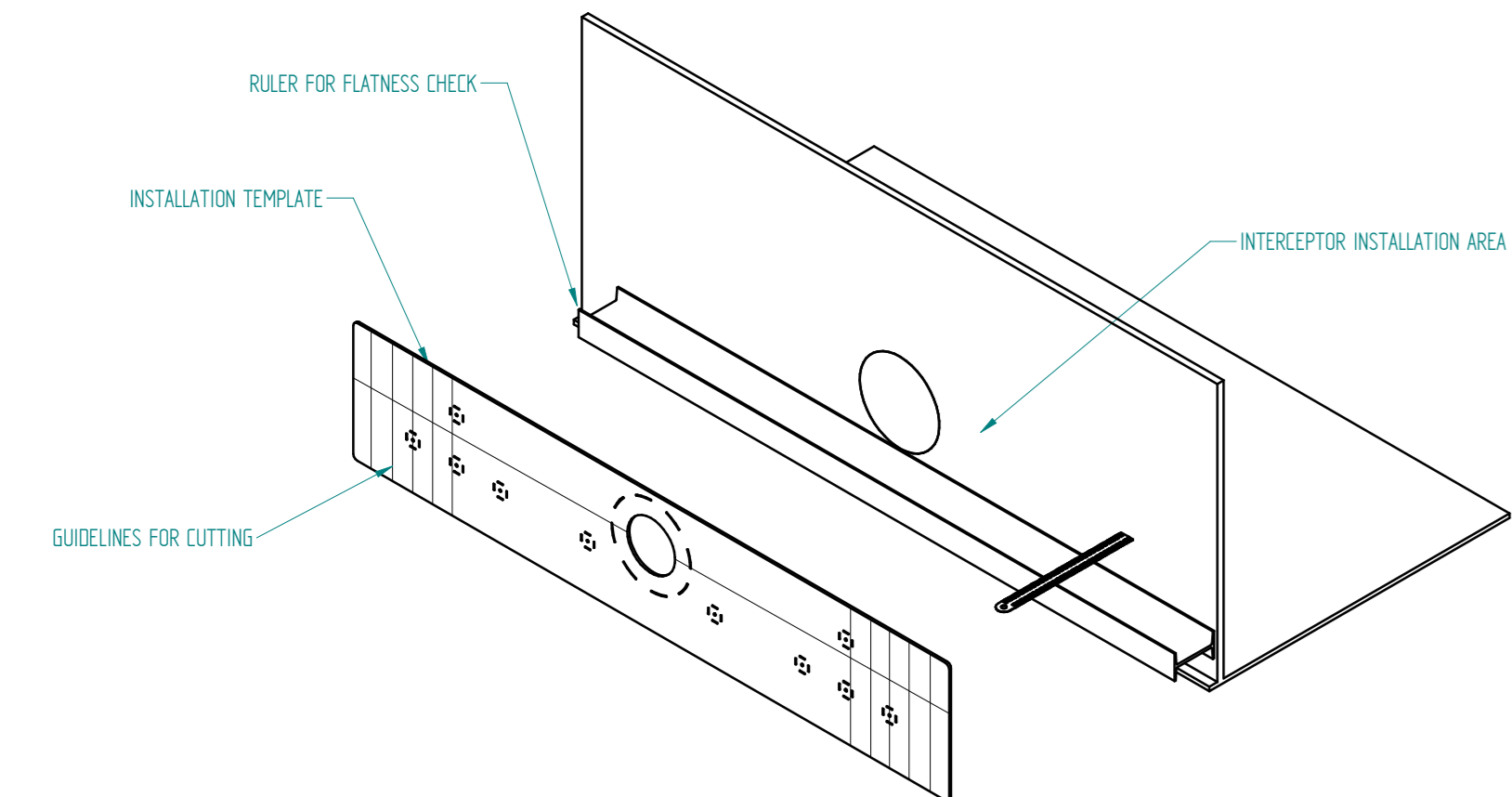


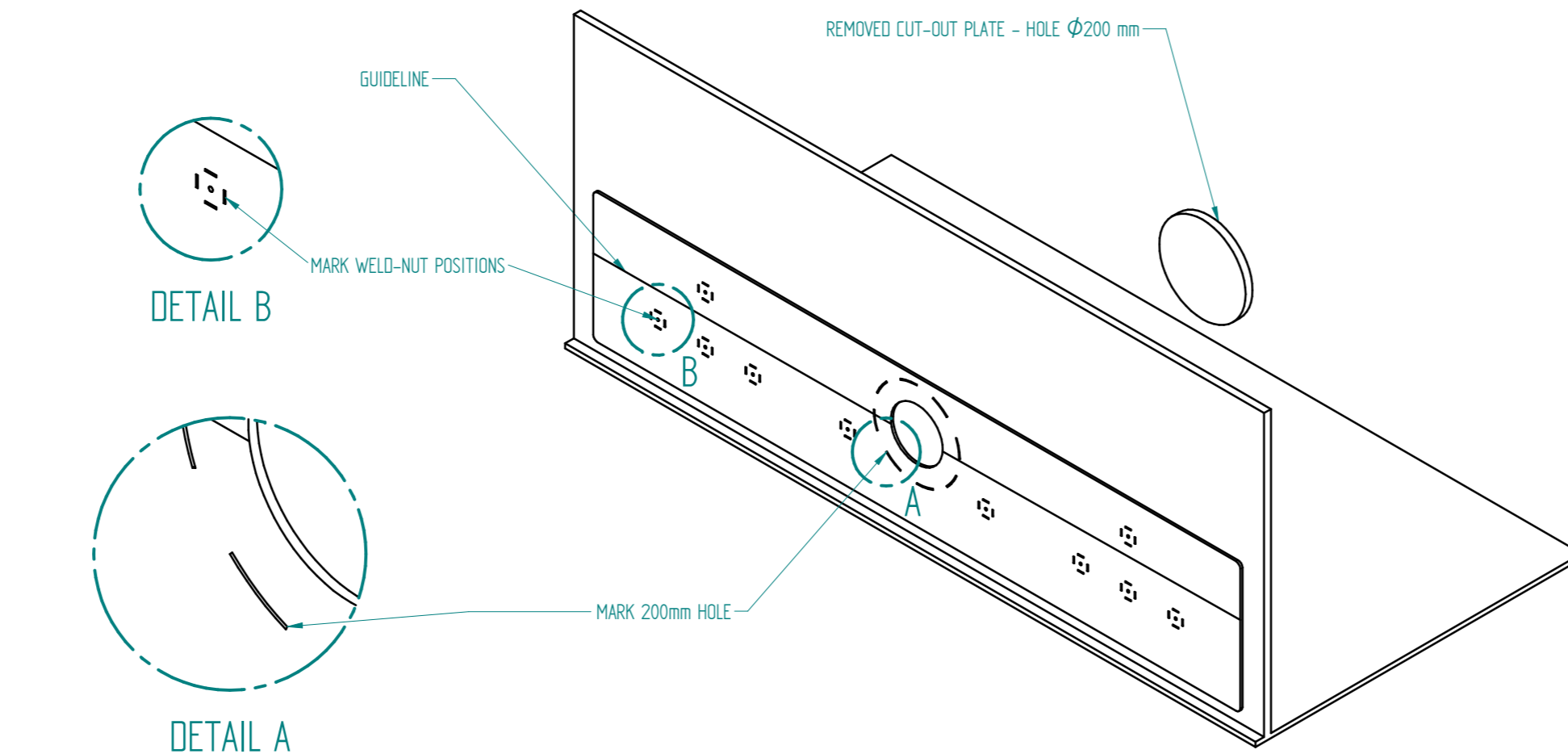
**STEP 1**

- TAKE MEASUREMENTS AND MARK CORRECT POSITION OF THE HLS INTERCEPTOR INSTALLATION AREA ON SHIP TRANSOM, ACCORDING TO YOUR TRANSOM INSTALLATION DRAWING SUPPLIED BY HUMPHREE.
- BY USE OF A RULER, VERIFY THE TRANSOM IN WAY OF INTERCEPTOR INSTALLATION AREA IS FLAT WITHIN A TOLERANCE OF +/-0.5 mm. IT IS IMPORTANT THAT THE WELD NUT SURFACES ARE WITHIN THE RECOMMENDED TOLERANCE, SEE STEP 5.
- VERIFY THAT THE HLS INSTALLATION TEMPLATE IS UNDAMAGED AND ITS CONTACT SURFACE TO TRANSOM IS FLAT.
- CUT THE HLS INSTALLATION TEMPLATE ALONG THE GUIDELINES ACCORDING TO YOUR INTERCEPTOR LENGTH
- LIFT THE HLS INSTALLATION TEMPLATE TO SHIP TRANSOM AT CORRECT POSITION.



**STEP 2**

- USING TAPE, SECURELY MOUNT THE HLS INSTALLATION TEMPLATE, ON SHIP TRANSOM AND VERIFY POSITION ACCORDING TO SHIP TRANSOM INSTALLATION DRAWING USING THE GUIDELINE.
