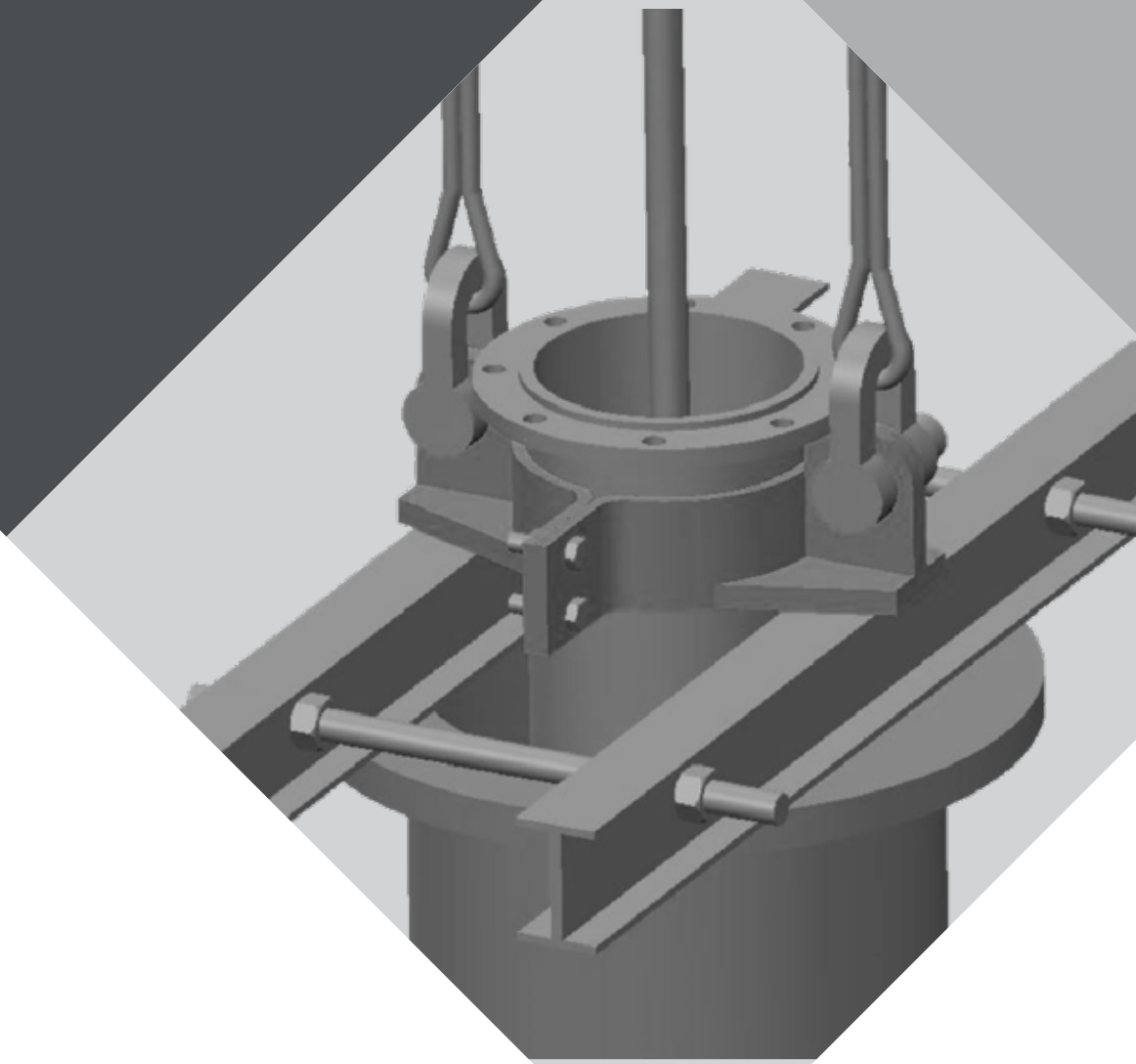
GOULDS PUMPS

Installation, Operation, and Maintenance Manual

Lifting Clamp Assembly



ITT

Table of Contents

This manual provides instructions for the installation of vertical turbine and submersible pumps using ITT Goulds supplied lifting equipment. The parts detailed in the manual are designed for safe and reliable operation when properly used in accordance with instructions in this manual. **This manual must be read and understood before installation using the ITT Goulds supplied lifting equipment.**

This *Lifting Clamp Instruction Manual* identifies specific safety risks that must be considered at all times during product installation. Understanding and adhering to these safety warnings is mandatory to ensure personnel, property, and/or the environment will not be harmed. Adherence to these warnings alone, however, is not sufficient—it is anticipated that the end user will also comply with industry and corporate safety standards. Identifying and eliminating unsafe installation, operation, and maintenance practices is the responsibility of all individuals involved in the installation, operation, and maintenance of industrial equipment.

Size hoisting fixtures according to the full weight of the equipment provided with appropriate factor of safety. For information regarding your specific equipment, refer to the project documentation supplied for specific weights, center of gravity, etc. Use caution when lifting heavy equipment.

ITT Goulds shall not be liable for physical injury, damage, or delays caused by a failure to observe the instructions for installation contained in this manual.

These instructions do not cover all details or variations in equipment, nor provide every possible contingency to be met in connection with installation. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Goulds Pumps Sales Office.

When pumping unit is installed in a potentially explosive atmosphere, all the instructions after the Ex symbol on VIT and VIS IOM's must be followed. Personal injury and/or equipment damage may occur if these instructions are not followed.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of ITT Goulds. The warranty contained in the contract between the parties is the sole warranty of ITT Goulds. Any statements contained herein do not create new warranties or modify the existing warranty.

Warranty is valid only when genuine ITT Goulds parts are used.

Use of the equipment on a service other than stated in the order will nullify the warranty, unless written approval is obtained in advance from ITT Goulds Pumps. Supervision by an authorized ITT Goulds representative is recommended to assure proper installation. Additional manuals can be obtained by contacting your local ITT Goulds representative or by calling 1-800-446-8537.

Section 2-1 : Lifting Clamp Ass'y Nomenclature

Throughout this manual the displayed names in Figures 1 and 2 (below) will be used frequently. This page is to be used as a reference for the reader/operator, and the nomenclature listed below will be used throughout the rest of this manual. Parts will be called out by the name followed by a number in parenthesis i.e. (XX).

NOTICE: Figure's may not represent the exact pump model at time of installation. Use Figure's as a reference only, as pump geometry may vary between models.

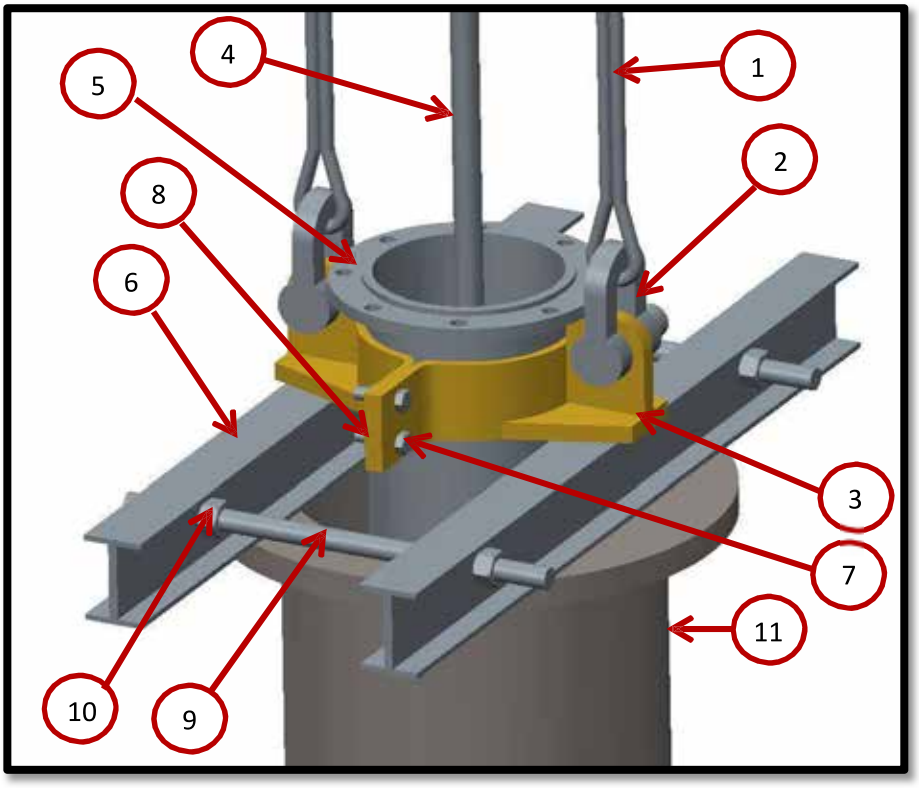


Figure 1 – Flanged column of VIT (Vertical Turbine) pump

TABLE 1	
Balloon Number	**Part Name**
1.	Lifting Sling a)
2.	Shackles a)
3.	Lifting Clamp
4.	Lineshaft b)
5.	Column or Riser
6.	I-Beam
7.	Bolt
8.	Nut
9.	Threaded Rod
10.	Hex Nut
11.	Caisson or pit opening

