Edwards SAPIEN 3 and SAPIEN 3 Ultra Transcatheter Heart Valve System

Edwards SAPIEN 3 and Edwards SAPIEN 3 Ultra Transcatheter Heart Valve

Edwards COMMANDER Delivery System

Instructions for Use

Implantation of the transcatheter heart valve should be performed only by physicians who have received Edwards Lifesciences training. The implanting physician should be experienced in standard catheterization techniques.

STERILE: The valve is supplied sterilized with glutaraldehyde solution. The delivery system, Edwards sheath, and crimper are supplied sterilized with ethylene oxide gas.

1.0 Device Description

Edwards SAPIEN 3 and SAPIEN 3 Ultra Transcatheter Heart Valve (THV) System

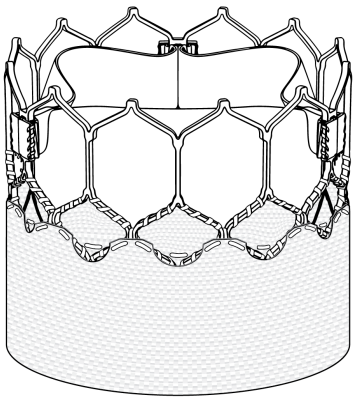
The Edwards SAPIEN 3 Ultra transcatheter heart valve (THV) system consists of the Edwards SAPIEN 3 and SAPIEN 3 Ultra transcatheter heart valves and delivery systems.

- **Edwards SAPIEN 3 Ultra Transcatheter Heart Valve – Model 9750TFX (Figure 1)**

The Edwards SAPIEN 3 Ultra transcatheter heart valve is comprised of a balloon-expandable, radiopaque, cobalt-chromium frame, trileaflet bovine pericardial tissue valve, and polyethylene terephthalate (PET) inner and outer fabric skirts. The leaflets are treated according to the Carpentier-Edwards ThermaFix process.

- **Edwards SAPIEN 3 Transcatheter Heart Valve – Model 9600TFX (Figure 2)**

The Edwards SAPIEN 3 transcatheter heart valve is comprised of a balloon-expandable, radiopaque, cobalt-chromium frame, trileaflet bovine pericardial tissue valve, and polyethylene terephthalate (PET) fabric skirt. The leaflets are treated according to the Carpentier-Edwards ThermaFix process.

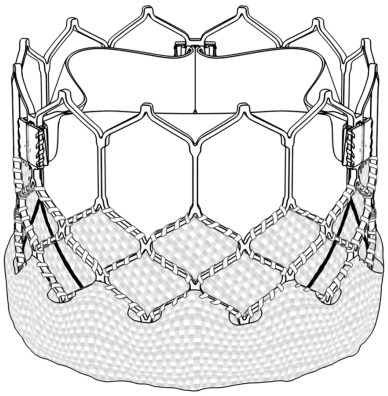


9750TFX

Table 1

Valve Size	Valve Height
20 mm	15.5 mm
23 mm	18 mm
26 mm	20 mm

Figure 1: Edwards SAPIEN 3 Ultra Transcatheter Heart Valve



9600TFX

Table 2

Valve Size	Valve Height
20 mm	15.5 mm
23 mm	18 mm
26 mm	20 mm
29 mm	22.5 mm

Figure 2: Edwards SAPIEN 3 Transcatheter Heart Valve

Sizing recommendations for implanting the Edwards SAPIEN 3 Ultra and Edwards SAPIEN 3 transcatheter heart valve in a native annulus are provided in the table below:

Table 3

Native Valve Annulus Size (TEE)	Native Valve Annulus Size (CT)		THV Size
	Area	Area Derived Diameter	
16 - 19 mm	273 - 345 mm^2	18.6 - 21 mm	20 mm
18 - 22 mm	338 - 430 mm^2	20.7 - 23.4 mm	23 mm
21 - 25 mm	430 - 546 mm^2	23.4 - 26.4 mm	26 mm
24 - 28 mm	540 - 683 mm^2	26.2 - 29.5 mm	29 mm
Valve size recommendations are based on native valve annulus size, as measured by transesophageal echocardiography (TEE) or computed tomography (CT). Patient anatomical factors and multiple imaging modalities should be considered during valve size selection. Note: Risks associated with undersizing and oversizing should be considered to minimize the risk of paravalvular leak, migration, and/or annular rupture. **Due to limitations in two-dimensional images, 2-D TEE imaging should be supplemented with 3-D area measurements.*			

Sizing recommendations for implanting the THV in a failing bioprosthesis, except for the INSPIRIS RESILIA aortic valve sizes 19 – 25 mm, as provided in Table 4:

Table 4

Surgical Valve True Inner Diameter (ID)[1]	THV-in-THV (Native Valve Annulus Size)	THV Size
16.5 – 19.0 mm	18.6 – 21.0 mm	20 mm
18.5 – 22.0 mm	20.7 – 23.4 mm	23 mm
22.0 – 25.0 mm	23.4 – 26.4 mm	26 mm
25.0 – 28.5 mm	26.2 – 29.5 mm	29 mm

Note: Surgical valve 'True ID' may be smaller than the labeled valve size. For THV-in-THV, the native valve annulus size should be considered to determine the appropriate THV size to implant. For a failing stentless bioprosthesis, consider sizing recommendations for a native annulus. The dimensions of the failed bioprosthesis should be determined so that the appropriate THV size can be implanted; and is best determined by using computed tomography, magnetic resonance imaging, and/or transesophageal echocardiography.

