CD HORIZON® LEGACY™
Anterior Spinal System Tumor/Trauma Surgical Technique

As described by:

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<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features and Benefits</td>
<td>2</td>
</tr>
<tr>
<td>Instrument Set</td>
<td>3</td>
</tr>
<tr>
<td>Patient Positioning, Surgical Exposure and Corpectomy</td>
<td>7</td>
</tr>
<tr>
<td>Measuring the Coronal Diameter of the Vertebral Body</td>
<td>8</td>
</tr>
<tr>
<td>Placement of the Vertebral Body Staples</td>
<td>9</td>
</tr>
<tr>
<td>Awl Guide Option</td>
<td>10</td>
</tr>
<tr>
<td>Screw Placement</td>
<td>11</td>
</tr>
<tr>
<td>Distraction</td>
<td>12</td>
</tr>
<tr>
<td>Implantation</td>
<td>13</td>
</tr>
<tr>
<td>Rod Placement</td>
<td>14</td>
</tr>
<tr>
<td>Final Tightening</td>
<td>15</td>
</tr>
<tr>
<td>Placing the CROSSLINK® Plates</td>
<td>16</td>
</tr>
<tr>
<td>Explantation</td>
<td>17</td>
</tr>
<tr>
<td>Product Ordering Information</td>
<td>18</td>
</tr>
<tr>
<td>Important Product Information</td>
<td>20</td>
</tr>
</tbody>
</table>
All CD HORIZON® LEGACY™ Anterior Spinal System implants are manufactured using 6Al4V or CP Grade II Titanium. Basic implants consist of vertebral body staples, fixed screws, CROSSLINK® Plates and 5.5mm diameter rods.

Vertebral Body Staples – This design offers contour in two planes to provide exceptional fit and a lower overall profile. The under surface is shaped to fit the sagittal curvature of the vertebral body and the concavity between the superior and inferior end plates of each instrumented vertebra. The upper surface has a smooth finish to minimize irritation to vascular structures and soft tissues. Additionally, the dual spikes are contained within the interior of the plate as a safety feature. The offset spikes provide excellent stability during implantation and system rigidity postoperatively. The contoured staples are offered in four sizes to ensure a better fit for patients of various sizes. Each staple is clearly marked with the size, caudal or rostral orientation and color-coded; blue (rostral) or dark gray (caudal). The staples have longer prongs and serrations that provide greater stability than the previous version and are contoured to fit.

CD HORIZON® LEGACY™ Anterior System Fixed Screws – The top-loading, top-tightening design facilitates a simplified construct assembly, compatible with a 5.5mm diameter rod. Open 5.5mm and 6.5mm diameter screws are available to accommodate various instrumented levels. Additionally, a 7.5mm diameter screw can be used as a “rescue screw” in the medium and large vertebral body staple. The screw design and blunt tip offers a precautionary feature, bicortical purchase.

CD HORIZON® LEGACY™ Anterior Spinal System CROSSLINK® Plate – This cross connector utilizes the tested CD HORIZON® X10 CROSSLINK® Plate design. The design allows the one-piece implant to be easily applied to the dual rod construct for a top-loading approach. The CROSSLINK® Plates are offered in 1mm increments, from 13mm to 19mm. The ease of use and top-tightening features make this an excellent benefit to the system.
Case 1

Hook Compressor 94632

Caliper 9339095

In Situ Benders 7480255, Left 7480260, Right

Parallel Capturing Distractor 6480172

Multi-Level Hook Compressor (optional) 808-503

Rod Gripper 7480175

Parallel Compressor, Small 7480165

Parallel Compressor, Large 7480166

Parallel Distractor 7480170

Parallel Post Style Distractor 6480173

CD HORIZON™ LEGACY™ Anterior Spinal System

Tumor/Trauma Surgical Technique

Instrument Set
Case 2

- Fixed Angle Screw Driver 6480282
- Staple Impactor 6481005
- 13mm/14mm Crosslink Measuring Tool 8691013
- 15mm/16mm Crosslink Measuring Tool 8691014
- 17mm/18mm Crosslink Measuring Tool 8691015
- 19mm Crosslink Measuring Tool 8691016
- Universal Quick Connect Ratcheting Handle 9960106
- Quick Connect Ratcheting Handle 9339082
- Fixed Angle Screw Positioner 6481010
- Depth Gauge 870-501
- Threaded Awl with Staple Impactor 6481205
- Staple Impactor 6481005
- Counter Torque 6480150
- Case 2 CD HORIZON® LEGACY™ Anterior Spinal System Instrument Set (Continued) Tumor/Trauma Surgical Technique
Case 2 (Continued)