a) Normally not supplied by ITT; b) Not applicable for submersible pumps

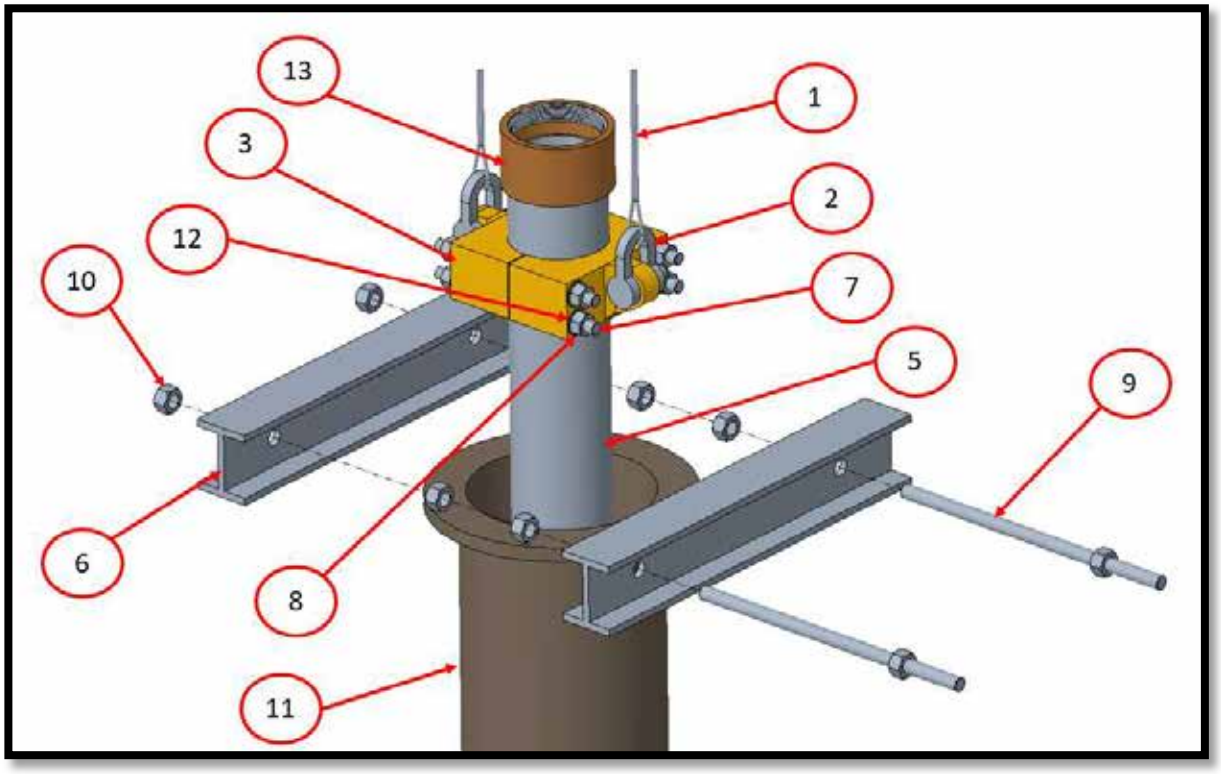


Figure 2 – Threaded column of VIS (Submersible) pump

TABLE 2	
Balloon Number	**Part Name**
1.	Lifting Sling a)
2.	Shackles a)
3.	Lifting Clamp
5.	Column or Riser
6.	I-Beam
7.	Stud
8.	Nut
9.	Threaded Rod
10.	Hex Nut
11.	Caisson
12	Washer
13	Threaded Coupling

a) Normally not supplied by ITT

Section 2-2: Safety Precaution Warnings

The parts detailed in the manual are designed for safe and reliable operation when properly used in accordance with instructions in this manual. Adherence to these warnings alone, however, is not sufficient—it is anticipated that the end user will also comply with industry and corporate safety standards. Identifying and eliminating unsafe installation, operation, and maintenance practices is the responsibility of all individuals involved in the installation, operation, and maintenance of industrial equipment.

Understanding and adhering to these safety warnings is mandatory to ensure personnel, property, and/or the environment will not be harmed. ITT Goulds shall not be liable for physical injury, damage, or delays caused by a failure to observe the instructions for installation contained in this manual. Refer to the ITT Goulds Pumps Installation, Operation, and Maintenance Manuals for your specific pump model which contains more complete information about pump specific safety precautions.

Specific to lifting equipment, significant risks bear reinforcement above and beyond normal safety precautions. Throughout this manual the words DANGER, WARNING, and CAUTION are used to indicate the hazard levels, procedures or situations which require special operator attention. All text under each heading should be read and fully understood before performing any work on the pump and any associated equipment.

Hazard level	Indication
DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	• A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury

SECTION 3: INSTALLATION INSTRUCTIONS

For information regarding the items that are assembled before the items contained in this manual, refer to the ITT Goulds Pumps VIT or VIS IOM. In the VIT IOM are directions on how to assemble the bowl assembly, bottom column, and first Lineshaft section. In the VIS IOM are directions for assembling the VIS bowl assembly and submersible motor.

The ITT Goulds Pumps VIT IOM will have details regarding both threaded and keyed Lineshaft configuration as well as open and enclosed Lineshaft construction.

VIS IOM presents the details regarding to suction and discharge adapter installation; and coupling to the motor.

This manual is to be used in conjunction with the ITT Goulds Pumps VIT or VIS IOM for assembling vertical pumps with the ITT Goulds supplied lifting clamps.

Section 3-1: Clamp Install for flanged columns

NOTICE: The bowl Assembly, bottom column, and 1st Lineshaft (not applicable for submersible pumps) section shall be pre-assembled prior to using the lifting clamps. The lifting clamps are designed to assist in installing the remaining column sections in a long vertical pump.

1. Push the Lifting Clamps (3) together. The top surface of the clamp shall rest underneath the column flange (in between bolt holes so that column hardware can be installed). The fit of the lifting clamps should be tight to the column.

DANGER

Watch your fingers when installing the clamps. Use proper PPE.

2. Install the Bolts (7) and Nuts (8) making sure to torque to recommended values based on fastener diameter. See the Appendix for the recommended Torque values based on Carbon Steel Fasteners.
3. Inspect the assembly to verify that the column flange is resting on the top of the lifting clamps and the bolts and nuts are installed. See Figures 2, 3, and 4 for an overview of how the parts will be assembled.
4. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.