Sizing recommendations for implanting the THV in a failing INSPIRIS RESILIA aortic surgical bioprosthesis in sizes 19 – 25 mm as provided in Table 5 below:

Table 5

INSPIRIS RESILIA Aortic Valve (model 11500A)* Labeled Size	THV Size
19 mm	20 mm or 23 mm
21 mm	23 mm or 26 mm
23 mm	26 mm
25 mm	29 mm

*INSPIRIS RESILIA aortic valve model 11500A sizes 19 – 25 mm incorporate VFit technology which consists of expandable bands and fluoroscopically visible size markers designed for potential future valve-in-valve procedures. Clinical data are not currently available on the INSPIRIS RESILIA aortic valve Model 11500A valve-in-valve procedure or expansion feature. The impact of tissue ingrowth on the expansion feature of the INSPIRIS RESILIA aortic valve has not been assessed.

WARNING: Do not perform stand-alone balloon aortic valvuloplasty procedures in the INSPIRIS RESILIA aortic valve for the sizes 19-25 mm. This may expand the valve causing aortic incompetence, coronary embolism or annular rupture.

Note: INSPIRIS RESILIA aortic valve model 11500A sizes 27 – 29 mm do not incorporate VFit technology and therefore follow the surgical valve True ID sizing provided in Table 4.

Note: Exact volume required to deploy the THV may vary depending on the bioprosthesis inner diameter. Factors such as calcification and pannus tissue growth may not be accurately visualized in imaging and may reduce the effective inner diameter of the failing bioprosthesis to a size smaller than the 'True ID'.

These factors should be considered and assessed in order to determine the most appropriate THV size to achieve nominal THV deployment and sufficient anchoring. Do not exceed the rated burst pressure. See inflation parameters in Table 6.

- **Edwards COMMANDER Delivery System (Figure 3)**

The Edwards COMMANDER delivery system facilitates the placement of the bioprosthesis. It consists of a flex catheter to aid in valve alignment to the balloon, tracking, and positioning of the valve. The delivery system includes a tapered tip to facilitate crossing of the valve. The handle contains a flex wheel to control flexing of the flex catheter, and a balloon lock and fine adjustment wheel to facilitate valve alignment and positioning of the valve within the target location. A stylet is included within the guidewire lumen of the delivery system. The balloon catheter has radiopaque valve alignment markers defining the working length of the balloon. A radiopaque center marker in the balloon is provided to help with valve positioning. A radiopaque triple marker proximal to the balloon indicates the flex catheter position during deployment. The inflation parameters for valve deployment are:

Table 6

Model	Nominal Balloon Diameter	Nominal Inflation Volume	Rated Burst Pressure (RBP)
9610TF20	20 mm	11 ml	7 atm
9610TF23	23 mm	17 ml	7 atm
9610TF26	26 mm	23 ml	7 atm

Model	Nominal Balloon Diameter	Nominal Inflation Volume	Rated Burst Pressure (RBP)
9610TF29	29 mm	33 ml	7 atm

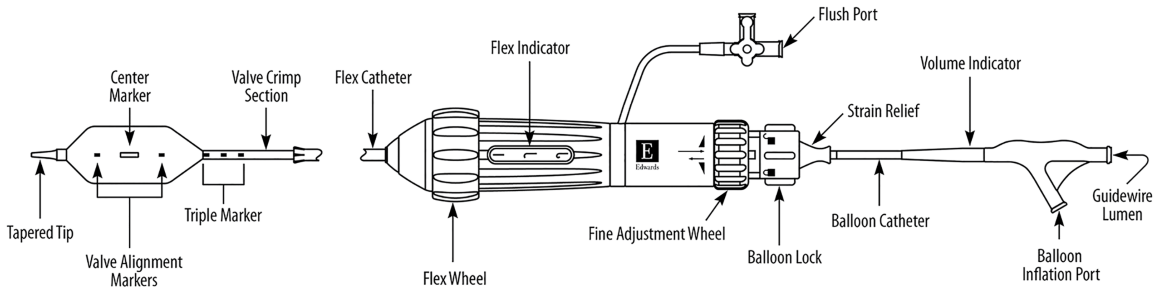


Figure 3: Edwards COMMANDER Delivery System

Additional Accessories

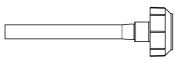


Figure 4: Loader

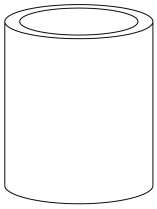


Figure 5: Qualcrimp Crimping Accessory

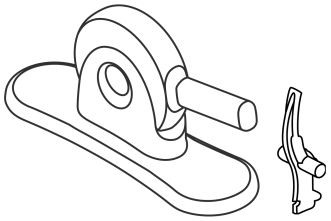


Figure 6: Edwards Crimper and 2-piece Crimp Stopper

- **Loader (Figure 4)**

The loader allows for the delivery of the crimped valve through the hemostasis valves of the sheath.

