or hooded liner is used, it should be positioned so that it corresponds with the mark made on the rim during trial reduction. The insert is seated using firm hand pressure only.

Final impaction into the shell is completed using the polyethylene headed liner impactor, until the liner locks into place (Figures 11 & 12).

Before the polyethylene liner is inserted, the locking ring (packaged with the polyethylene liner) is introduced to the locking ring groove in the shell. Starting with one end of the ring, each bend is introduced progressively until the ring is fully seated in the groove (Figure 13).

The definitive polyethylene liner is inserted in the same position as the trial liner (Figures 11 & 12).

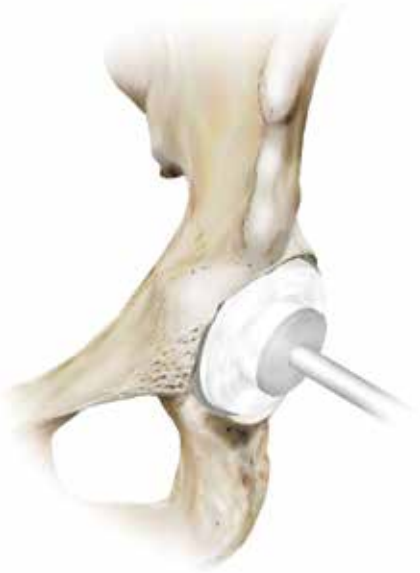

Figure 11
DURALOC Liner

Figure 12
Option Liner

Figure 13

POLYETHYLENE LINER EXTRACTION

If required, the polyethylene liner can be removed using the polyethylene liner extractor.

The blunt jaw is located on the rim of the shell while the 'claw' jaw is used to bite into the liner, breaking the seal and allowing extraction to be completed (Figure 14).

Warning: An extracted liner should not be re-used.

Figure 14

ORDERING INFORMATION

Cat. No.	Description
Bantam Cups (38 - 46 mm)	
1245-38-503	DURALOC Bantam Cup 38 mm
1245-40-503	DURALOC Bantam Cup 40 mm
1245-42-503	DURALOC Bantam Cup 42 mm
1245-44-503	DURALOC Bantam Cup 44 mm
1245-46-503	DURALOC Bantam Cup 46 mm
Bantam ENDURON™ 10° Liners 22.225mm (38 - 46 mm)	
1241-38-526	DURALOC ENDURON 10° Liner 22.225 mm x 38 mm
1241-40-526	DURALOC ENDURON 10° Liner 22.225 mm x 40 mm
1241-42-526	DURALOC ENDURON 10° Liner 22.225 mm x 42 mm
1241-44-526	DURALOC ENDURON 10° Liner 22.225 mm x 44 mm
1241-46-526	DURALOC ENDURON 10° Liner 22.225 mm x 46 mm
Sector Cups (48 - 66 mm)	
1245-80-055	DURALOC Sector Cup 48 mm
1245-80-056	DURALOC Sector Cup 50 mm
1245-80-049	DURALOC Sector Cup 52 mm
1245-80-050	DURALOC Sector Cup 54 mm
1245-80-051	DURALOC Sector Cup 56 mm
1245-80-052	DURALOC Sector Cup 58 mm
1245-80-053	DURALOC Sector Cup 60 mm
1245-80-054	DURALOC Sector Cup 62 mm
1245-80-057	DURALOC Sector Cup 64 mm
1245-80-058	DURALOC Sector Cup 66 mm
MARATHON™ 0° Neutral Liners 28 mm (48 - 66 mm)	
1220-28-048	DURALOC MARATHON 0° Liner 28 mm x 48 mm
1220-28-050	DURALOC MARATHON 0° Liner 28 mm x 50 mm
1220-28-052	DURALOC MARATHON 0° Liner 28 mm x 52 mm
1220-28-054	DURALOC MARATHON 0° Liner 28 mm x 54 mm
1220-28-056	DURALOC MARATHON 0° Liner 28 mm x 56 mm
1220-28-058	DURALOC MARATHON 0° Liner 28 mm x 58 mm
1220-28-060	DURALOC MARATHON 0° Liner 28 mm x 60 mm
1220-28-062	DURALOC MARATHON 0° Liner 28 mm x 62 mm
1220-28-064	DURALOC MARATHON 0° Liner 28 mm x 64 mm
1220-28-066	DURALOC MARATHON 0° Liner 28 mm x 66 mm