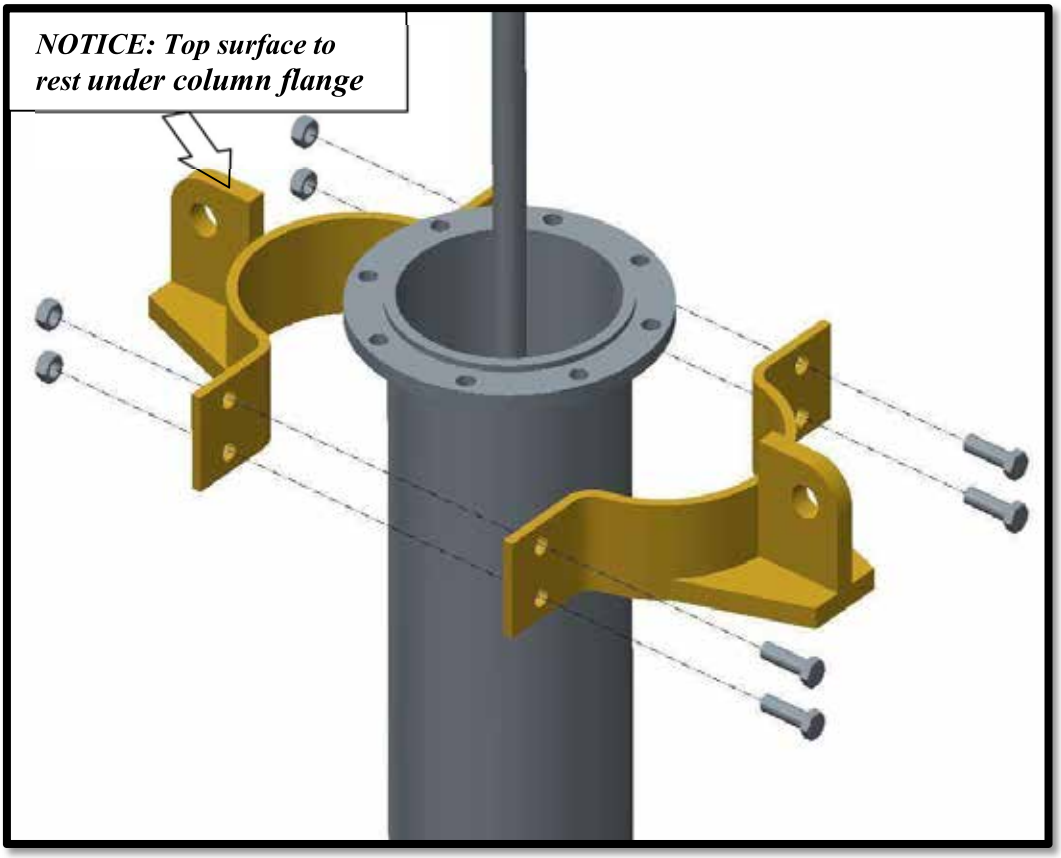


Figure 3: Be sure to install the Lifting Clamps (3) centered between the column holes. This will allow for proper fastener installation in later steps. See Figures 4 and 5 below for clarification.

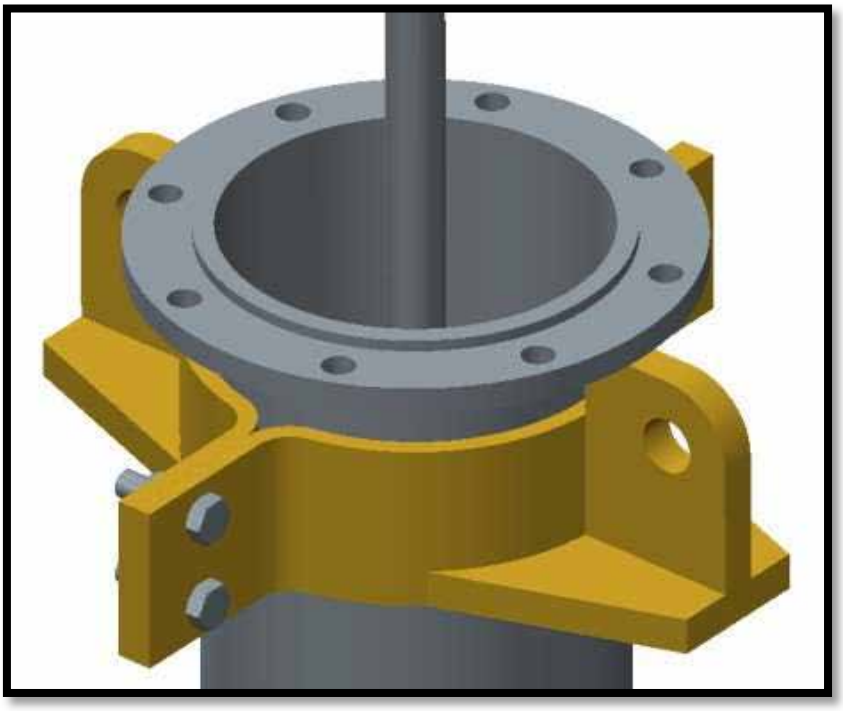


Figure 4

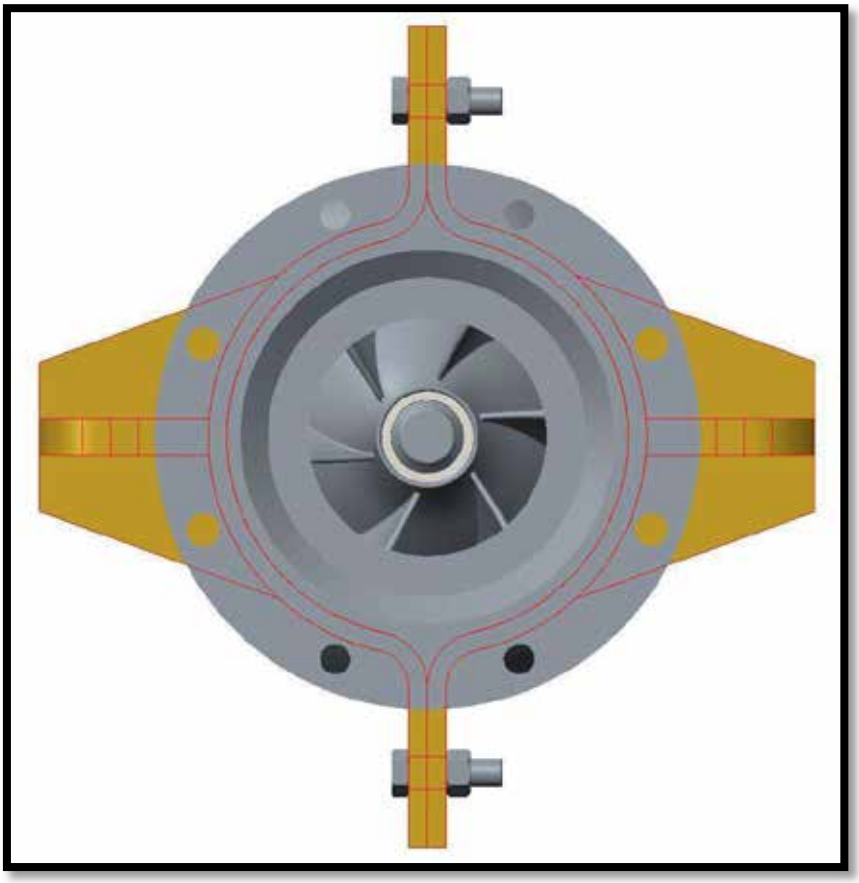


Figure 5

Section 3-1-1: Connect Lifting Device

1. Install shackles (2) into each of the lifting eyes. Thread the shackle bolt through Lifting Clamps (3) making sure to tighten per manufacturer recommendations. The shackles should be free to rotate around bolt axis.
2. Attach Lifting Sling (1) to each shackle.

WARNING

Size lifting fixtures according to the full weight of the equipment provided with appropriate factor of safety. If lifting equipment is not sized correctly, it could result in personal injury or loss of life.

CAUTION

If lifting equipment is not sized correctly, it could result in damage or destruction of equipment.