- Solid Tap, 4.5mm
  836-014

- Solid Tap, 5.5mm
  836-015

- Solid Tap, 6.5mm
  836-016

- T25 Driver, Quick Connect
  7484147

- Set Screw Starter
  7480122

- Ball Tip Probe
  8572102

- Quick Connect Awl
  6481000

- Beale Rod Reducer
  6480136

- Crosslink Holder
  6481011

- Provisional Driver
  7480130

- French Bender
  7480162

- Awl Guide
  19mm, 6481019
  21mm, 6481021
  23mm, 6481023
  25mm, 6481025
Case 3

7/32" Breakoff Driver
6480144

Obturator
7484154

or

7/32" Plug Starter (for Crosslinks)
6480122

3.0mm Hex Driver
8110530

5.5mm Forcep Rocker
7480142

Coronal Plane Bender
7480265, Left
7480270, Right

6.35mm Hex Breakoff Driver
7480144
When treating thoracic and thoracolumbar fractures or tumors with anterior instrumentation, the approach is usually from the patient’s left side, particularly below the diaphragm. If indications warrant, the operation can be accomplished from the patient’s right side. The preoperative axial MRI or CT scan should be reviewed to ensure the aorta is midline. A left deviation of the aorta may require a right-sided approach above the diaphragm.

It is important to ensure the patient is positioned in a true lateral position and that the position is maintained throughout the procedure (Figure 1).

The appropriate intervertebral discs and vertebral body are removed from the desired fusion area, using a variety of general surgical instruments.
Using the Depth Gauge, measure the coronal diameter of the vertebral body above and below the corpectomy (Figure 2). This distance is used to determine the length of the screws to be implanted. This may also be done using the graduated scale on the preoperative MRI/CT films (Figure 3). If unable to measure preoperatively, the intraoperative option of determining screw length and trajectory with the Awl and Tap can be used.

The screw length can also be determined by measuring the vertebral body width on a preoperative CT scan or MRI scan. Use the scale provided on the scan to accommodate magnification.
The appropriately-sized staple is selected and placed on the Staple Impactor (Figure 4). Staples are available in four sizes with both a caudal (dark gray) and rostral (blue) orientation. The largest staple that will fit within the confines of the vertebral body should be used. Intraoperative fluoroscopy can be used to assist in ideal staple positioning.

The staple attaches to the Staple Impactor by threading the Impactor Shaft into the center hole in the staple until snug. The staple is then impacted into position (Figure 5). Pilot holes are made using the provided Threaded Awl, and the Impactor is unthreaded from the center retaining hole (Figure 6). Generally, the screws are directed at a 10° convergent angle. When correctly placed, the staples will ensure that the anterior rod will be longer than the posterior rod.
As an option, the surgeon may elect to use the provided Awl Guides. After the staple is impacted into the vertebral body, the Awl Guide connects under the Staple Impactor (Figure 7). The thumb wheel on the Staple Impactor may be turned to temporarily lock the two instruments together (Figure 8). Using these instruments, the awl will create a 10° convergent trajectory for both the anterior and posterior screws (Figures 9 and 10). After both pilot holes are created, the thumb wheel may be released and the Staple Impactor unthreaded from the center of the staple.
Screw holes may be tapped so that the CD HORIZON® LEGACY™ Anterior Spinal System Fixed Angle Screws can be inserted until the head of the screw makes contact with the staple (Figure 11). Care should be taken to ensure that the screw openings are aligned from segment to segment allowing for rod introduction (Figure 12). Each screw should contact the far cortex to ensure bicortical fixation.
A vertebral body spreader or the provided Distractor may be used against the heads of the rostral and caudal screws. Insert the arms of the Distractor into the screw heads. If using a Parallel Post Style Distractor, insert a CD HORIZON® LEGACY™ Anterior Spinal System Set Screw over each arm of the Distractor using the Set Screw Starter. Each Set Screw should be provisionally tightened. A distractive force is placed against the heads until the desired distraction is achieved (Figure 13a). Please note that if the Parallel Capturing Distractor is used, Set Screws are not needed during distraction (Figure 13b). Once distraction has been achieved, the Graft Measuring Caliper may be used to determine the required graft length (Figure 14).
After careful selection, measurement, and placement of the corpectomy device and graft into the corpectomy site, distraction is released (Figure 15). Depress the ratchet lever on the Distractor until the corpectomy device comes in full contact with the superior and inferior end plates. Remove the Set Screws and the Parallel Post Style Distractor from the surgical site.
Measure the required rod length using the Graft Measuring Caliper or the 20” Rod Template. The posterior rod is measured first. Cut the rod to length and place in the posterior screws (Figure 16). Set Screws are applied and finger tightened. This process is repeated for the anterior rod. Once the proper alignment is achieved, tighten either the rostral or caudal Set Screws provisionally.