- **Qualcrimp Crimping Accessory (Figure 5)**

The Qualcrimp crimping accessory is used during crimping of the bioprosthesis.

- **Edwards Crimper (Figure 6)**

The Edwards crimper reduces the diameter of the valve to mount it onto the delivery system. The crimper is comprised of a housing and a compression mechanism that is closed with a handle located on the housing. A 2-piece crimp stopper is used to crimp the valve to its intended diameter.

- **Edwards Sheath**

Refer to the Edwards sheath instructions for use for device description.

- **Inflation Device**

An inflation device with locking mechanism is used during valve deployment.

Note: For proper volume sizing, the delivery system must be used with the inflation device provided by Edwards Lifesciences.

The following table identifies the access vessel diameters that should be used for delivery system access. Access vessels should be without severe obstructive calcification or severe tortuosity.

Table 7

Vessel Diameter	Delivery System
≥ 5.5 mm	20 mm
≥ 5.5 mm	23 mm
≥ 5.5 mm	26 mm
≥ 6.0 mm	29 mm

2.0 Intended Use

The devices are intended for use in patients requiring heart valve replacement.

3.0 Indications

1. The Edwards SAPIEN 3 and SAPIEN 3 Ultra transcatheter heart valve system is indicated for relief of aortic stenosis in patients with symptomatic heart disease due to severe native calcific aortic stenosis who are judged by a Heart Team, including a cardiac surgeon, to be appropriate for the transcatheter heart valve replacement therapy.
2. The Edwards SAPIEN 3 and SAPIEN 3 Ultra transcatheter heart valve system is indicated for patients with symptomatic heart disease due to failing (stenosed, insufficient, or combined) of a surgical or transcatheter bioprosthetic aortic valve or surgical bioprosthetic mitral valve who are judged by a heart team, including a cardiac surgeon, to be at high or greater risk for open surgical therapy (i.e., predicted risk of surgical mortality ≥ 8% at 30 days, based on the Society of Thoracic Surgeons (STS) risk score and other clinical co-morbidities unmeasured by the STS risk calculator).

4.0 Contraindications

The valve and delivery systems are contraindicated in patients with:

- Evidence of intracardiac mass, thrombus, vegetation, active infection or endocarditis.
- Inability to tolerate anticoagulation/antiplatelet therapy.

5.0 Warnings

- Observation of the pacing lead throughout the procedure is essential to avoid the potential risk of pacing lead perforation.
- There may be an increased risk of stroke in transcatheter aortic valve replacement procedures, as compared to balloon aortic valvuloplasty or other standard treatments in high or greater risk patients.
- The devices are designed, intended, and distributed for single use only. **Do not resterilize or reuse the devices.** There are no data to support the sterility, nonpyrogenicity, and functionality of the devices after reprocessing.
- Incorrect sizing of the valve may lead to paravalvular leak, migration, embolization, residual gradient (patient-prosthesis mismatch) and/or annular rupture.
- The physician must verify correct orientation of the THV prior to its implantation to prevent the risk of severe patient harm.
- Accelerated deterioration of the valve may occur in patients with an altered calcium metabolism.
- Prior to delivery, the valve must remain hydrated at all times and cannot be exposed to solutions other than its shipping storage solution and sterile physiologic rinsing solution. Valve leaflets mishandled or damaged during any part of the procedure will require replacement of the valve.
- Caution should be exercised in implanting a valve in patients with clinically significant coronary artery disease.
- Patients with pre-existing bioprostheses should be carefully assessed prior to implantation of the valve to ensure proper valve positioning and deployment.
- Do not use the valve if the tamper evident seal is broken, the storage solution does not completely cover the valve, the temperature indicator has been activated, the valve is damaged, or the expiration date has elapsed.
- Do not mishandle the delivery system or use it if the packaging or any components are not sterile, have been opened or are damaged (e.g. kinked or stretched), cannot be flushed, or the expiration date has elapsed.
- Use of excessive contrast media may lead to renal failure. Measure the patient's creatinine level prior to the procedure. Contrast media usage should be monitored.
- Patient injury could occur if the delivery system is not un-flexed prior to removal.
- Care should be exercised in patients with hypersensitivities to cobalt, nickel, chromium, molybdenum, titanium, manganese, silicon, and/or polymeric materials.
- The procedure should be conducted under fluoroscopic guidance. Some fluoroscopically guided procedures are associated with a risk of radiation injury to the skin. These injuries may be painful, disfiguring, and long-lasting.
- Valve recipients should be maintained on anticoagulant/antiplatelet therapy, except when contraindicated, to minimize the risk of valve thrombosis or thromboembolic events, as determined by their physician. This device has not been tested for use without anticoagulation.
- Do not add or apply antibiotics to the storage solution, rinse solutions, or to the valve.
- Balloon valvuloplasty should be avoided in the treatment of failing bioprostheses as this may result in embolization of bioprosthesis material and mechanical disruption of the valve leaflets.
- In accordance with MDR Section Annex I, 10.4.5, the THV and Edwards COMMANDER delivery system do not contain carcinogenic, mutagenic, or toxic to reproduction, or endocrine-disrupting substances.
- Access characteristics such as severe obstructive or circumferential calcification, severe tortuosity, vessel diameters less than 5.5 mm (for size 20, 23 and 26 mm SAPIEN 3/SAPIEN 3 Ultra transcatheter heart valve) or 6.00 mm (for 29 mm SAPIEN 3 transcatheter heart valve) may preclude safe placement of the sheath and should be carefully assessed prior to the procedure.