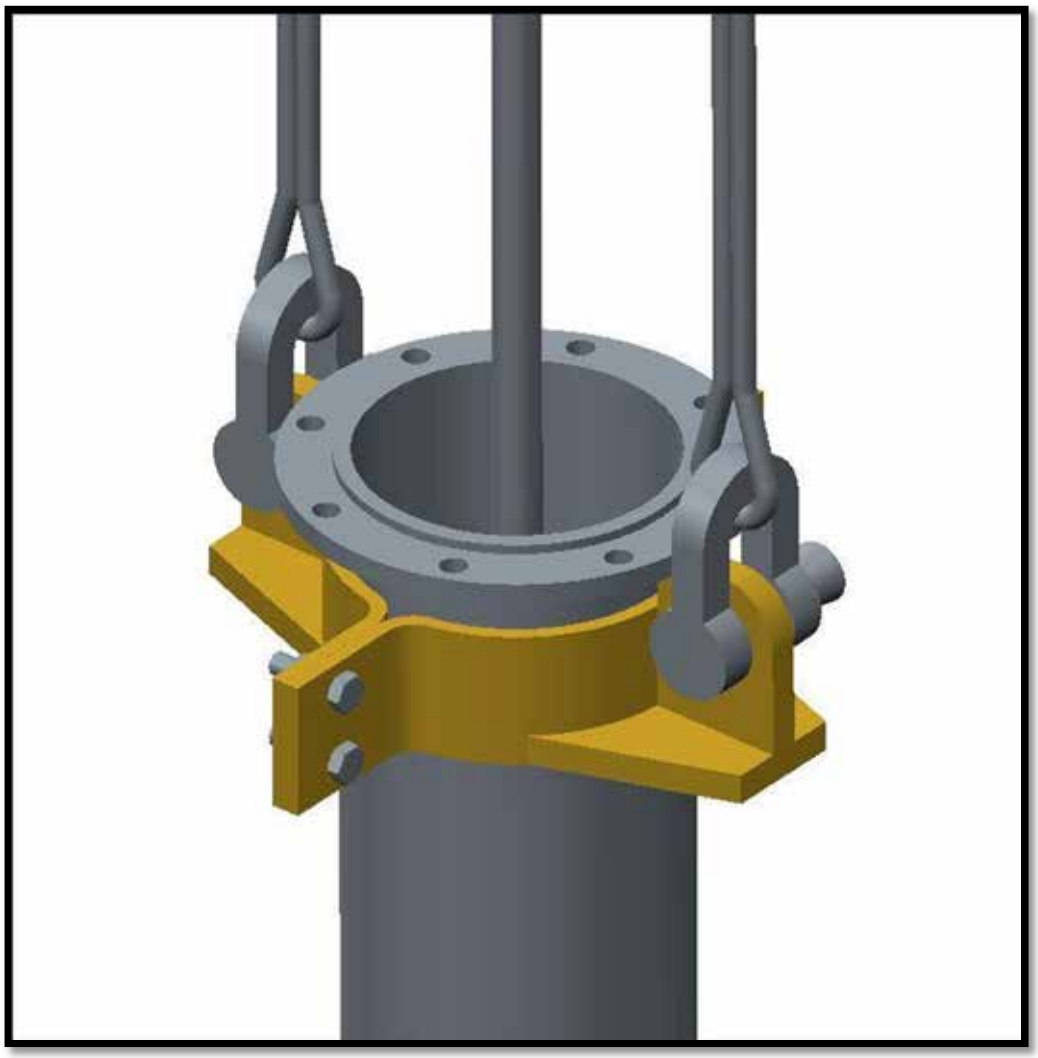


Figure 6 – Clamp and lifting devices on a flanged column

Section 3-1-2: Lower Assembly

1. Position the pump assembly over the top of the Caisson or pit opening (11) and center it.
2. Slowly lower the pump assembly into the caisson or pit opening taking care to make sure that it does not swing from side to side, colliding with the caisson or pit opening. Proceed with extreme caution lowering the pump assembly into the caisson or pit opening.
3. Stop lowering when the column flange is 2-3 feet above the top of the caisson and move on to next step to install the I-Beams.
4. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.

CAUTION

If this operation is not done carefully, the pump assembly is not guided into the caisson or pit opening properly, or there is any side to side movement, it could result in damage or destruction of equipment.

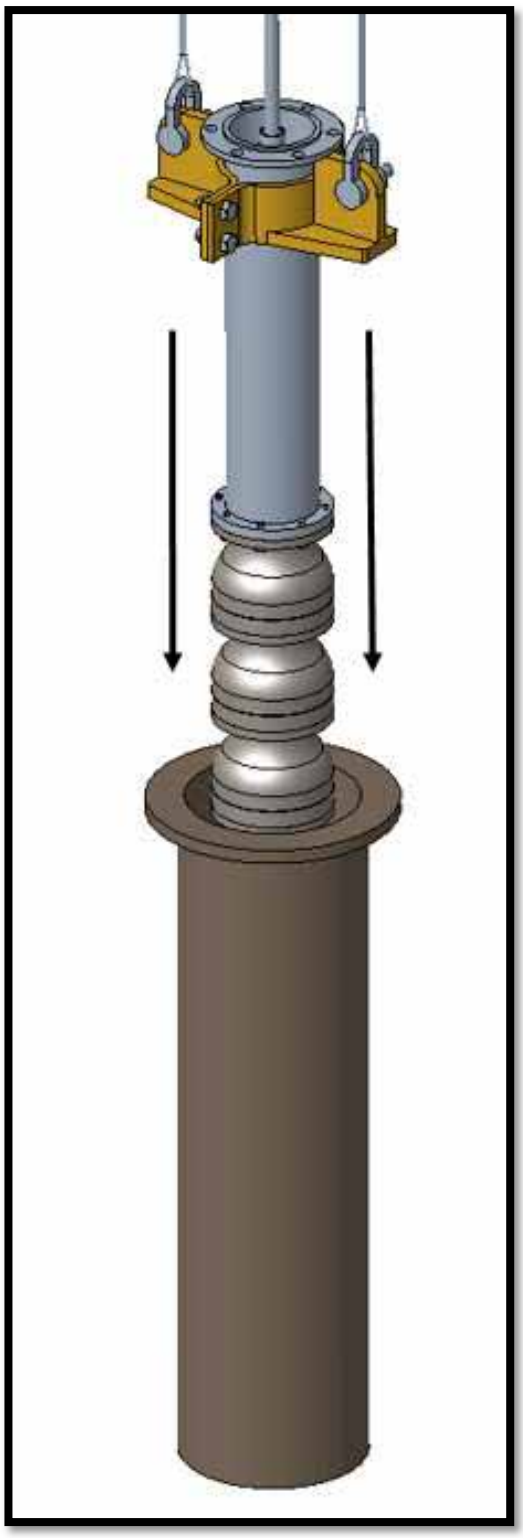


Figure 7 – Bowl assembly and bottom column lowering

Section 3-1-3: Install I-Beam

1. While the pump assembly is being held in place by the Lifting Sling (1) bring in the two I-Beams (6) and locate them on top of the Caisson (11). Locate the top flange of the I-Beam to within 1-2" of the Column (5) body (outside diameter of body pipe).

   NOTICE: Depending on the application, the top flange of the caisson may need to be protected from the I-beams scratching or damaging the caisson. Take necessary precautions as needed.

2. Install Threaded Rod (9) through one Hex Nut (10), through the hole in the I-Beam, through two hex nuts, through the hole in the other I-Beam, and finally through the fourth hex nut. Locate the hex nuts on the threaded rod so as to keep the I-Beams in place. Each I-Beam should be sandwiched by two hex nuts (9). Refer to Figure 8 for more detail.
3. After the I-Beam installation is complete, finish lowering the pump assembly until the Lifting Clamps (3) rest firmly on the I-Beam supports. Remove lifting sling and Shackles (2). Refer to Figure 9.
4. Place a cover over the column opening to prevent entrance of dirt or other foreign matter.

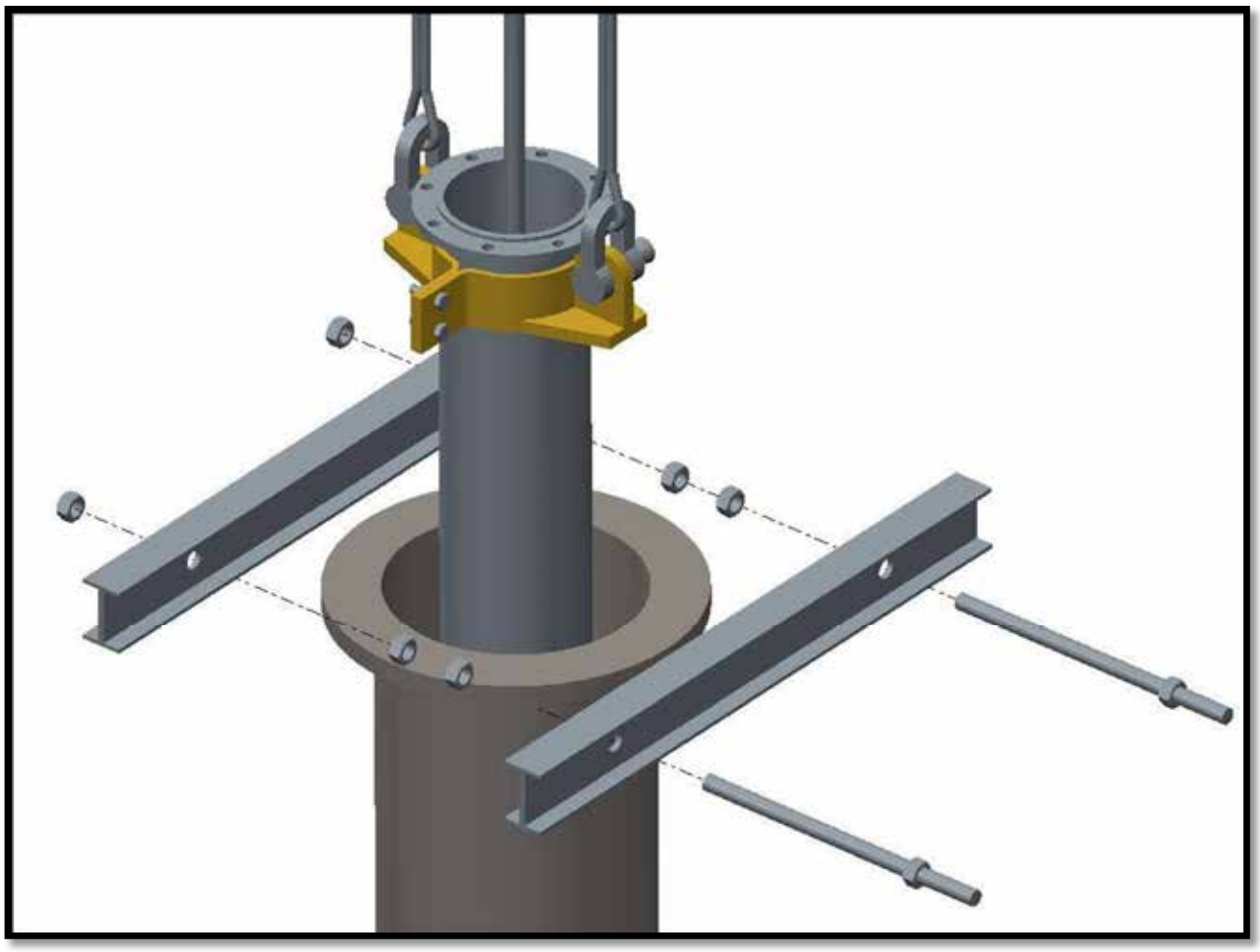


Figure 8: The Threaded Rod (9) and Hex Nuts (10) are used to stabilize the I-Beams (6) so that they don't move relative to each other once they have been located. This will ensure that the platform is stable while installing the next column.