Figure 16
The Compressor is placed on the outside of the unsecured screws (Figure 17). A compressive force is applied to the construct to lock the corpectomy device in place. Provisionally tighten the remaining posterior Set Screw. Repeat this procedure for the anterior rod. Once the final position is confirmed, the Set Screws are broken off using the Counter Torque and the Hex Breakoff Driver (Figure 18).
The CROSSLINK® Plates are added to the construct to provide torsional stability. Two CROSSLINK® Plates are recommended for each construct. Use the Crosslink Measuring Tools to determine the required implant size (Figure 19). Plates are offered in one-millimeter increments from 13mm to 19mm to provide a precise fit. Grasp the selected CROSSLINK® Plate with the Crosslink Holder and place on the rods (Figure 20).
CROSSLINK® Plate Set Screws may be oriented facing either anteriorly or posteriorly (Figure 21). Orientation will depend on the surgical exposure. Construct rigidity is identical regardless of the plate orientation. If two CROSSLINK® Plates will be used, place the first in the rostral 1/3 of the construct and the second in the caudal 1/3 of the construct (Figure 22). Use the 7/32" Breakoff Driver for final tightening of the CROSSLINK® Plate Set Screws.

**Figure 21**

**Figure 22**

**Explantation**

If removal of the construct is necessary, the 3.0mm Hex Driver may be used to remove the CROSSLINK® Plate Set Screws. Place the tip of the 3.0mm Hex Head shaft (Removal Driver) into the CROSSLINK® Plate Set Screw and confirm that the 3.0mm tip is completely inserted so that the tip does not strip the hex. Turn the 3.0mm Hex Driver counterclockwise to loosen the CROSSLINK® Plate Set Screw from the rod. Next, the T25 Driver will remove the remaining Set Screws. Finally, the fixed angle screws, staples and rods are removed using the same instruments used for insertion.
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7440020 Breakoff Set Screw, Titanium
## INSTRUMENT SET

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Important Product Information

General Instruments

PURPOSE
This instrument is intended for use in surgical procedures.

DESCRIPTION
Unless otherwise stated, instruments are made out of a variety of materials commonly used in orthopedic and neurological procedures including stainless steel and acetyl copolymer materials which meet available national or international standards specifications. Some instruments are made out of aluminum, and some with handles made of resin bonded composites, and while these can be steam autoclaved, certain cleaning fluids must not be employed. None of the instruments should be implanted.

INTENDED USE
This instrument is a precision device which may incorporate a measuring function and has uses as described on the label. Unless labeled for single use, this instrument may be re-used.

WARNING
It is important that the surgeon exercise extreme caution when working in close proximity to the bone. Failure to do so can result in the disassembly of multi-component instruments occurring during surgery. To determine the screw diameter with the screw gauge, start with the smallest test hole.

OVER-BENDING, NOTCHING, STRIKING AND SCRATCHING OF THE IMPLANTS WITH ANY INSTRUMENTS MAY RESULT IN DAMAGE TO THE INSTRUMENTS OR THE IMPLANT

If there is any doubt or uncertainty concerning the proper use of this instrument, please contact MEDTRONIC SOFAMOR DANEK Customer Service for instructions. Any available surgical techniques will be provided at no charge.

DO NOT IMPLANT THE INSTRUMENTS.

POSSIBLE ADVERSE EFFECTS
Breakage, slippage, misuse, or mishandling of instruments, such as on sharp edges, may cause injury to the patient or operative personnel.

Improper maintenance, handling, or poor cleaning procedures can render the instrument unsuitable for its intended purpose or even dangerous to the patient or surgical staff.

Extreme care should be taken to ensure that this instrument remains in good working order. Any damaged instrument should not be used. Additional back-up instruments should be available in case of an unexpected need.

MEDTRONIC SOFAMOR DANEK does not and cannot warrant the use of this instrument nor any of the component parts upon which repairs have been made or attempted except as performed by MEDTRONIC SOFAMOR DANEK or an authorized MEDTRONIC SOFAMOR DANEK repair representative.

Implied warranties of merchantability and fitness for a particular purpose or use are specifically excluded. See the MEDTRONIC SOFAMOR DANEK catalog for further information about warranties and limitations of liability.