6.0 Precautions

- Long-term durability has not been established for the valve. Regular medical follow-up is advised to evaluate valve performance.
- Glutaraldehyde may cause irritation of the skin, eyes, nose and throat. Avoid prolonged or repeated exposure to, or breathing of, the solution. Use only with adequate ventilation. If skin contact occurs, immediately flush the affected area with water; in the event of contact with eyes, seek immediate medical attention. For more information about glutaraldehyde exposure, refer to the Material Safety Data Sheet available from Edwards Lifesciences.
- To maintain proper valve leaflet coaptation, do not overinflate the deployment balloon.
- Appropriate antibiotic prophylaxis is recommended post-procedure in patients at risk for prosthetic valve infection and endocarditis.
- Safety and effectiveness have not been established for patients with the following characteristics/comorbidities:
  - Non-calcified aortic annulus
  - Severe ventricular dysfunction with ejection fraction < 20%
  - Congenital unicuspid aortic valve
  - Pre-existing prosthetic heart valve or prosthetic ring in any position
  - Severe mitral annular calcification (MAC), severe (> 3+) mitral insufficiency, or Gorlin syndrome
  - Blood dyscrasias defined as: leukopenia (WBC < 3000 cells/ml), acute anemia (Hb < 9 g/dL), thrombocytopenia (platelet count < 50,000 cells/ml), or history of bleeding diathesis or coagulopathy
  - Hypertrophic cardiomyopathy with or without obstruction (HOCM)
  - Echocardiographic evidence of intracardiac mass, thrombus, or vegetation
  - A known hypersensitivity or contraindication to aspirin, heparin, ticlopidine (Ticlid™), or clopidogrel (Plavix™), or sensitivity to contrast media, which cannot be adequately premedicated
  - Significant aortic disease, including abdominal aortic or thoracic aneurysm defined as maximal luminal diameter 5 cm or greater; marked tortuosity (hyperacute bend), aortic arch atheroma (especially if thick [> 5 mm], protruding, or ulcerated) or narrowing (especially with calcification and surface irregularities) of the abdominal or thoracic aorta, severe "unfolding" and tortuosity of the thoracic aorta
  - Access characteristics that would preclude safe placement of the Edwards sheath, such as severe obstructive calcification or severe tortuosity
  - Bulky calcified aortic valve leaflets in close proximity to coronary ostia
  - A concomitant paravalvular leak where the failing bioprosthesis is not securely fixed in the native annulus or is not structurally intact (e.g. wireform frame fracture)
  - A partially detached leaflet of the failing bioprosthesis that in the aortic position may obstruct a coronary ostium
  - Additional precautions for transseptal replacement of a failed mitral valve bioprosthesis include: presence of devices or thrombus or other abnormalities in the caval vein precluding safe transvenous femoral access for transseptal approach; presence of Atrial Septal Occluder Device or calcium preventing safe transseptal access.

- Special care must be exercised in mitral valve replacement if chordal preservation techniques were used in the primary implantation to avoid entrapment of the subvalvular apparatus. If a significant increase in resistance occurs when advancing the catheter through the vasculature, stop advancement and investigate the cause of resistance before proceeding. Do not force passage, as this could increase the risk of vascular complications.
- Based on the treating physician's consideration of risks and benefits, the SAPIEN 3 valve may be implanted in relatively young patients, although the longer-term durability is still the subject of ongoing clinical research.
- Patients with pre-existing mitral valve devices should be carefully evaluated before implantation of the THV to ensure proper THV positioning and deployment.
- Residual mean gradient may be higher in a "THV-in-failing bioprothesis" configuration than that observed following implantation of the valve inside a native aortic annulus using the same size device. Patients with elevated mean gradient post procedure should be carefully followed. It is important that the manufacturer, model and size of the preexisting bioprosthetic valve be determined, so that the appropriate valve can be implanted and a prosthesis-patient mismatch be avoided. Additionally, pre-procedure imaging modalities must be employed to make as accurate a determination of the inner diameter as possible.