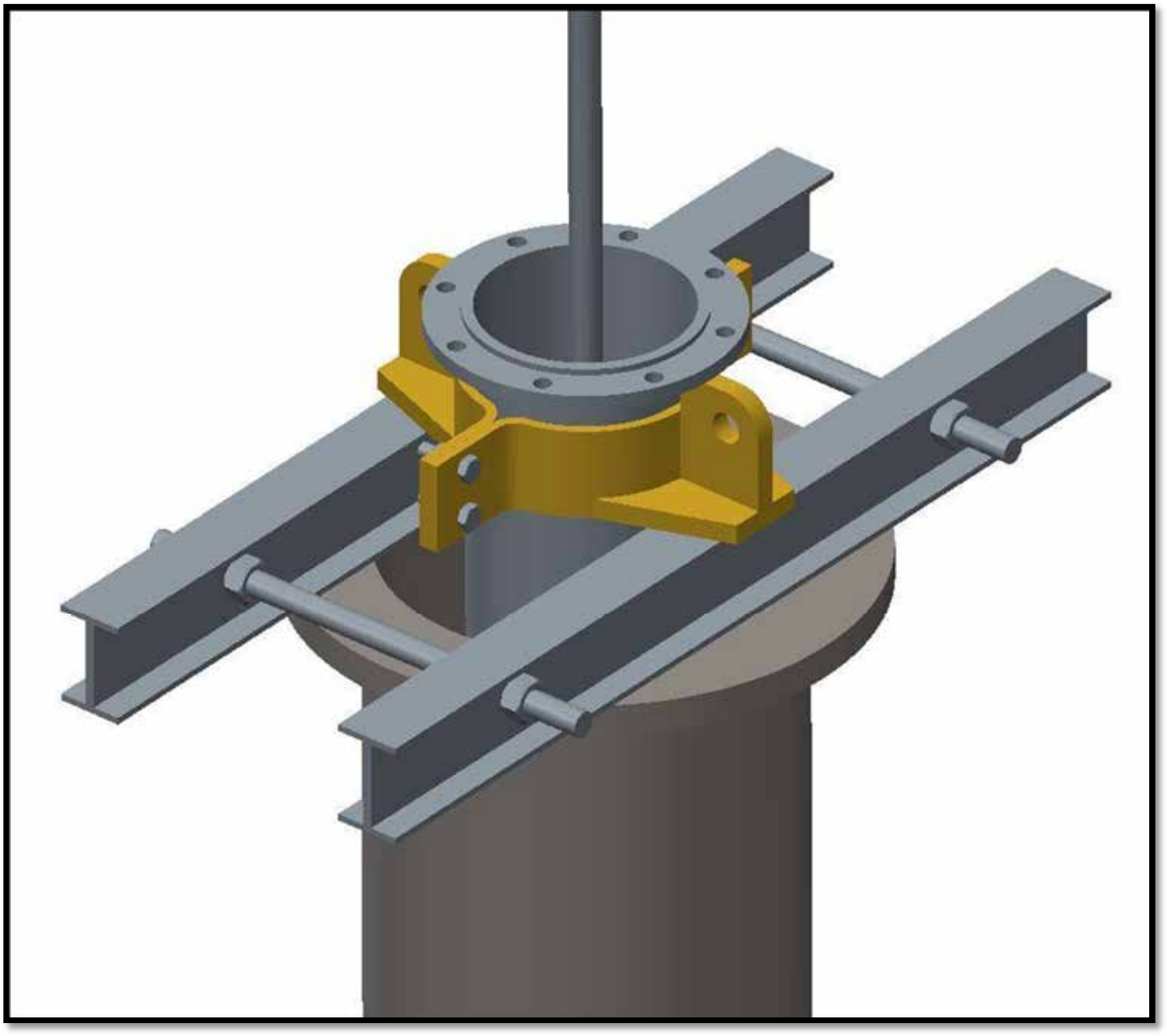


Figure 9: Finished Assembly showing partial pump assembly resting on I-Beams.

Section 3-1-4: Additional Column(s)

1. Prepare the next Column (5) by installing the Lifting Clamps (3) per Section 3-1.
2. Connect the Lifting Sling (1) and Shackles (2) to the second clamp per Section 3-1-1.
3. Lower column down over the Lineshaft (4) when applicable taking care to guide the shaft through the column bearing retainer. Refer to the ITT Goulds Pumps VIT IOM for more information.
4. Align the registers to allow the column flanges to fully engage and insure the column being installed is resting firmly on the column held in place by the I-beams and clamps. Refer to Figure 10 for more information.
5. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.

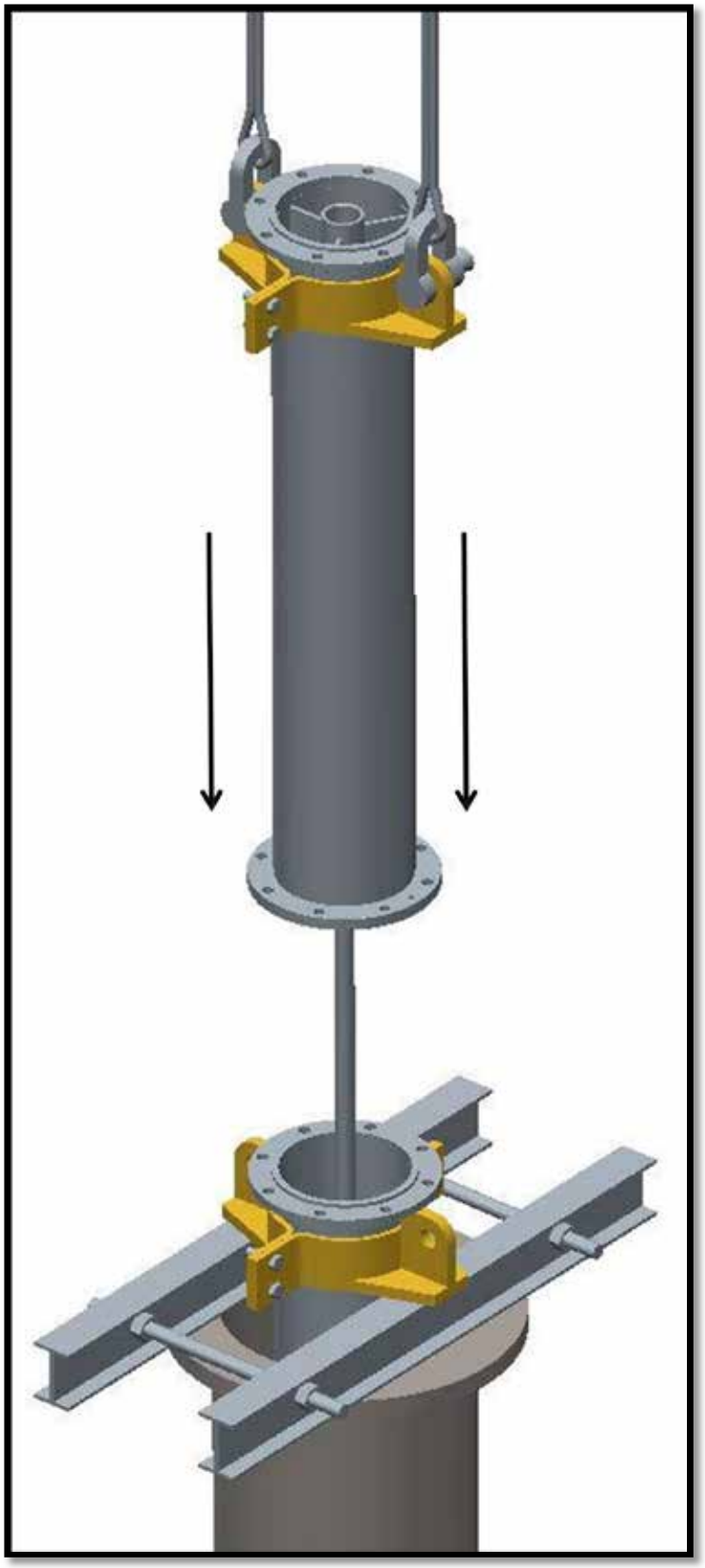


Figure 10: Columns assembly.