DO NOT USE THIS INSTRUMENT FOR ANY ACTION FOR WHICH IT WAS NOT INTENDED SUCH AS HAMMERING, PYING, OR LIFTING. Do not use this instrument for any action for which it was not intended such as hammering, pying, or lifting.

This instrument should be treated as any precision instrument and should be carefully placed on trays, cleaned after each use, and stored in a dry environment.

Instruments must always be examined by the user prior to use in surgery. Examination should be thorough, and in particular, should take into account a visual and functional inspection of the working surfaces, pivots, racks, spring or torsional operation, cleanliness of location holes or cannulations, and the presence of any cracks, bending, bruising or distortion, and that all components of the instrument are complete.

Never use instruments with obvious signs of excessive wear, damage, or that are incomplete or otherwise unfunctional.

CLEANING AND DECONTOAMINATION

Unless just removed from an unopened MEDTRONIC SOFAMOR DANEK package, all instruments must be disassembled (if applicable) and cleaned using neutral cleaners before sterilization and introduction into a sterile surgical field or (if applicable) return of the product to MEDTRONIC SOFAMOR DANEK. Cleaning and decontamination of instruments can be performed with alkaline-free solvents at higher temperatures. Cleaning and decontamination must include the use of neutral cleaners followed by a deionized water rinse.

Note: Certain cleaning solutions such as those containing formalin, glutaraldehyde, bleach and/or other alkaline cleaners may damage some devices, particularly instruments; these solutions should not be used. Also, many instruments require disassembly before cleaning.

All products should be treated with care. Improper use or handling may lead to damage and/or possible improper functioning of the device.

STERILIZATION

Unless marked sterile and clearly labeled as such in an unopened sterile package provided by the company, all implants and instruments used in surgery must be sterilized by the hospital prior to use.

Always use MEDTRONIC SOFAMOR DANEK instruments. The physician should take precautions against putting undue stress on the spinal area with instruments. Any surgical technique instructional manual should be carefully followed. If an instrument breaks in surgery and pieces go into the patient, these pieces should be removed prior to closure and should not be implanted.
REMOVAL OF IMPLANTS

For the best results, the same type of MEDTRONIC SOFAMOR DANEX instruments as used for implantation should be used for implant removal purposes. Various sizes of screwdrivers are available to adapt to the removal drive sizes in auto break fixation screws.

It should be noted that where excessive bone or fibrous growth has occurred from the first surgery, there may be added stress on the removal instruments and the implants. Both instrument and implant may be prone to possible breakage. In this case it is necessary to first remove the bone and/or tissue from around the implants.

PRODUCT COMPLAINT

Any Health Care Professionals (e.g., customer users of MEDTRONIC SOFAMOR DANEX instruments), who have any complaint or who have experienced dissatisfaction in the product quality, identity, durability, reliability, safety, effectiveness and/or performance, should notify the distributor, MEDTRONIC SOFAMOR DANEX. Further, if any instrument “malfunctions” (i.e., does not meet any of its performance specifications or otherwise does not perform as intended), or is suspected of doing so, the distributor or MEDTRONIC SOFAMOR DANEX should be notified immediately. If any MEDTRONIC SOFAMOR DANEX product ever “malfunctions” and may have caused or contributed to the death or serious injury of a patient, the distributor or MEDTRONIC SOFAMOR DANEX should be notified as soon as possible by telephone, FAX or written correspondence. When filing a complaint, please provide the component(s) name and number, lot number(s), your name and address, and the nature of the complaint.

FURTHER INFORMATION

In case of complaint, or for supplementary information, please contact MEDTRONIC SOFAMOR DANEX.

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The CD HORIZON® Spinal System is intended to help provide immobilization and stabilization of spinal segments as an adjunct to fusion of the thoracic, lumbar, and/or sacral spine.

**DESCRIPTION:**

The CD HORIZON® Spinal System consists of a variety of shapes and sizes of rods, hooks, screws, CROSSLINK® plates, staples and connecting components, as well as implant components from other Medtronic spinal systems, which can be rigidly locked into a variety of configurations, with each construct being tailored to the individual need.

Certain implant components from other Medtronic spinal systems can be used with the CD HORIZON® Spinal System. These components include TSH™ rods, hooks, screws, plates, CROSSLINK® plates, connectors, staples and washers, GED® hooks, rods, hooks, connectors and CROSSLINK® bar and connectors; LIBERTY™ screws and screws with PLL and DYNALOCK™ CLASSIC™ and DYNALOCK™ CLASSIC™ ALIGNED with rod holes; and Medtronic Multi-Axial rods and screws. Please note that certain components are specifically designed to connect to 3.5mm, 4.5mm, 5.5mm rods or 6.35mm rods, while other components can connect to both 5.5mm rods and 6.35mm rods. Care should be taken so that the correct components are used in the spinal construct.