7.0 Potential Adverse Events

Potential risks associated with the overall procedure including potential access complications associated with standard cardiac catheterization, balloon valvuloplasty, the potential risks of conscious sedation and/or general anesthesia, and the use of angiography:

- Death
- Stroke/transient ischemic attack, silent cerebral ischemia, clusters or neurological deficit
- Paralysis
- Permanent disability
- Aneurysm
- Respiratory insufficiency or respiratory failure
- Hemorrhage requiring transfusion or intervention
- Cardiovascular injury including perforation or dissection of vessels, ventricle, atrium, septum, myocardium, aortic annulus, coronary ostia, or valvular structures that may require intervention
- Pericardial effusion or cardiac tamponade
- Embolization including air, calcific valve material or thrombus
- Infection including abscess, septicemia, and endocarditis
- Heart failure or low cardiac output
- Myocardial ischemia or infarction
- Renal insufficiency or renal failure
- Conduction system defect which may require a permanent pacemaker
- Arrhythmia
- Retroperitoneal bleed
- Arteriovenous (AV) fistula or pseudoaneurysm
- Reoperation
- Ischemia or nerve injury
- Restenosis
- Pulmonary edema
- Pleural effusion
- Bleeding
- Vessel spasm
- Vessel thrombosis/occlusion
- Vessel trauma requiring surgical repair or intervention
- Anemia
- Abnormal lab values (including electrolyte imbalance)
- Hypertension or hypotension
- Allergic reaction to antithrombotic therapy, anesthesia, contrast media, or device materials
- Hematoma
- Syncope
- Compartment syndrome
- Pain or changes at the access site
- Exercise intolerance or weakness
- Inflammation
- Angina
- Heart murmur
- Fever

Additional potential risks associated with the use of the valve, delivery system, and/or accessories include:

- Cardiac arrest
- Cardiogenic shock
- Emergency cardiac surgery
- Cardiac failure or low cardiac output
- Coronary flow obstruction/transvalvular flow disturbance
- Device thrombosis requiring intervention
- Valve thrombosis
- Device embolization
- Device migration or malposition requiring intervention
- Left ventricular outflow tract obstruction
- Valve deployment in unintended location

- Valve stenosis
- Injury to mitral valve
- Structural valve deterioration (wear, fracture, calcification, leaflet tear/tearing from the stent posts, leaflet retraction, suture line disruption of components of a prosthetic valve, thickening, stenosis)
- Device degeneration
- Paravalvular or transvalvular leak
- Valve regurgitation
- Hemolysis
- Vasovagal response
- Device explants
- Dissection, rupture, trauma of the aortic annulus and surrounding structures including ascending aorta, coronary ostia and ventricular septum
- Nonstructural dysfunction
- Mechanical failure of delivery system, and/or accessories
- Non-emergent reoperation

8.0 Directions for Use

8.1 System Compatibility

Table 8

Product Name	20 mm System	23 mm System	26 mm System	29 mm System
	Model			
Edwards SAPIEN 3 Transcatheter Heart Valve	9600TFX20	9600TFX23	9600TFX26	9600TFX29
Edwards SAPIEN 3 Ultra Transcatheter Heart Valve	9750TFX20	9750TFX23	9750TFX26	
Edwards COMMANDER Delivery System	9610TF20	9610TF23	9610TF26	9610TF29*
Sheath provided by Edwards Lifesciences				
Inflation device, Qualcrimp crimping accessory, loader and crimp stopper provided by Edwards Lifesciences				
Edwards Crimper	9600CR			
*If using the Edwards sheath introducer set, use 16F or equivalent				

Additional Equipment:

- Balloon catheter, per the discretion of the physician
- 20 cc syringe or larger
- 50 cc syringe or larger
- High-pressure 3-way stopcock (x2)
- Standard cardiac catheterization lab equipment
- Fluoroscopy (fixed, mobile or semi-mobile fluoroscopy systems appropriate for use in percutaneous coronary interventions)
- Transesophageal or transthoracic echocardiography capabilities
- Exchange length 0.035 in (0.89 mm) extra-stiff guidewire
- Temporary pacemaker (PM) and pacing lead
- Instrumentation for transseptal access and septostomy, as applicable
- Sterile rinsing basins, physiological saline, heparinized saline, 15% diluted radiopaque contrast medium
- Sterile table for valve and device preparation

8.2 Valve Handling and Preparation

Follow sterile technique during device preparation and implantation.

8.2.1 Valve Rinsing Procedure

Before opening the valve jar, carefully examine for evidence of damage (e.g. a cracked jar or lid, leakage, or broken or missing seals).

CAUTION: Valves from containers found to be damaged, leaking, without adequate sterilant, or missing intact seals must not be used for implantation.

1. Set up two (2) sterile bowls with at least 500 ml of sterile physiological saline to thoroughly rinse the glutaraldehyde sterilant from the valve.
2. Carefully remove the valve/holder assembly from the jar without touching the tissue. Verify the valve serial identification number with the number on the jar lid and record in the patient information documents. Inspect the valve for any signs of damage to the frame or tissue.
3. Rinse the valve as follows: Place the valve in the first bowl of sterile, physiological saline. Be sure the saline solution completely covers the valve and holder. With the valve and holder submerged, slowly agitate (to gently swirl the valve and holder) back and forth for a minimum of 1 minute. Transfer the valve and holder to the second rinsing bowl of sterile physiological saline and gently agitate for at least one more minute. Ensure the rinse solution in the first bowl is not used. The valve should be left in the final rinse solution until needed to prevent the tissue from drying.