- MARK THE Ø200 mm CENTRE HOLE POSITION AND THE WELD-NUT POSITIONS WITH THE TEMPLATE IN POSITION. MARK ALONG THE INNER EDGES AS SHOWN ON THE HLS TEMPLATE.
- DRAW A LINE ON EACH SIDE OF THE HLS INSTALLATION TEMPLATE FOR LATER USE. THESE LINES WILL BE USED WHEN TEMPLATE IS REINSTALLED AND TO AVOID INSTALLING INTERCEPTORS IN WAY OF EACH OTHER.
- REMOVE THE HLS INSTALLATION TEMPLATE FROM THE TRANSOM, TO AVOID DAMAGE OF THE TEMPLATE.
- FLAME CUT OR DRILL OUT THE Ø200 mm CENTRE HOLE IN THE TRANSOM.
- SERVO MUST BE ACCESSIBLE AND SERVICE SPACE PROVIDED ACCORDING TO DRAWING 022565.



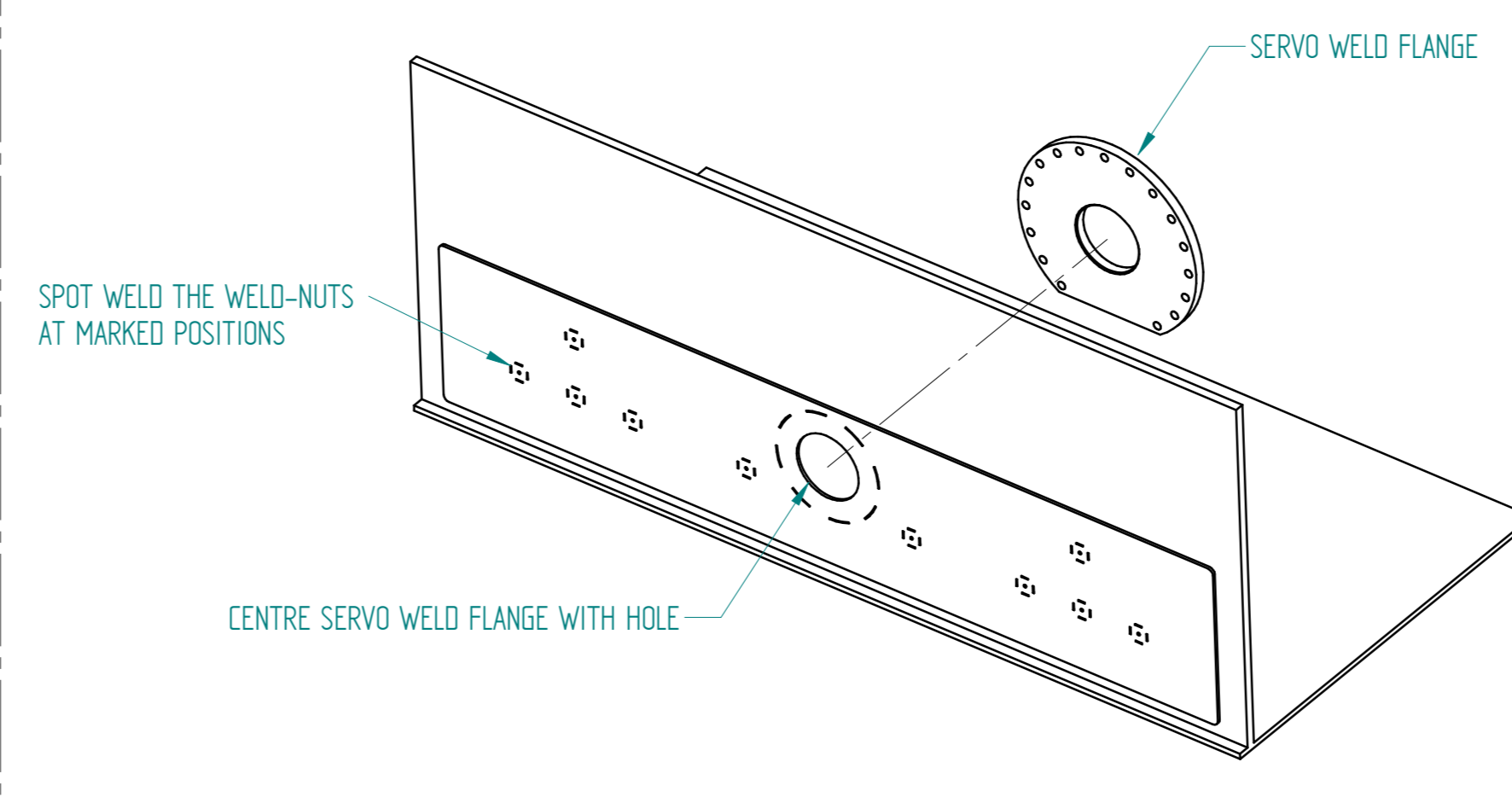
**STEP 3**

- FIXATE THE HLS INSTALLATION TEMPLATE AGAIN ON THE TRANSOM IN ITS PREVIOUS POSITION
- CENTRE THE SERVO WELD FLANGE WITH THE HOLE ON THE HLS INSTALLATION TEMPLATE.