Section 3-1-5: Column Bolting

1. Refer to the ITT Goulds Pumps VIT IOM for instructions on installing the next Lineshaft (4) when applicable and associated coupling, bearings, and hardware.
2. Insert the cap screws through both flanges and engage hex nuts. Tighten cap screws gradually in diametrically opposite pairs.

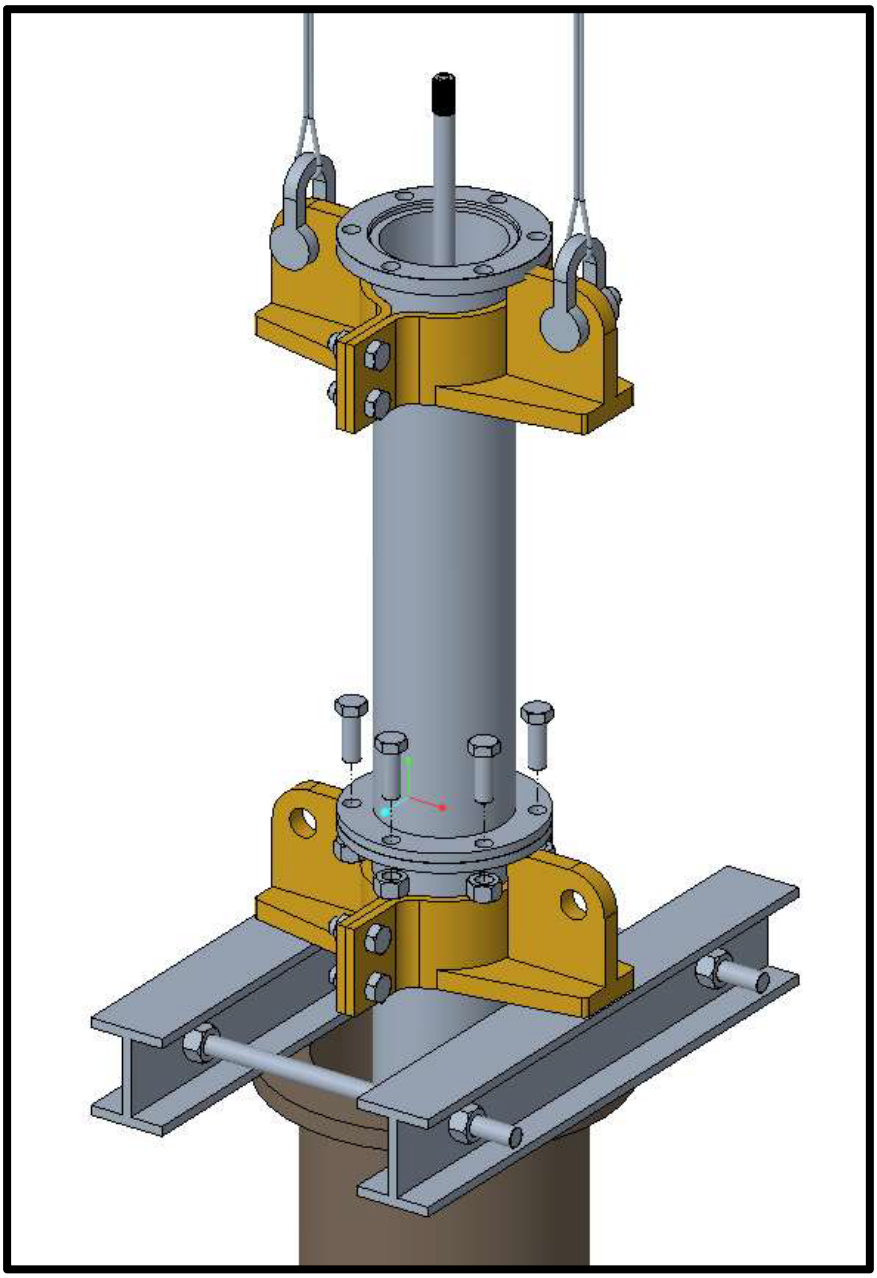


Figure 11: Column bolting.

3. Lift the assembly using the top set of lifting clamps. Remove the bottom set of lifting clamps. These will be installed on the next column in the assembly process.
4. Slowly lower the assembly down into the Caisson or pit opening (11) until the top set of lifting clamps rests on the I- Beams. Detach the lifting sling and repeat the processes detailed in Sections 3-1 thru 3-1-5 until all column sections have been installed.

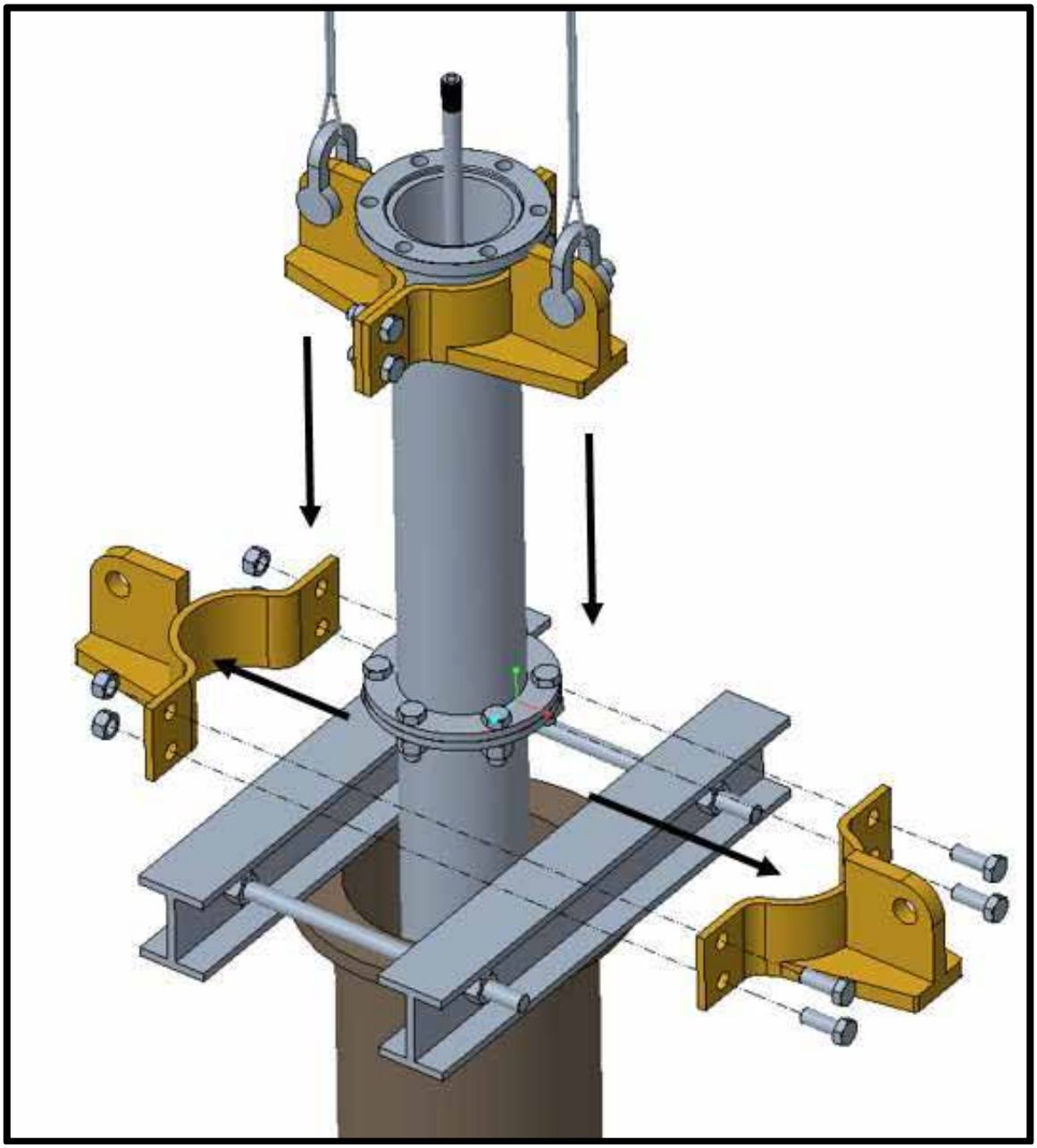


Figure 12: Repeat processes per Sections 3-1 thru 3-1-5 until all Columns (5) have been assembled and lowered into the Caisson (11) or pit opening.