   CAUTION: Do not allow the valve to come into contact with the bottom or sides of the rinse bowl during agitation or swirling in the rinse solution. Direct contact between the identification tag and valve is also to be avoided during the rinse procedure. No other objects should be placed in the rinse bowls. The valve should be kept hydrated to prevent the tissue from drying.

8.2.2 Prepare the Components

Refer to the provided Edwards sheath instructions for use for device preparation.

1. Visually inspect all the components for damage. Ensure the delivery system is fully unflexed and the balloon catheter is fully advanced in the flex catheter.

   WARNING: To prevent possible damage to the balloon shaft, ensure that the proximal end of the balloon shaft is not subjected to bending.
2. Flush the delivery system with heparinized saline through the flush port.

3. Remove the distal balloon cover from the delivery system. Remove the stylet from the distal end of the guidewire lumen and set aside.
4. Flush the guidewire lumen with heparinized saline. Insert the stylet back into the guidewire lumen.

   Note: Failure to replace the stylet in the guidewire lumen may result in damage to the lumen during the THV crimping process.
5. Place the delivery system into the default position (end of strain relief is aligned between the two white markers on the balloon shaft) and make sure that the flex catheter tip is covered by the proximal balloon cover.
6. Unscrew the loader cap from the loader and flush the loader cap with heparinized saline.
7. Place the loader cap onto the delivery system with the inside of the cap oriented towards the distal tip.
   Fully advance the balloon catheter in the flex catheter.

   Peel off the proximal balloon cover over the blue section of the balloon shaft.
8. Attach a 3-way stopcock to the balloon inflation port. Fill a 50 cc or larger syringe with 15-20 ml of diluted contrast medium and attach to the 3-way stopcock.
9. Fill the inflation device provided by Edwards Lifesciences with excess volume of diluted contrast medium relative to the indicated inflation volume. Lock and attach to the 3-way stopcock. Close stopcock to the inflation device.
10. Pull vacuum with the syringe to remove air. Slowly release the plunger to ensure that the contrast medium enters the lumen of the delivery system. Repeat until all air bubbles are removed from the system. Leave zero-pressure in the system.

    WARNING: Ensure there is no residual fluid left in the balloon to avoid potential difficulty with valve alignment during the procedure.

    Close stopcock to the delivery system.
11. Rotate the knob of the inflation device to remove the contrast medium into the syringe and achieve the appropriate volume required to deploy the THV. Close the stopcock to the 50 cc or larger syringe and remove syringe.
12. Verify that the inflation volume in the inflation device is correct and lock the inflation device provided by Edwards Lifesciences..

    CAUTION: Maintain the inflation device in the locked position until THV deployment to minimize the risk of premature balloon inflation and subsequent improper THV deployment.

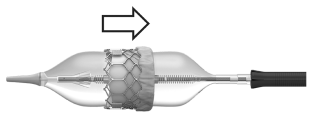
8.2.3 Mount and Crimp the THV on the Delivery System

1. Set up two (2) additional sterile bowls with at least 100 ml of sterile physiological saline to thoroughly rinse the Qualcrimp crimping accessory.
2. Completely submerge the Qualcrimp crimping accessory in a bowl of 100 ml physiological saline. Gently compress until fully saturated. Swirl for a minimum of 1 minute. Repeat this process in a second bowl.
3. Remove crimper from packaging.
4. Rotate the crimper handle until the aperture is fully open.
5. Attach the 2-piece crimp stopper to the base of the crimper and click into place.
6. Remove the valve from the holder and remove the ID tag.
7. If necessary, partially crimp the THV in the crimper until it snugly fits inside the Qualcrimp crimping accessory.

   Note: Partial crimping is not necessary for the 20 mm valve.
8. Place the Qualcrimp crimping accessory over the THV aligning the edge of the Qualcrimp crimping accessory with the outflow of the THV.
9. Place the THV and Qualcrimp crimping accessory in crimper aperture. Insert the delivery system coaxially within the THV 2-3 mm distal to the blue balloon shaft (in the Valve Crimp Section) of the delivery system with the orientation of the valve on the delivery system as described below:

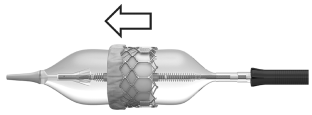
   Antegrade approach:

   Inflow (outer skirt end) of the valve towards the **proximal end** of the delivery system.



   Retrograde approach:

   Inflow (outer skirt end) of the valve towards the **distal end** of the delivery system.



10. Center the balloon shaft coaxially within the THV. Crimp the THV until it reaches the Qualcrimp stop.
11. Remove the Qualcrimp crimping accessory from the THV and Qualcrimp stop from the crimp stopper, leaving the final stop in place.
12. Center the THV within the crimper aperture. Fully crimp the THV until it reaches the final stop and hold for 5 seconds. Repeat this crimp step two (2) more times for a total of 3 crimps.

    Note: Ensure that the Valve Crimp Section is coaxial within the THV.
13. Pull the balloon shaft and engage the balloon lock so the delivery system is in default position.
14. Flush the loader with heparinized saline. Immediately advance the THV into the loader until the tapered tip of the delivery system is exposed.