**IMPORTANT**

CENTER OF TEMPLATE TO CENTER OF SERVO WELD FLANGE MUST BE WITHIN 0,5mm TO ENSURE CORRECT ALIGNMENT OF SERVO AND INTERCEPTOR.

- OBSERVE THE MARKING "INSIDE" ON THE WELD FLANGE FOR CORRECT ORIENTATION OF WELD FLANGE FACES.
- REMOVE THE TEMPLATE AND SPOT WELD THE WELD-NUTS TO THE TRANSOM USING THE MARKED POSITIONS MADE EARLIER.

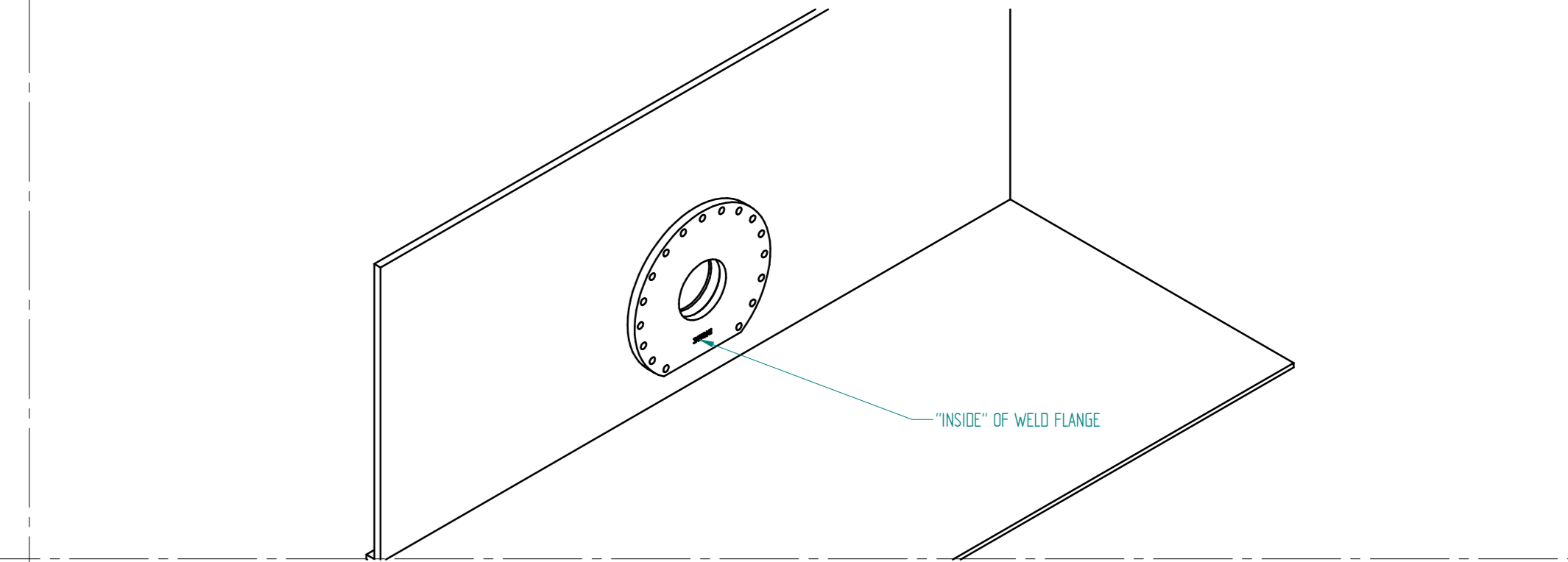


**STEP 4**

- THE FLAT SIDE OF THE WELD FLANGE CIRCLE MAY BE POSITIONED IN THE MOST SUITABLE WAY:
  - A) ALIGNED WITH HULL BOTTOM FOR EASY ACCESS OF WELDING.
  - B) FOR AVOIDING CLASH WITH WATERJET FLANGE OR STRUCTURAL MEMBERS.
- ARRANGE THE WELD FLANGE ON THE INSTALLATION TEMPLATE SHAFT HUB WITH THE TEXT "INSIDE" FACING THE INSIDE (DRY SIDE) OF THE SHIP HULL.
- SPOT WELD THE SERVO FLANGE TO THE TRANSOM FROM THE INSIDE OF THE VESSEL TO ENSURE ITS POSITION AND ALIGNMENT.
- REMOVE HLS INSTALLATION TEMPLATE.
- WELD CONTINUOUSLY AROUND EACH WELD-NUT TO ENSURE WATER TIGHTNESS OF THE WELDS TO AVOID CORROSION.
- WELD CONTINUOUSLY AROUND SERVO WELD FLANGE ON BOTH INSIDE AND OUTSIDE TO ENSURE WATER TIGHTNESS OF THE HULL AND TO AVOID CORROSION.

**WARNING**

THE WELDINGS ARE SOLELY THE INSTALLERS RESPONSIBILITY. IN CASE THE WELDS FAIL IT MAY RESULT IN RISK OF WATER INGRESSION. IT IS THE INSTALLERS RESPONSIBILITY TO SOURCE THE CORRECT TYPE OF WELDING CONSUMABLES DEPENDING ON WHERE THE WELD NUTS AND SERVO FLANGE ARE TO BE WELDED. THE WELD NUT AND SERVO WELD FLANGE MATERIAL ARE: FOR STEEL SHIPS EN 14462; FOR ALUMINIUM SHIPS EN AW 5083 H111.