CD HORIZON® implants are intended for posterior use only. CD HORIZON® staples and associated components may be used anteriorly for use only. However, for patients of smaller stature, CD HORIZON® 4.5mm rods and associated components may be used posteriorly.

**Contraindications include, but are not limited to:**

- Grossly distorted anatomy caused by congenital abnormalities.
- Severe bone resorption.
- Severe osteoporosis.
- Morbid obesity.
- Severe osteolysis.
- Fracture, microfracture, resorption, or penetration of any spinal bone (including the sacrum, pedicles, and/or vertebral body) and/or bone graft or bone graft harvest site at, above, and/or below the level of surgery Resutefl. graced.
- Hemorrhage, hematoma, osseous, seroma, edema, hypertension, embolism, stroke, excessive bleeding, phlebitis, wound necrosis, wound dehiscence, damage to blood vessels, or other types of cardiovascular system compromise.
- Reproductive system compromise, including sterility, loss of consortium, and sexual dysfunction.
- Development of respiratory problems, e.g., pulmonary embolism, atelectasis, bronchitis, pneumonia, etc.
- Cessation of any potential growth of the operated portion of the spine.
- Loss of or increase in spinal mobility or function.
- Inability to perform the activities of daily living.
- Bone loss or decrease in bone density, possibly caused by stress shielding.
- Gross allergy reaction to any component of the device.
- patients with poor muscle and bone quality and/or significant previous fusion.
- Patients with other diseases, elevation of white blood count (WBC), or a marked left shift in the WBC differential count.
- Any case not needing a bone graft and fusion.
- Any case not described in the indications.
- Any case where the implant components selected for use would be too large or too small to achieve a successful result.
- Any patient having inadequate tissue coverage over the vertebral body or ineffective bone stock or quality.
- Any patient in which implant utilization would interfere with anatomical structures or expected physiological performance.

**NOTA BENE:** Although not absolute contraindications, conditions to be considered as potential factors for not using this device include:

- Severe bone resorption.
- Osteomalacia.
- Severe osteoporosis.

**POTENTIAL ADVERSE EVENTS:**

All of the possible adverse events associated with spinal fusion surgery without instrumentation are possible. With instrumentation, a listing of potential adverse events includes, but is not limited to:

- Early or late loosening of any or all of the components.
- Disassembly, bending, and/or breakage of any or all of the components.
- Foreign body (allergic) reaction to surgical implants, debris, corrosion products (from crevice, fretting, and/or general corrosion), including metallosis, staining, tumor formation, and/or autoimmune disease.
- Pressure on the skin from component parts in patients with inadequate tissue coverage over the implant possibly causing skin penetration, irritation, fibrosis, neurosis, and/or pain. Bursting Tissue or nerve damage caused by improper positioning and placement of implants or instruments.
- Post-operative change in spinal curvature, loss of correction, height, and/or reduction.
- Infection.
- Sural tears, pseudosynovial cysts, fistula, persistent CSF leakage, meningitis.
- Loss of neurological function (e.g., sensory and/or motor), including paralysis (complete or incomplete), dysaesthesia, hyperesthesia, anesthetia, paresis, appearance of radiculopathy, and/or the development or continuation of pain, numbness, neurona, spasms, sensory loss, tingling sensation, and/or visual deficits.
- Cauda equina syndrome, neuropathy, neurological deficits (transient or permanent), paraplegia, paraparesis, reflex deficits, irritation, arachnoiditis, and/or muscle loss.
- Urinary retention or loss of bladder control or other types of urological system compromise.
- Sacral injury possibly causing neurological compromise or compression around nerves and/or pain.
- Fracture, non-union, disassembly, and/or breakage of any or all of the components.
- Fracture, disassembly, and/or breakage of any or all of the components.
- Hyperventilation, hypoxia, atelectasis, pulmonary embolism, stroke, excessive bleeding, phlebitis, wound necrosis, wound dehiscence, damage to blood vessels, or other types of cardiovascular system compromise.
- Reproductive system compromise, including sterility, loss of consortium, and sexual dysfunction.
- Development of respiratory problems, e.g., pulmonary embolism, atelectasis, bronchitis, pneumonia, etc.
- Cessation of any potential growth of the operated portion of the spine.
- Loss of or increase in spinal mobility or function.
- Inability to perform the activities of daily living.
- Bone loss or decrease in bone density, possibly caused by stress shielding.
- Gross allergy reaction to any component of the device.
- patients with poor muscle and bone quality and/or significant previous fusion.
- Patients with other diseases, elevation of white blood count (WBC), or a marked left shift in the WBC differential count.
- Any case not needing a bone graft and fusion.
- Any case not described in the indications.
- Any case where the implant components selected for use would be too large or too small to achieve a successful result.
- Any patient having inadequate tissue coverage over the vertebral body or ineffective bone stock or quality.
- Any patient in which implant utilization would interfere with anatomical structures or expected physiological performance.
- Other preoperative, intraoperative, and postoperative warnings and precautions are as follows:

**WARNING:**

The safety and effectiveness of pedicle screw spinal systems have been established only for spinal conditions with significant mechanical instability or deformity requiring fusion with instrumentation. These conditions are significant mechanical instability or deformity of the thoracic, lumbar, and sacral spine secondary to traumatic injury, spondylolisthesis with or without evidence of neurologic impairment, fracture, dislocation, scoliosis, kyphosis, spinal tumor, and failed previous fusion (pseudarthrosis). The safety and effectiveness of the device for any other conditions is unknown. The implants are not prostheses. In the absence of fusion, the instrumentation and/or one or more of its components can be expected to pull out, bend or fracture as a result of exposure to every day mechanical stresses.

**PRECAUTION:**

The implantation of pedicle screw spinal systems should be performed only by experienced spinal surgeons with specific training in the use of this pedicle screw spinal system because this is a technically demanding procedure presenting a risk of serious injury to the patient. A successful result is not always achieved in every surgical case. This fact is especially true in spinal surgery where many extenuating circumstances may compromise the results. This device system is not intended to be the sole method of spinal support. Use of this product without a bone graft or in cases that develop into a non-union will not be successful. No spinal implant can withstand body loads without the support of bone. In this event, bending, loosening, disassembly and/or breakage of the device(s) will eventually occur. Preoperative and operating procedures, including knowledge of surgical techniques, good reduction, and proper selection and placement of the implants are important considerations in the successful utilization of the system by the surgeon. Further, the proper selection and compliance of the patient will greatly affect the outcome. The device is not appropriate for use in patients who smoke has been shown to have an increased incidence of non-unions. These patients should be advised of this fact and warned of this consequence. Obese, marnouherent, and/or alcohol abuse patients are also poor candidates for spine fusion. Patients with poor muscle and bone quality and/or nerve paralysis are also poor candidates for spine fusion.

**PHYSICIAN NOTE:** Although the physician is the learned intermediary between the company and the patient, the important medical information given in this document should be conveyed to the patient.
DEVICE FIXATION:
In cases where a percutaneous posterior approach is used refer to the CD HORIZON® SEXTANT™ surgical technique. Medtronic CD HORIZON Spinal System instrumentation contains 3.5mm, 4.5 mm, 5.5mm and/or 6.35mm rods and implants, which are intended to be used with device specific instruments. For self breaking plug use, always handle the device with the Counter torque device. Tighten and break-off the head of the plug to leave the assembly at optimum fixation security. After the upper part of the self breaking plug has been sheared off, further re-tightening is not necessary and not recommended. The head part should not remain in the patient. AFTER THE UPPER PART OF THE SELF BREAKING PLUG HAS BEEN SHEARRED OFF, RE-ADJUSTMENT IS NOT POSSIBLE UNLESS THE PLUG IS REMOVED AND REPLACED WITH A NEW ONE.
When using DTT Transverse Links, the M6 plug should be tightened to between 8 and 9Nm. (70 to 80 inch-lbs).

CD HORIZON® PEER® Rods are not to be used with CROSSLINK™ Plates.
When using the CD HORIZON® AGILE™ Dynamic Stabilization device, refer to the surgical technique for the appropriate directions for use.

PREOPERATIVE:
1. Only patients that meet the criteria described in the indications should be selected.
2. Patient conditions and/or predispositions such as those addressed in the aforementioned contraindications should be avoided.
3. Care should be used in the handling and storage of the implant components. The implants should not be scratched or otherwise damaged. Instruments and implants should be protected during storage, especially from corrosive environments.
4. An adequate inventory of implants should be available at the time of surgery, normally a quantity in excess of what is expected to be used.
5. Since mechanical parts are involved, the surgeon should be familiar with the various components before using the device and should personally assemble the devices to verify that all parts and necessary instruments are present before the surgery begins. The CD HORIZON® Spinal System components (described in the DESCRIPTION section) are not to be combined with the components from another manufacturer.
6. All components and instruments should be cleaned and sterilized before use. Additional sterile components should be available in case of an unexpected need.