    CAUTION: The THV should not remain fully crimped and/or in the loader for over 15 minutes, as leaflet damage may result and impact valve functionality.
15. Attach the loader cap to the loader, re-flush the flex catheter and close the stopcock to the delivery system. Remove the stylet and flush the guidewire lumen of the delivery system.

    CAUTION: Keep THV hydrated until ready for implantation to prevent damage to the leaflets which may impact valve functionality.

    WARNING: The physician must verify correct orientation of the THV prior to its implantation to prevent the risk of severe patient harm.

8.3 Native Valve Predilation and THV Delivery

Native valve predilation and THV delivery should be performed under local and/or general anesthesia with hemodynamic monitoring in a catheterization lab/hybrid operating room with fluoroscopic and echocardiographic imaging capabilities.

Administer heparin to maintain the ACT at ≥ 250 sec.

CAUTION: Contrast media usage should be monitored to reduce the risk of renal injury.

Balloon valvuloplasty should be avoided in the treatment of failing bioprostheses as this may result in embolization of bioprosthesis material and mechanical disruption of the valve leaflets.

CAUTION: Procedure may require an arterial cut-down with surgical closure of the puncture site due to the size of the arteriotomy.

8.3.1 Baseline Parameters

1. Perform an angiogram with the projection of the valve perpendicular to the view.
2. For aortic implantation, evaluate the distance of the left and right coronary ostia from the aortic annulus in relation to the THV frame height.
3. Introduce a pacemaker (PM) lead and position appropriately.
4. Set the stimulation parameters to obtain 1:1 capture, and test pacing.

8.3.2 Native Valve Predilation

Pre-dilate the native aortic valve, per the discretion of the physician, according to the instructions for use for the selected balloon aortic valvuloplasty catheter.

CAUTION: Valve implantation should not be carried out if balloon cannot be fully inflated during valvuloplasty.

Refer to Edwards balloon catheter Instructions for Use (IFU) for information on device preparation and handling.

Note: Rapid ventricular pacing should be performed when using the Edwards balloon catheter for valvuloplasty prior to aortic transcatheter valve implantation.

After placement of the balloon at the intended site, begin rapid ventricular pacing. Once the systolic blood pressure has decreased to 50 mmHg or below, balloon inflation can commence.

8.3.3 THV Delivery

1. Prepare the Edwards sheath per its Instructions for Use.
2. If necessary, predilate the vessel.
3. Introduce the sheath per its instructions for use.
4. Insert the loader assembly into the sheath until the loader stops.
5. Advance the delivery system until the THV exits the sheath.

   CAUTION: For iliofemoral access, the THV should not be advanced through the sheath if the sheath tip is not past the bifurcation to minimize the risk of vessel damage.

   CAUTION: The THV should not remain in the sheath for over 5 minutes as leaflet damage may result and impact valve functionality.
6. In a straight section of the vasculature, initiate valve alignment by disengaging the balloon lock and pulling the balloon catheter straight back until part of the Warning Marker is visible. Do not pull past the Warning Marker.

   WARNING: To prevent possible damage to the balloon shaft, ensure that the proximal end of the balloon shaft is not subjected to bending.

   WARNING: If valve alignment is not performed in a straight section, there may be difficulties performing this step which may lead to delivery system damage and inability to inflate the balloon. Utilizing alternate fluoroscopic views may help with assessing curvature of the anatomy. If excessive tension is experienced during valve alignment, repositioning the delivery system to a different straight section of the aorta and relieving compression (or tension) in the system will be necessary.

   Engage the balloon lock.

   Utilize the fine adjustment wheel to position the THV between the valve alignment markers.

   CAUTION: Do not turn the fine adjustment wheel if the balloon lock is not engaged.

   WARNING: Do not position the THV past the distal valve alignment marker to minimize the risk of improper THV deployment or THV embolization.

   CAUTION: Maintain guidewire position during valve alignment to prevent loss of guidewire position.
7. Utilize the flex wheel to access and cross the valve.

   Note: Verify the orientation of the Edwards logo to ensure proper articulation.

   Note: The delivery system articulates in a direction opposite from the flush port.
8. Disengage the balloon lock and retract the tip of the flex catheter to the center of the triple marker. Engage the balloon lock.
9. Position the THV with respect to the valve.
10. As necessary, utilize the flex wheel to adjust the co-axiality of the THV and the fine adjustment wheel to adjust the position of the THV.
11. Before deployment, ensure that the THV is correctly positioned between the valve alignment markers and the flex catheter tip is over the triple marker.
12. Begin THV deployment:
    - Unlock the inflation device.
    - Ensure hemodynamic stability is established and begin rapid pacing; once arterial blood pressure has decreased to 50 mmHg or below, balloon inflation can commence.
    - Using slow controlled inflation, deploy the THV with the entire volume in the inflation device, hold for 3 seconds and confirm that the barrel of the inflation device is empty to ensure complete inflation of the balloon.
    - Deflate the balloon. When the balloon catheter has been completely deflated turn off the pacemaker.

8.3.4 System Removal

1. Unflex the delivery system while retracting the device. Verify that the flex catheter tip is locked over the triple marker. Retract the loader to the proximal end of the delivery system. Remove the delivery system from the sheath.