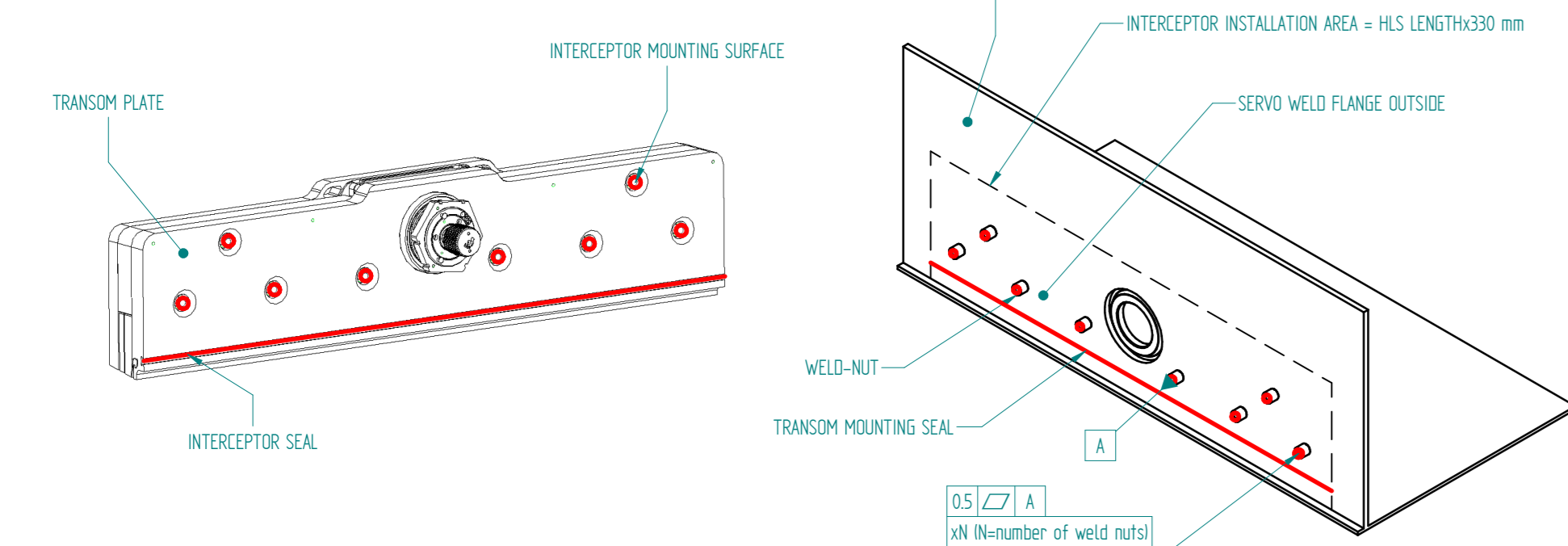
**STEP 5**

- RESTART FROM STEP 2, VERIFY PROPER SEPARATION DISTANCE BETWEEN EACH INTERCEPTOR BY CHECKING THAT THE DRAWN LINES FROM STEP 2 ARE VISIBLE, AND REPEAT UNTIL ALL HLS INTERCEPTOR WELD-NUTS AND SERVO WELD FLANGES ARE INSTALLED.
- FOR EACH INTERCEPTOR, VERIFY THAT THE MATING SURFACES OF THE WELD NUTS ARE PLANE WITHIN TOLREANCE OF +/-0.5 mm TO EACH OTHER, SEE DRAWING BELOW.
- REMOVE ANY WELD SPLATTER AT THE SEALING SURFACE ON "OUTSIDE" OF THE SERVO WELD FLANGE. KEEP THE SEALING SURFACE SMOOTH.
- REMOVE ANY INSTALLED WELD-ON SADDLE PLATES.
- GRIND THE TRANSOM SURFACE AND THE WELD NUTS SMOOTH AND FREE FROM ANY WELD SPLATTER IN WAY OF INTERCEPTOR INSTALLATION AREA.
- MASK THE WELD-NUT AND WELD FLANGE THREADS AND THEIR CONTACT AND SEALING SURFACES. APPLY PAINT ACCORDING TO SHIP PAINTING SPECIFICATION.

**WARNING**

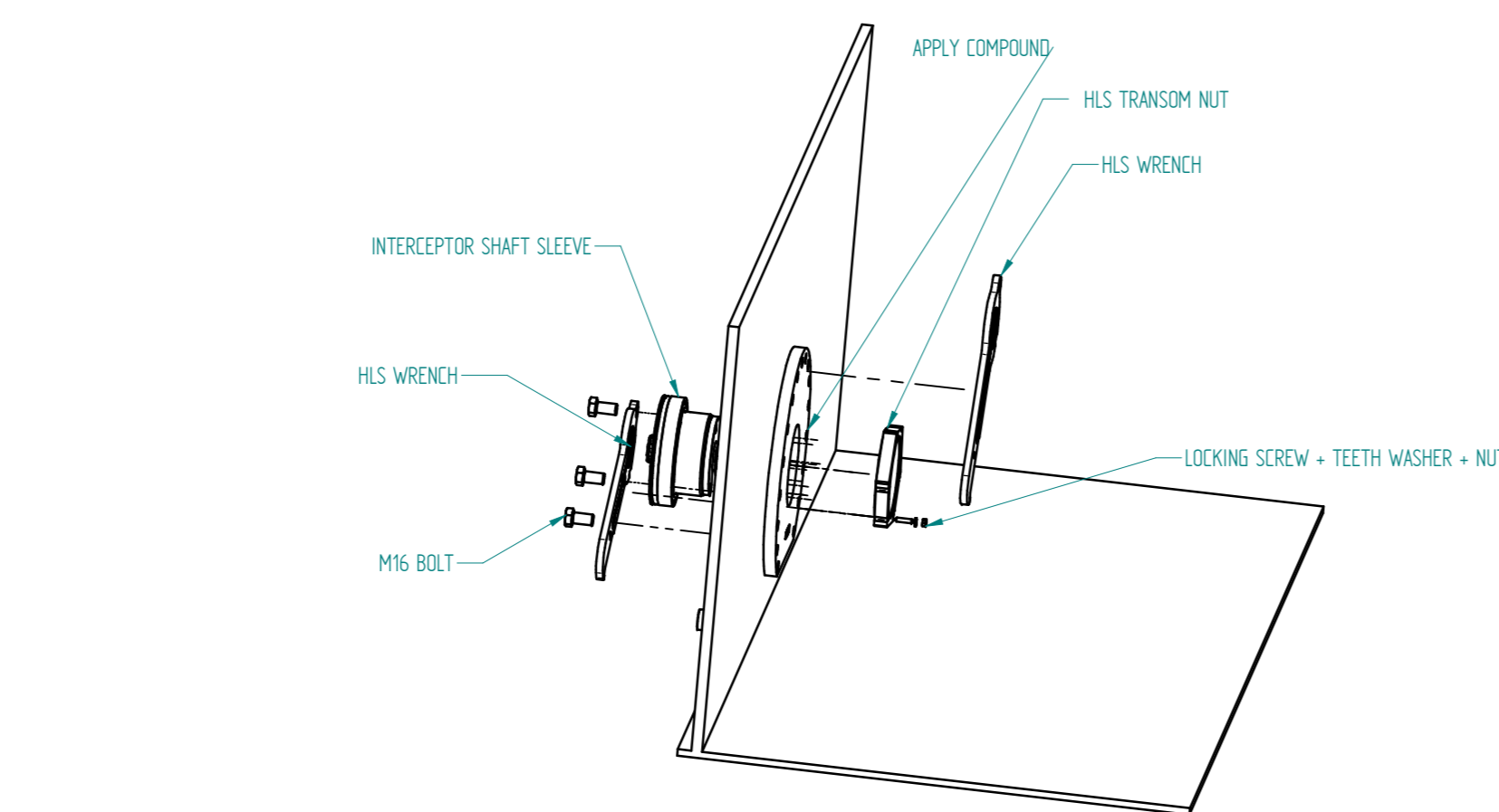
IT IS THE INSTALLERS RESPONSIBILITY TO PROVIDE TRANSOM MOUNTING SURFACE WHICH WILL NOT CONTRIBUTE TO SIGNIFICANT FORCE BETWEEN HLS TRANSOM PLATE AND VESSEL TRANSOM OR DOUBLING PLATE. THE MOUNTING PRINCIPAL IS TO KEEP THE HLS TRANSOM PLATE FREE FROM PRESSURE. BOLT FORCE SHOULD ONLY BE TRANSMITTED BETWEEN THE HLS WELD NUTS AND THE INTERCEPTOR MOUNTING SURFACE, SEE RED MARKINGS BELOW.