INTRAOPERATIVE:
1. Extreme caution should be used around the spinal cord and nerve roots. Damage to the nerves will cause loss of neurological functions.
2. Breakage, slippage, or misuse of instruments or implant components may cause injury to the patient or operative personnel.
3. The rods should not be repeatedly or excessively bent. The rods should not be reverse bent in the same location. Use great care to insure that the implant surfaces are not scratched or notched, since such actions may reduce the functionality of the construct, or the rods are cut to length, they should be cut in such a way as to create a flat, non-sharp surface perpendicular to the midline of the rod. Cut the rods outside the operative field. Whenever possible, use pre-cut rods of the length needed.
4. Utilize an imaging system to facilitate surgery.
5. To insert a screw properly, a guide wire should first be used, followed by a sharp tap. Caution: Be careful that the guide-wire, if used, is not inserted too deep, becomes bent, and/or breaks. Ensure that the guide-wire does not advance during tapping or screw insertion. Remove the guide-wire and make sure it is intact. Failure to do so may cause the guide wire or part of it to advance through the bone and into a location that may cause damage to underlying structures.
6. Caution: Do not overtight or use a screwdriver that is either too long or too large. Overtightening, using an incorrectly sized screwdriver, or accidentally advancing the guidewire during tap or screw/insertion, may cause nerve damage, hemorrhage, or the other possible adverse events listed elsewhere in this package insert. If screw/boils are being inserted into spinal pedicles, use as large a screw/boil diameter as will fit into each pedicle.
7. Bone graft must be placed in the area to be fused and graft material must extend from the upper to the lower vertebral body being fused.
8. To assure maximum stability, two or more CROSSLINK™ plates or DTT Transverse Links on two bilaterally placed, continuous rods, should be used whenever possible.
9. Before closing the soft tissues, provisionally tighten (finger tighten) all of the nuts or screws, especially screws or nuts that have a breakoff feature. Once this is completed go back and tighten fully all of the screws and nuts. Recheck the tightness of all nuts or screws after finishing to make sure that none loosened during the tightening of the other nuts or screws. Failure to do so may cause loosening of the other components.

POSTOPERATIVE:
The physician’s postoperative directions and warnings to the patient, and the corresponding patient compliance, are extremely important.
1. Detailed instructions on the use and limitations of the device should be given to the patient. If partial weight-bearing is recommended or required prior to firm bony union, the patient must be warned that bending, loosening and/or breakage of the device(s) is complications which may occur as a result of excessive or early weight-bearing or muscular activity. The risk of bending, loosening, or breakage of a temporary internal fixation device during postoperative rehabilitation may be increased if the patient is active, or if the patient is debilitated or demented. The patient should be warned to avoid falling or sudden jolts in spinal position.
2. To allow the maximum chances for a successful surgical result, the patient or devices should not be exposed to mechanical vibrations or shock that may loosen the device construct. The patient should be warned of the possibility of implant loosening and limit and restrict physical activities, especially lifting and twisting motions and any type of sport participation. The patient should be advised not to smoke tobacco or utilize nicotine products, or to consume alcohol or non-steroidal or anti-inflammatory medications such as aspirin during the bone healing process.
3. The patient should be advised of their inability to bend or rotate at the point of spinal fusion and taught to compensate for this permanent physical restriction in body motion.
4. Failure to immobilize a delayed or non-union of bone will result in excessive and repeated stresses on the implant. By the mechanism of fatigue, these stresses can cause the eventual bending, loosening, or breakage of the device(s). It is important that immobilization of the spinal surgical site be maintained until firm bony union is established and confirmed by roentgenographic examination. If a state of non-union persists or if the components loosen, bend, and/or break, the device(s) should be revised and/or removed immediately before serious injury occurs. The patient must be adequately warned of these hazards and closely supervised to insure cooperation until bony union is confirmed.
5. As a precaution, before patients with implants receive any subsequent surgery (such as dental procedures), prophylactic antibiotics may be considered, especially for high-risk patients.

6. The CD HORIZON® Spinal System implants are temporary internal fixation devices. Internal fixation devices are designed to stabilize the operative site during the normal healing process. After the spine is fused, these devices serve no functional purpose and may be removed. While the final decision on implant removal is, of course, up to the surgeon and patient, in most patients, removal is indicated because the implants are not intended to transfer or support forces developed during normal activities. If the device is not removed following completion of its intended use, one or more of the following complications may occur: (1) Corrosion, with localized tissue reaction or pain; (2) Migration of implant position, possibly resulting in injury; (3) Risk of additional injury from postoperative trauma; (4) Bending, loosening and breakage, which could make removal impractical or difficult; (5) Pain, discomfort, or abnormal sensations due to the presence of the device; (6) Possible increased risk of infection; (7) Bone loss due to stress shielding; and (8) Potential unknown and/or unexpected long term effects such as carcinogenesis, implant removal should be followed by a adequate postoperative management to avoid fracture, re-fracture, or other complications.