Section 3-2: Clamp Install for threaded columns

NOTICE: The bowl Assembly, bottom column (or riser) shall be pre-assembled prior to using the lifting clamps. The lifting clamps are designed to assist in installing the remaining column sections in a long vertical pump.

1. Push the Lifting Clamps (3) together approximately 4" below the threaded coupling. The fit of the lifting clamps should be tight on the column pipe with a friction fit.
2. Install the Studs (7), Washer (12) and Nuts (8) making sure to torque to recommended values based on fastener diameter. See the Appendix for the recommended Torque values based on Carbon Steel Fasteners.
3. Inspect the assembly to verify that the clamp is securely fasten against the riser pipe and all bolting has been properly fastened. See Figures 13, 14, and 15 for an overview of how the parts will be assembled.
4. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.

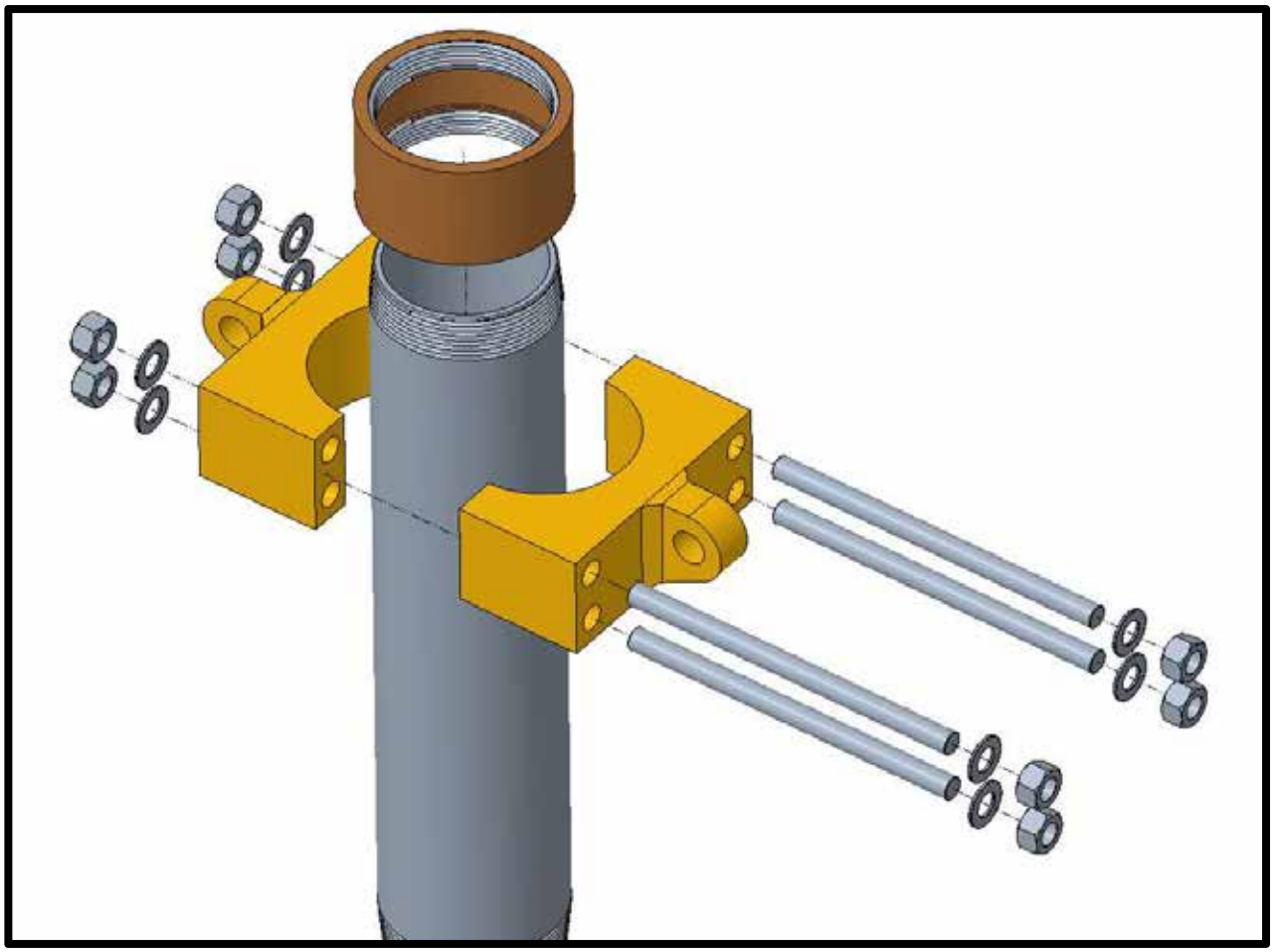


Figure 13: Be sure to install the Lifting Clamps (3) 4" below the threaded coupling. See Figures 14 and 15 below for clarification.