THE WELDING ARE SOLELY THE INSTALLERS RESPONSIBILITY. IT IS THE INSTALLERS RESPONSIBILITY TO SOURCE THE CORRECT TYPE OF WELDING CONSUMABLES DEPENDING ON WHERE THE WELD NUTS AND SERVO FLANGE ARE TO BE WELDED. THE WELD NUT AND SERVO WELD FLANGE MATERIAL ARE: FOR STEEL SHIPS EN 14462; FOR ALUMINIUM SHIPS EN AW 5083 H111.



**STEP 6**

- INSTALL THE HLS INTERCEPTOR SHAFT TRANSITION ASSEMBLY. SEE DRAWING 022487.
- IN CASE OF AN ALU TRANSOM NUT, APPLY TEFGEL, CORROSION SEALING COMPOUND (SUCH AS ZINK PASTE) OR YARD SPECIFIED CORROSION ELIMINATION COMPOUND BETWEEN THE SERVO WELD FLANGE AND THE TRANSOM NUT.
- TIGHTEN THE SHAFT NUT WITH A TORQUE OF 50 Nm USING HUMPHREE SUPPLIED WRENCHES, OUTSIDE AFT OF TRANSOM THE SHAFT TRANSITION SHOULD BE PREVENTING ROTATION DURING THE TIGHTENING OPERATION BY ONE HUMPHREE WRENCH AND THREE M16 BOLTS. TWO BOLTS THROUGH HOLES IN WRENCH INTO THREADED HOLES IN SHAFT SLEEVE AND ONE BOLT INTO INSTALLED WELD-NUT (POSITION 4 ACCORDING TO STEP 8 BELOW).
- AFTER TIGHTENING OF TRANSOM NUT, LOCK THE SHAFT NUT BY ITS SUPPLIED LOCKING SCREW, TEETH-WASHER AND NUT.



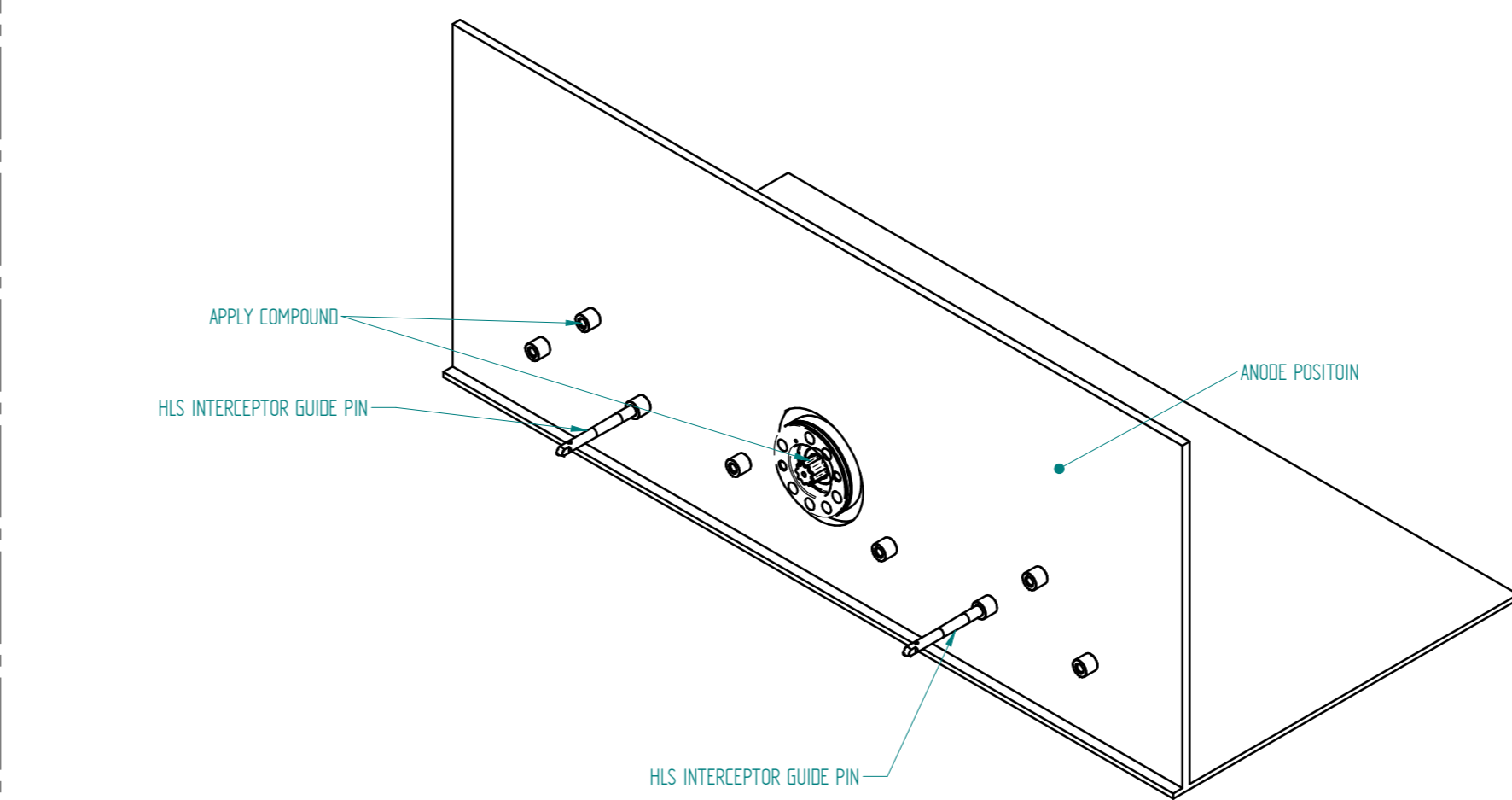
**STEP 7**

- APPLY TEFGEL, CORROSION SEALING COMPOUND (SUCH AS ZINK PASTE) OR YARD SPECIFIED CORROSION ELIMINATION COMPOUND TO THE THREADS AND MATING SURFACE OF THE WELD NUTS BEFORE INSTALLING THE INTERCEPTOR. ALSO APPLY THE CORROSION SEALING COMPOUND TO THE INTERCEPTOR SHAFT BEFORE INSTALLATION.

**IMPORTANT**

DO NOT USE MARINE SEALANT (SUCH AS SIKAFLEX 291 OR 591) ON THE BOLT, THIS WILL AFFECT THE TIGHTENING TORQUE.

- FIT THE TWO INTERCEPTOR GUIDE PINS IN THE TWO LOWER WELD-NUTS, ACCORDING TO THE PICTURE.
- GUIDE THE INTERCEPTOR TO CORRECT POSITION BY THE GUIDE PINS.
- AS THE SHIP'S HULL MATERIAL, THE WELD NUTS AND THE FASTENING BOLTS WILL BE MADE OF DIFFERENT MATERIALS, THERE WILL BE GALVANIC CORROSION, UNLESS PROTECTIVE ANODES ARE USED. TO AVOID GALVANIC CORROSION, ANODES MUST BE POSITIONED IN THE NEAR AREA OF EACH INTERCEPTOR. HUMPHREE RECOMMENDS AT LEAST ONE ANODE (1KG) FOR EACH INTERCEPTOR. THE ANODES SHALL BE REPLACED ONCE 50% IS CONSUMED. IT IS THE INSTALLERS RESPONSIBILITY TO SOURCE AND INSTALL THE CORRECT TYPE OF ANODES, DEPENDING HULL MATERIAL.