Cat. No.	Description
MARATHON 10° Liners 28 mm (48 - 66 mm)	
1220-28-148	DURALOC MARATHON 10° Liner 28 mm x 48 mm
1220-28-150	DURALOC MARATHON 10° Liner 28 mm x 50 mm
1220-28-152	DURALOC MARATHON 10° Liner 28 mm x 52 mm
1220-28-154	DURALOC MARATHON 10° Liner 28 mm x 54 mm
1220-28-156	DURALOC MARATHON 10° Liner 28 mm x 56 mm
1220-28-158	DURALOC MARATHON 10° Liner 28 mm x 58 mm
1220-28-160	DURALOC MARATHON 10° Liner 28 mm x 60 mm
1220-28-162	DURALOC MARATHON 10° Liner 28 mm x 62 mm
1220-28-164	DURALOC MARATHON 10° Liner 28 mm x 64 mm
1220-28-166	DURALOC MARATHON 10° Liner 28 mm x 66 mm
MARATHON 0° Neutral Liners 32 mm (52 - 66 mm)	
1220-32-052	DURALOC MARATHON 0° Liner 32 mm x 52 mm
1220-32-054	DURALOC MARATHON 0° Liner 32 mm x 54 mm
1220-32-056	DURALOC MARATHON 0° Liner 32 mm x 56 mm
1220-32-058	DURALOC MARATHON 0° Liner 32 mm x 58 mm
1220-32-060	DURALOC MARATHON 0° Liner 32 mm x 60 mm
1220-32-062	DURALOC MARATHON 0° Liner 32 mm x 62 mm
1220-32-064	DURALOC MARATHON 0° Liner 32 mm x 64 mm
1220-32-066	DURALOC MARATHON 0° Liner 32 mm x 66 mm
MARATHON 10° Liners 32 mm (52 - 66 mm)	
1220-32-152	DURALOC MARATHON 10° Liner 32 mm x 52 mm
1220-32-154	DURALOC MARATHON 10° Liner 32 mm x 54 mm
1220-32-156	DURALOC MARATHON 10° Liner 32 mm x 56 mm
1220-32-158	DURALOC MARATHON 10° Liner 32 mm x 58 mm
1220-32-160	DURALOC MARATHON 10° Liner 32 mm x 60 mm
1220-32-162	DURALOC MARATHON 10° Liner 32 mm x 62 mm
1220-32-164	DURALOC MARATHON 10° Liner 32 mm x 64 mm
1220-32-166	DURALOC MARATHON 10° Liner 32 mm x 66 mm
Constrained Enduron Liners 28 mm (48 - 66 mm)	
1241-08-527	DURALOC Constrained Liner 28 mm x 48 mm
1241-10-527	DURALOC Constrained Liner 28 mm x 50 mm
1241-12-527	DURALOC Constrained Liner 28 mm x 52 mm
1241-14-527	DURALOC Constrained Liner 28 mm x 54 mm
1241-16-527	DURALOC Constrained Liner 28 mm x 56 mm
1241-18-527	DURALOC Constrained Liner 28 mm x 58 mm
1241-20-527	DURALOC Constrained Liner 28 mm x 60 mm
1241-22-527	DURALOC Constrained Liner 28 mm x 62 mm
1241-24-527	DURALOC Constrained Liner 28 mm x 64 mm
1241-26-527	DURALOC Constrained Liner 28 mm x 66 mm

Cat. No.	Description
Constrained Enduron Liners 32 mm (52 - 66 mm)	
1242-12-527	DURALOC Constrained Liner 32 mm x 52 mm
1242-14-527	DURALOC Constrained Liner 32 mm x 54 mm
1242-16-527	DURALOC Constrained Liner 32 mm x 56 mm
1242-18-527	DURALOC Constrained Liner 32 mm x 58 mm
1242-20-527	DURALOC Constrained Liner 32 mm x 60 mm
1242-22-527	DURALOC Constrained Liner 32 mm x 62 mm
1242-24-527	DURALOC Constrained Liner 32 mm x 64 mm
1242-26-527	DURALOC Constrained Liner 32 mm x 66 mm
Option LPW liners 22.225 mm, 28 mm and 32 mm	
Available for revisions	
Apex Hole Eliminators	
1246-03-000	Apex Hole Eliminator
Cancellous Bone Screws	
1172-20-000	Cancellous Bone Screw 6.5 mm x 20 mm
1172-30-000	Cancellous Bone Screw 6.5 mm x 30 mm
1172-40-000	Cancellous Bone Screw 6.5 mm x 40 mm
1172-50-000	Cancellous Bone Screw 6.5 mm x 50 mm
Dynamic Locking Rings	
1249-38-503	Dynamic Locking Ring 38 mm
1249-40-503	Dynamic Locking Ring 40 mm
1249-42-503	Dynamic Locking Ring 42 mm
1249-44-503	Dynamic Locking Ring 44 mm
1249-46-503	Dynamic Locking Ring 46 mm
1249-48-000	Dynamic Locking Ring 48 mm
1249-50-000	Dynamic Locking Ring 50 mm
1249-52-000	Dynamic Locking Ring 52 mm
1249-54-000	Dynamic Locking Ring 54 mm
1249-56-000	Dynamic Locking Ring 56 mm
1249-58-000	Dynamic Locking Ring 58 mm
1249-60-000	Dynamic Locking Ring 60 mm
1249-62-000	Dynamic Locking Ring 62 mm
1249-64-000	Dynamic Locking Ring 64 mm
1249-66-000	Dynamic Locking Ring 66 mm

+ Associated Instruments

References

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2. Schmalzried TP, Guttmann D, Grecula M, Amstutz H. The relationship between the design, position, and articular wear of acetabular components inserted without cement and the development of pelvic osteolysis. J Bone Joint Surg. 1994;76A:677-688.

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4. Tower SS, Currier JH, Currier BH, Lyford KA, Van Citters DW, Mayor MB. Rim cracking of the cross-linked longevity polyethylene acetabular liner after total hip arthroplasty. J Bone Joint Surg Am. 2007 Oct;89(10):2212-7.

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