PACKAGING:
Packages for each of the components should be intact upon receipt. If a loaner or consignment system is used, all sets should be carefully checked for completeness and all components including instruments should be carefully checked to ensure that there is no damage prior to use. Damaged packages or products should not be used, and should be returned to Medtronic.

CLEANING AND DECONTAMINATION:
Unless just removed from an unopened Medtronic package, all instruments and implants must be disassembled (if applicable) and cleaned using neutral cleaners before sterilization and introduction into a sterile surgical field or (if applicable) return of the product to Medtronic. Cleaning and disinfecting of instruments can be performed with aldehyde-free solvents at higher temperatures. Cleaning and decontamination must include the use of neutral cleaners followed by a deionized water rinse.

NOTE: Certain cleaning solutions such as those containing formalin, glutaraldehyde, bleach and/or other suckal cleaners may damage some devices, particularly instruments; these solutions should not be used. Also, many instruments require disassembly before cleaning.

Sterilization:
Unless marked sterile and clearly labeled as such in an unopened sterile package provided by the company, all implants and instruments used in surgery must be sterilized by the hospital prior to use. Remove all packaging materials prior to sterilization. Only sterile products should be placed in the operative field. Unless specified elsewhere, these products are recommended to be steam sterilized by the hospital using one of the sets of process parameters below:

<table>
<thead>
<tr>
<th>METHOD</th>
<th>CYCLE</th>
<th>TEMPERATURE</th>
<th>EXPOSURE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam</td>
<td>Pre-Vacuum</td>
<td>270°F (132°C)</td>
<td>4 Minutes</td>
</tr>
<tr>
<td>Steam</td>
<td>Gravity</td>
<td>265°F (121°C)</td>
<td>60 Minutes</td>
</tr>
<tr>
<td>Steamb*</td>
<td>Pre-Vacuum</td>
<td>273°F (134°C)</td>
<td>20 Minutes*</td>
</tr>
<tr>
<td>Steamb*</td>
<td>Gravity</td>
<td>273°F (134°C)</td>
<td>20 Minutes*</td>
</tr>
</tbody>
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*NOTE: Because of the many variables involved in sterilization, each medical facility should calibrate and verify the sterilization process (e.g., temperatures, times) used for their equipment. For outside the United States, some non-U.S. Health Care Authorities recommend sterilization according to these parameters so as to minimize the potential risk of transmission of Creutzfeldt-Jakob disease, especially for neurosurgical instruments that could come into contact with the central nervous system.

PRODUCT COMPLAINTS:
Any Health Care Professional (e.g., customer or user of this system of products), who has any complaints or who has experienced any dissatisfaction in the product quality, identity, durability, reliability, safety, effectiveness and/or performance, should notify the distributor, Medtronic. Further, if any of the implanted spinal system component(s) ever “malfunctions,” (i.e., does not meet any of its performance specifications or otherwise), the distributor should be notified. If any Medtronic product ever “malfunctions” and may have caused or contributed to the death or serious injury of a patient, the distributor should be notified immediately by telephone, FAX or written correspondence. When filing a complaint, please provide the component(s) name and number, lot number(s), date(s) received, date(s) implanted or who has experienced any dissatisfaction in the product quality, identity, durability, reliability, safety, effectiveness and/or performance, should notify the distributor, Medtronic. Further, if any of the implanted spinal system component(s) ever “malfunctions,” (i.e., does not meet any of its performance specifications or otherwise), the distributor should be notified. If any Medtronic product ever “malfunctions” and may have caused or contributed to the death or serious injury of a patient, the distributor should be notified immediately by telephone, FAX or written correspondence. When filing a complaint, please provide the component(s) name and number, lot number(s), date(s) received, date(s) implanted, your name and address, the nature of the complaint and notification of whether a written report from the distributor is requested.

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Contact Customer Service or your Sales Representative for the most up-to-date version of the package insert.
The surgical technique shown is for illustrative purposes only. The technique(s) actually employed in each case will always depend upon the medical judgment of the surgeon exercised before and during surgery as to the best mode of treatment for each patient. Please see the package insert for the complete list of indications, warnings, precautions, and other medical information.