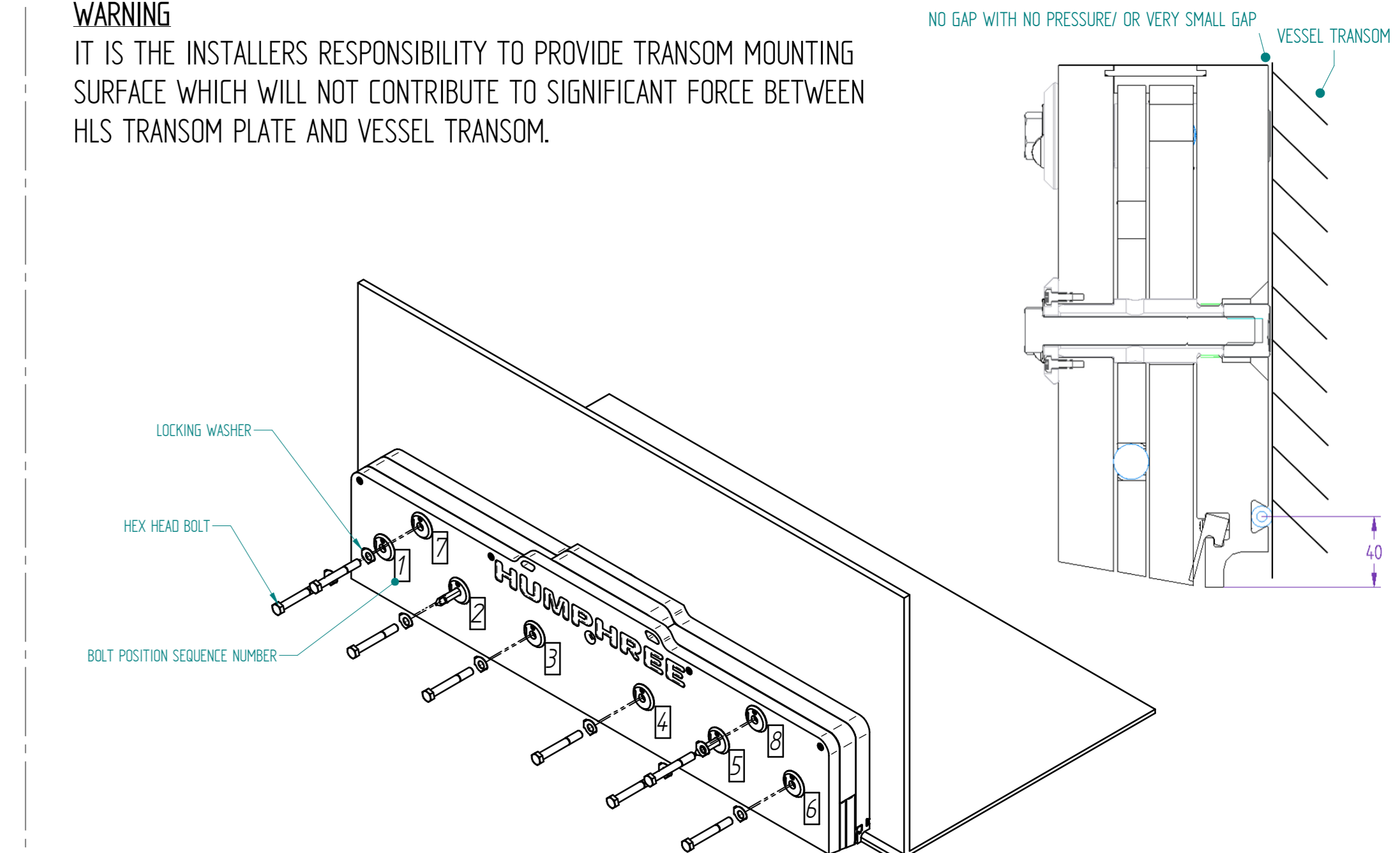


**STEP 8**

- BEND THE EIGHT (8x) LOCKING WASHERS, TAB OF WASHER INTO LOCKING SLOT AND CIRCULAR FLANGE AGAINST BOLT HEAD, FOR PROPER LOCKING OF THE EIGHT (8x) M16x120 BOLTS.
- INSERT THE EIGHT M16x120 (CLASS A4-80 WAXED) BOLTS PLUS LOCKING WASHERS, AND TIGHTEN ALL BY HAND, MAKING SURE THE INTERCEPTOR IS FLAT TO THE TRANSOM SURFACE.
- REMOVE THE TWO GUIDE PINS AND REPLACE THEM WITH BOLTS AND WASHERS.
- APPLY A LIGHT TIGHTENING OF ALL BOLTS IN THE FOLLOWING SEQUENCE, POSITION 3, 4, 7, 8, 2, 5, 1 AND 6.
- APPLY A TIGHTENING TORQUE OF 190 Nm ON ALL BOLTS STEPWISE WORKING FROM CENTRE TO THE MOST OUTSIDE BOLTS IN THE FOLLOWING SEQUENCE; POSITION 3, 4, 7, 8, 2, 5, 1 AND 6.