   CAUTION: Completely unflex the delivery system prior to removal to minimize the risk of vascular injury.

2. Refer to the Edwards sheath instructions for use for device removal.

8.4 Verification of Prosthetic Valve Position and Measurements

Measure and record hemodynamic parameters.

1. Perform an angiogram to evaluate device performance and coronary patency, where applicable.
2. Measure and record the transvalvular pressure gradients.
3. Remove all devices when the ACT level is appropriate (e.g., reaches < 150 sec).
   Refer to the Edwards sheath instructions for use for device removal.
4. Close the access site.

9.0 How Supplied

STERILE: The valve is supplied sterilized with glutaraldehyde solution. The delivery system and accessories are supplied sterilized with ethylene oxide gas.

9.1 Storage

The valve must be stored at 10 °C to 25 °C (50 °F to 77 °F). Each jar is shipped in an enclosure containing a temperature indicator to detect exposure of the valve to extreme temperature.

The delivery system and accessories should be stored in a cool, dry place.

10.0 MR Safety

MR Conditional

Non-clinical testing has demonstrated that the Edwards SAPIEN 3 transcatheter heart valve and the Edwards SAPIEN 3 Ultra transcatheter heart valves are MR Conditional. A patient with this device can be scanned safely, immediately after placement of this device under the following conditions:

- Static magnetic field of 1.5T or 3.0T
- Maximum spatial gradient field of 2500 gauss/cm (25 T/m) or less
- Maximum MR system reported, whole body averaged specific absorption rate (SAR) of 2 W/kg (Normal Operating Mode)

Under the scan conditions defined above, the transcatheter heart valve is expected to produce a maximum temperature rise of 3.0 °C after 15 minutes of continuous scanning.

In non-clinical testing, the image artifact caused by the device extends as far as 14.5 mm from the implant for spin echo images and 30 mm for gradient echo images when scanned in a 3.0 T MRI system. The artifact obscures the device lumen in gradient echo images.

The implant has not been evaluated in MR systems other than 1.5 or 3.0 T.

For valve-in-valve implantation or in the presence of other implants, please refer to the MRI safety information for the surgical valve or other devices prior to MR imaging.

11.0 Patient Information

A patient registration form is provided with each THV. After implantation, please complete all requested information and provide the implant card to the patient. The serial number may be found on the package and on the identification tag attached to the THV. Return the original form to the Edwards Lifesciences address indicated on the form and provide the temporary identification card to the patient prior to discharge.

12.0 Recovered Valve and Device Disposal

The explanted valve should be placed into a suitable histological fixative such as 10% formalin or 2% glutaraldehyde and returned to the company. Refrigeration is not necessary under these circumstances. Contact Edwards Lifesciences to request an Explant Kit.

Used delivery system may be disposed of in the same manner that hospital waste and biohazardous materials are handled. There are no special risks related to the disposal of these devices.

REFERENCES

1. Bapat V, Attia R, Thomas M. Effect of Valve Design on the Stent Internal Diameter of a Bioprosthetic Valve: A Concept of True Internal Diameter and Its Implications for the Valve-in-Valve Procedure. JACC: Cardiovascular Interventions. Vol. 7, No. 2 2014: 115-127.

Symbol Legend

	English
REF	Reorder Number
#	Model Number
cm	Usable length
	Do not re-use
LOT	Lot Number
	Caution
	Consult instructions for use
eifu.edwards.com + 1 888 570 4016	Consult instructions for use on the website
	Do not use if package is damaged and consult instructions for use
	Exterior diameter
	Inner diameter
	Store in a cool, dry place.
	Keep dry
	Keep away from sunlight
UDI	Unique Device Identifier
	Temperature limit
STERILE	Sterile

	English
STERILE EO	Sterilized using ethylene oxide
STERILE R	Sterilized using irradiation
STERILIZE	Do not resterilize
eSheath	eSheath compatibility
eSheath™	eSheath compatibility
	Single sterile barrier system
	Single sterile barrier system with protective packaging inside
QTY	Quantity
	Use-by-date
SN	Serial Number
	Manufacturer
	Date of manufacture
EC REP	Authorized representative in the European Community/European Union
GWC	Guidewire compatibility
NP	Nominal Pressure
RBP	Rated burst pressure
	Recommended guidewire length

	English
Sheath	Minimum sheath size
Catheter	Catheter shaft size
	Importer
	Balloon diameter
	Balloon working length
20 mm	For use with size 20 mm Edwards transcatheter heart valve
23 mm	For use with size 23 mm Edwards transcatheter heart valve
26 mm	For use with size 26 mm Edwards transcatheter heart valve
29 mm	For use with size 29 mm Edwards transcatheter heart valve
MR	MR Conditional
	Contents
	Non-pyrogenic
MD	Medical device
BIO	Contains biological material of animal origin
Rx only	Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.
	Time & Temperature Sensitive
	Contains hazardous substances
SZ	Size

Note: Not all symbols may be included in the labeling of this product.

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Web IFU

Edwards Lifesciences LLC
One Edwards Way
Irvine, CA 92614 USA