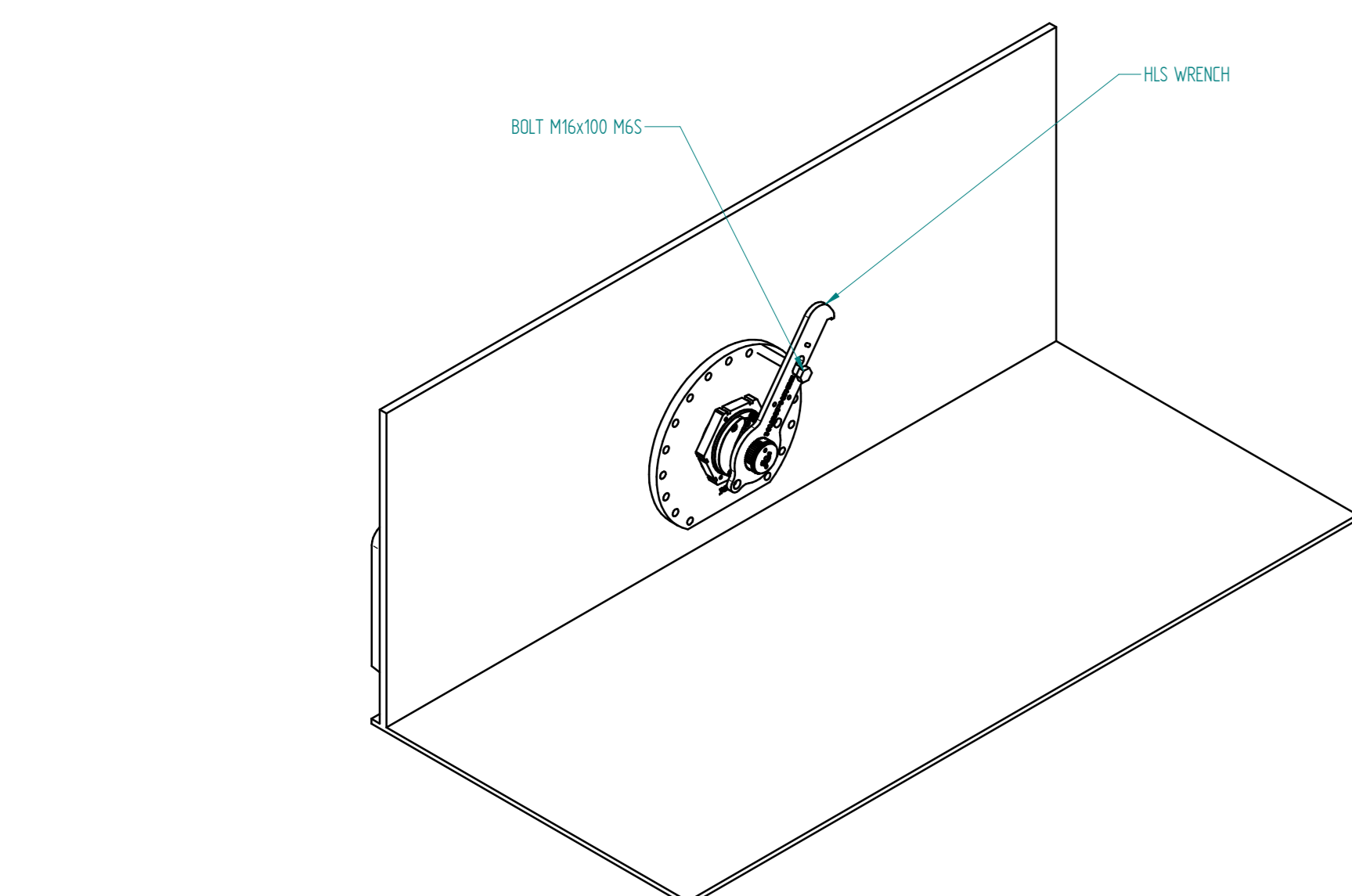
**WARNING**

IT IS THE INSTALLERS RESPONSIBILITY TO PROVIDE TRANSOM MOUNTING SURFACE WHICH WILL NOT CONTRIBUTE TO SIGNIFICANT FORCE BETWEEN HLS TRANSOM PLATE AND VESSEL TRANSOM.



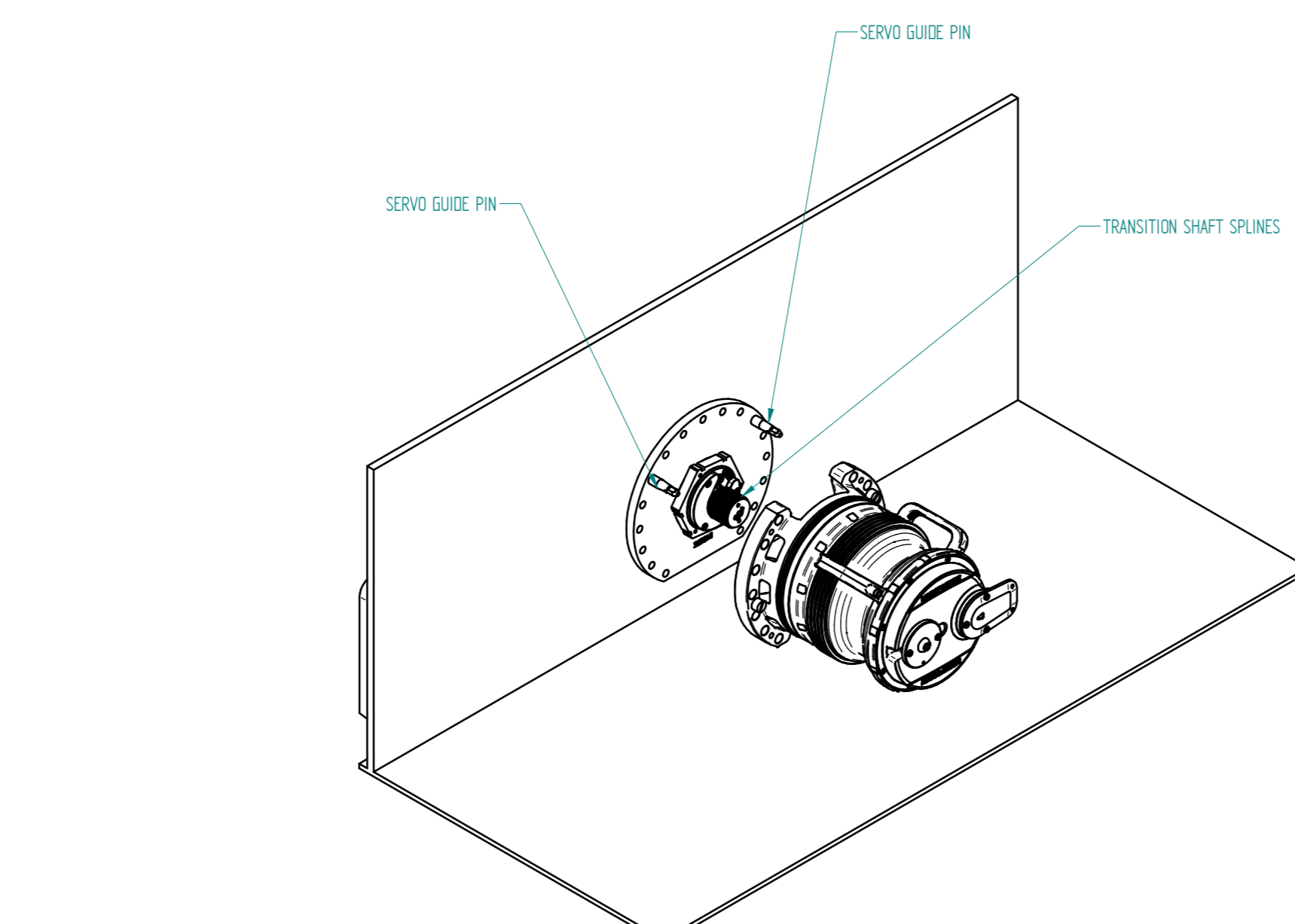
**STEP 9**

- TEST THE INTERCEPTOR BLADE MOVEMENT AND MAXIMUM REQUIRED OPERATION TORQUE TO TURN THE SHAFT (MAX. 50 Nm) BY USE OF THE HUMPHREE WRENCH.
- THE INTERCEPTOR CAN BE LOCKED BY USE OF A HUMPHREE WRENCH AND A M16x80 BOLT.



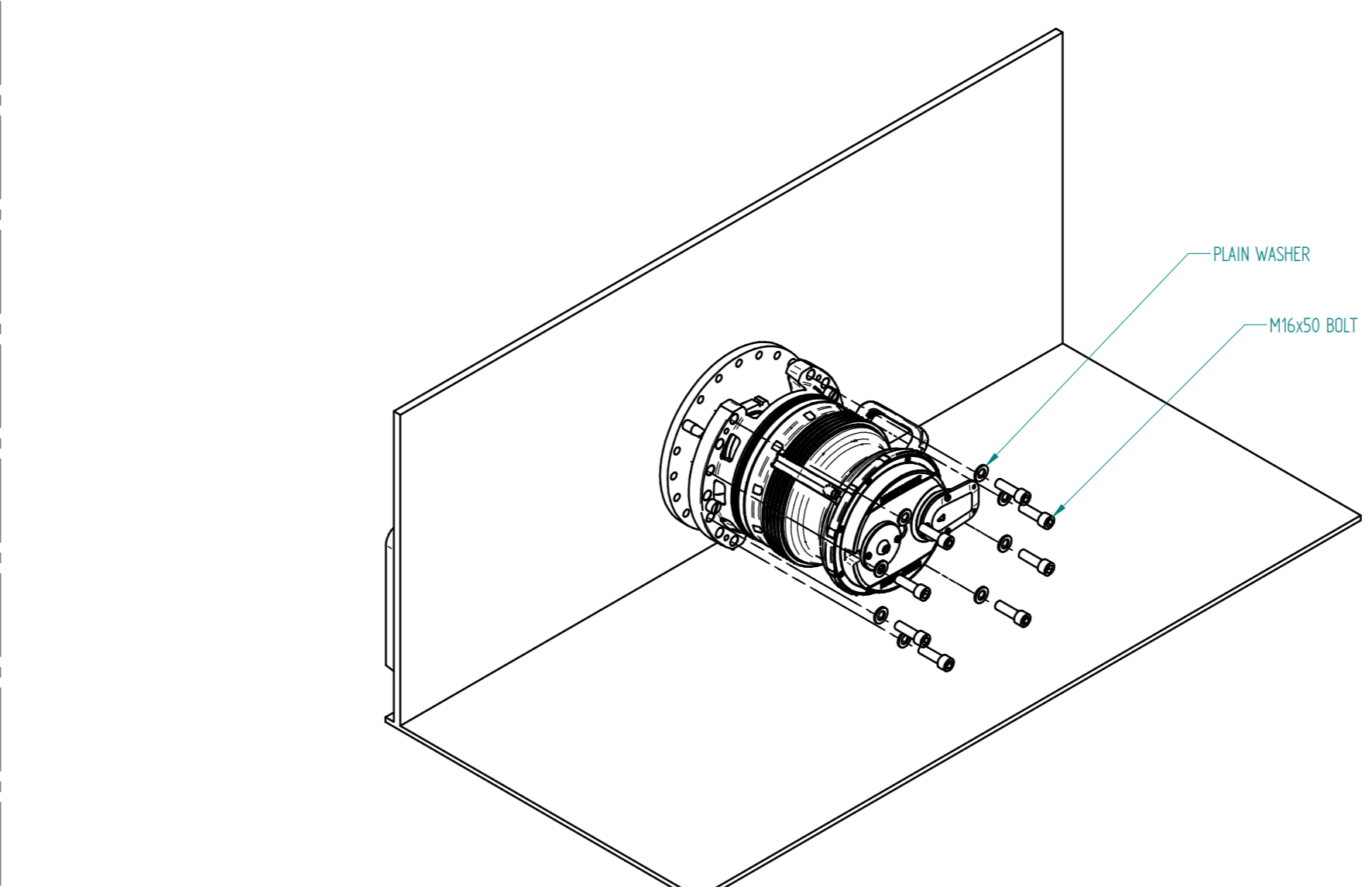
**STEP 10**

- FIT THE TWO SERVO GUIDE PINS IN THE WELD FLANGE AS SHOWN IN THE PICTURE. THE GUIDE PINS SHALL BE KEPT IN THIS POSITION PERMANENTLY FOR LATER USE DURING MAINTENANCE AND REMOVING OF SERVO.
- APPLY MARINE GREASE ON THE TRANSITION SHAFT SPLINES FOR EASIER INSTALLATION OF THE SERVO UNIT.



**STEP 11**

- FIXATE THE SERVO UNIT ONTO THE WELD FLANGE BY EIGHT (8x) M16x50 INTERNAL HEX SOCKET BOLTS (CLASS A4-80 WAXED) AND EIGHT (8x) PLAIN WASHERS (A4).
- MAKE SURE THE EXTERNAL SPLINES OF THE SHAFT AND INTERNAL SPLINES OF THE SERVO ARE PROPERLY CONNECTED.
- MAKE SURE EVERY BOLT FITS BY A LIGHT HAND TIGHTENING OF ALL EIGHT BOLTS. THEN TIGHTEN THE M16 BOLTS WITH A TIGHTENING TORQUE OF 190 Nm.



**REQUIRED TOOLS SUPPLIED BY YARD**

- HULL MARKING PEN/CHALK.
- MEASURING TOOLS.
- LIFTING EYES AND GEAR FOR TEMPLATE AND INTERCEPTORS AND SERVOS.
- CUTTING TOOL FOR Ø200 mm HOLE IN TRANSOM, DRILL OR FLAME CUTTING.
- A STRAIGHT RULER, AT LEAST 1.5 M LONG.
- ALL NEEDED WELDING EQUIPMENTS TO BE DETERMINED BY INSTALLER.
- PAINT MASKING MATERIAL FOR THREADS (M16) AND SEALING SURFACES.
- ONE M16x80 BOLT FOR LOCKING THE INSTALLED INTERCEPTOR BY USE OF A HUMPHREE WRENCH.
- A CALIBRATED TORQUE WRENCH AND A M16 EXTERNAL HEX SOCKET (WIDTH = 24mm) AND A M16 INTERNAL HEX SOCKET (WIDTH = 14 mm).
- A PAIR OF NIPPERS FOR BENDING THE LOCKING WASHERS.
- STANDARD HAND TOOLS FOR TRANSOM NUT LOCKING SCREW, DRAIN SCREW ETC.

**REQUIRED TOOLS SUPPLIED BY HUMPHREE**

- INSTALLATION TEMPLATE (OPTIONAL ORDER) AND WITH EIGHT M16 BOLTS AND EIGHT WASHERS.
- Two (2x) HUMPHREE WRENCHES.
- Two (2x) INTERCEPTOR GUIDE PINS.
- Two (2x) SERVO GUIDE PINS FOR EACH HLS SERVO INSTALLED ONBOARD.

**WARNING!** DESIGN AND FABRICATION OF THE TRANSOM MOUNTING FOR A SPECIFIC VESSEL IS THE RESPONSIBILITY OF THE INSTALLER. IT IS REQUIRED FOR THE INSTALLER TO DETERMINE AN APPROPRIATE TRANSOM MOUNTING TO SAFELY DISTRIBUTE THE HLS INTERCEPTOR LOADS.

**WARNING!** DISCONNECT THE POWER CONNECTOR BEFORE PERFORMING ANY MAINTENANCE OR ADJUSTMENT.

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04	Add info about Anode and Marine Sealant	2020-01-25	JT		
05	Add equipment and update welding information	2020-01-15	JT		
06	Update drawings and update welding information	2020-01-09	JT		
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TITLE: HLS INSTALLATION MANUAL POSTER					
DRAWN	CHKD	BY	APPROV	SCALE	DATE
022558				1:1	2020-12-10
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SIZE	022558	SHEET		1 OF 1	K06