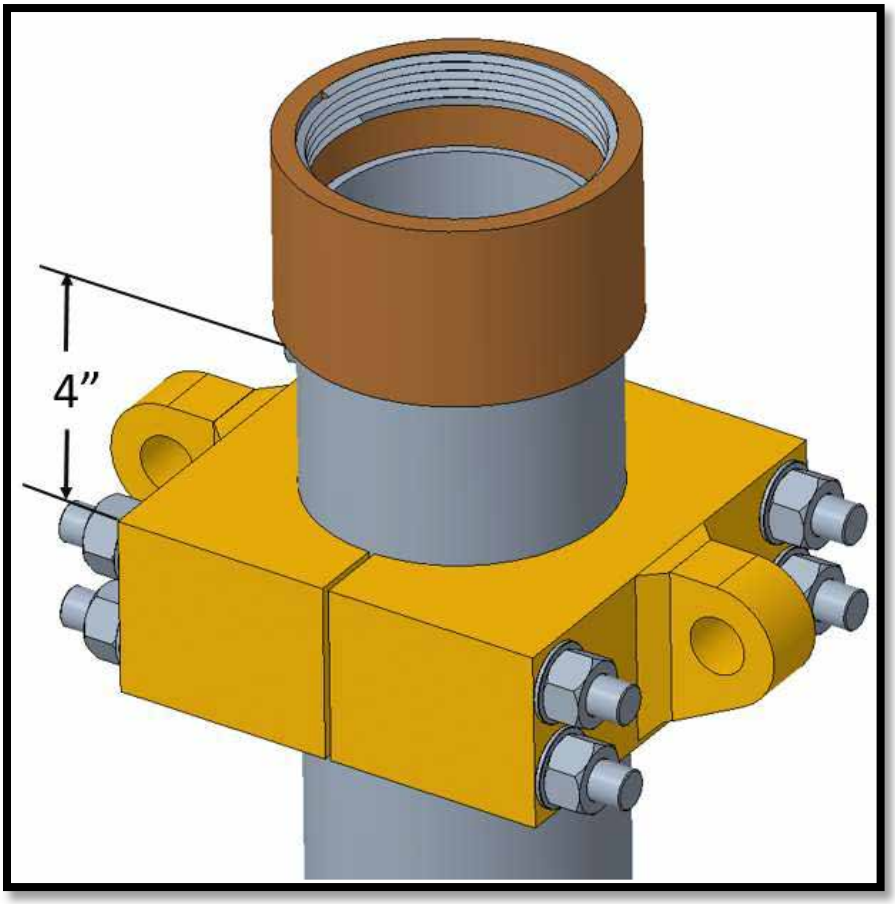


Figure 14

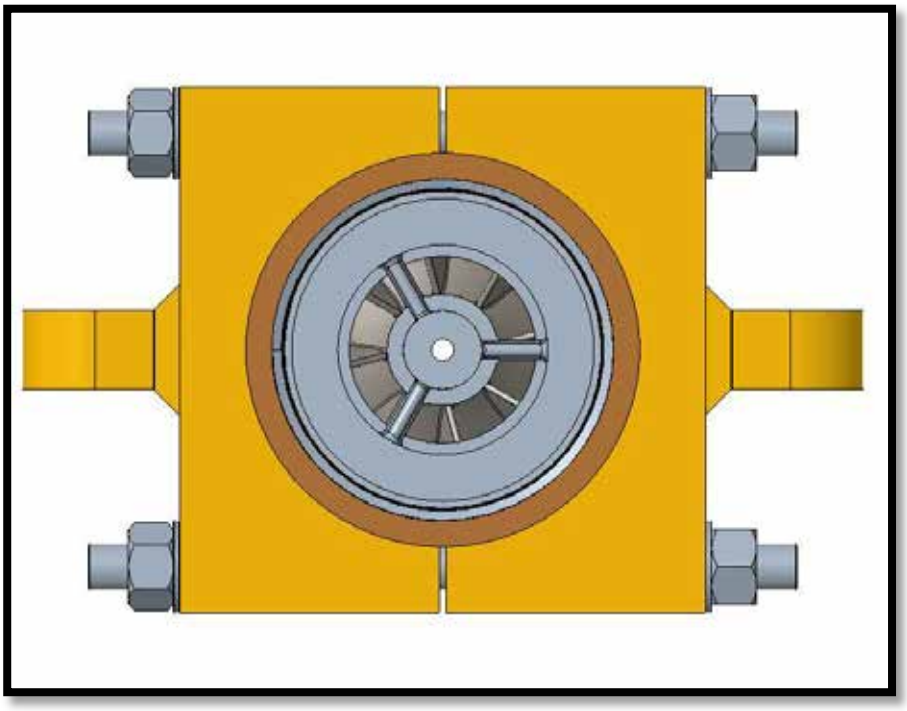


Figure 15

Section 3-2-1: Connect Lifting Device

1. Install shackles (2) into each of the lifting eyes. Thread the shackle bolt through Lifting Clamps (3) making sure to tighten per manufacturer recommendations. The shackles should be free to rotate around bolt axis.
2. Attach Lifting Sling (1) to each shackle.

WARNING

Size lifting fixtures according to the full weight of the equipment provided with appropriate factor of safety. If lifting equipment is not sized correctly, it could result in personal injury or loss of life.

CAUTION

If lifting equipment is not sized correctly, it could result in damage or destruction of equipment.

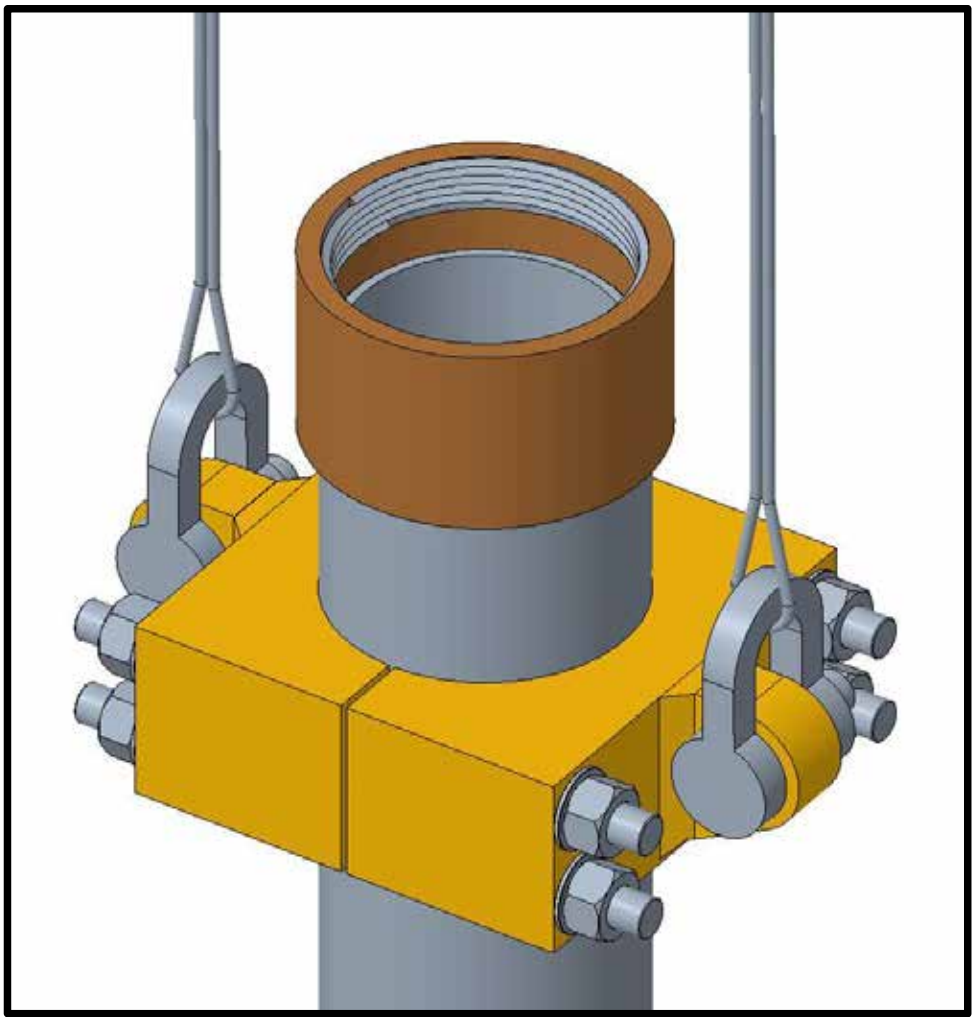


Figure 16 – Clamp and lifting devices on a threaded column

Section 3-2-2 : Lower Assembly

1. Position the pump assembly over the top of the Caisson (11) or pit opening and center it.
2. Slowly lower the pump assembly into the caisson or pit opening taking care to make sure that it does not swing from side to side, colliding with the caisson or pit opening. Proceed with extreme caution lowering the pump assembly into the caisson or pit opening.
3. Stop lowering when the column flange is 2-3 feet above the top of the caisson and move on to next step to install the I-Beams.
4. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.

CAUTION

If this operation is not done carefully, the pump assembly is not guided into the caisson or pit opening properly, or there is any side to side movement, it could result in damage or destruction of equipment.

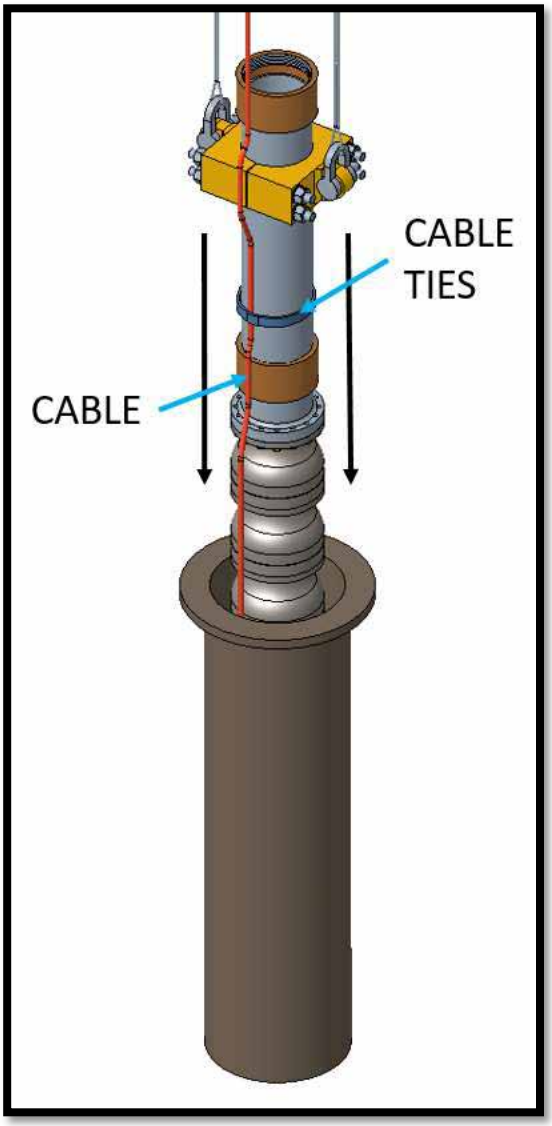


Figure 17 – Bowl assembly and bottom riser lowering

Section 3-2-3: Install I-Beam

1. While the pump assembly is being held in place by the Lifting Sling (1) bring in the two I-Beams (6) and locate them on top of the Caisson (11) or pit opening. Locate the top flange of the I-Beam to within 1-2" of the Column (5) body (outside diameter of body pipe).

   NOTICE: Depending on the application, the top flange of the caisson may need to be protected from the I-beams scratching or damaging the caisson. Take necessary precautions as needed.

2. Install Threaded Rod (9) through one Hex Nut (10), through the hole in the I-Beam, through two hex nuts, through the hole in the other I-Beam, and finally through the fourth hex nut. Locate the hex nuts on the threaded rod so as to keep the I-Beams in place. Each I-Beam should be sandwiched by two hex nuts (9). Refer to Figure 18 for more detail.
3. After the I-Beam installation is complete, finish lowering the pump assembly until the Lifting Clamps (3) rest firmly on the I-Beam supports. Remove lifting sling and Shackles (2). Refer to Figure 19.
4. Place a cover over the column opening to prevent entrance of dirt or other foreign matter.

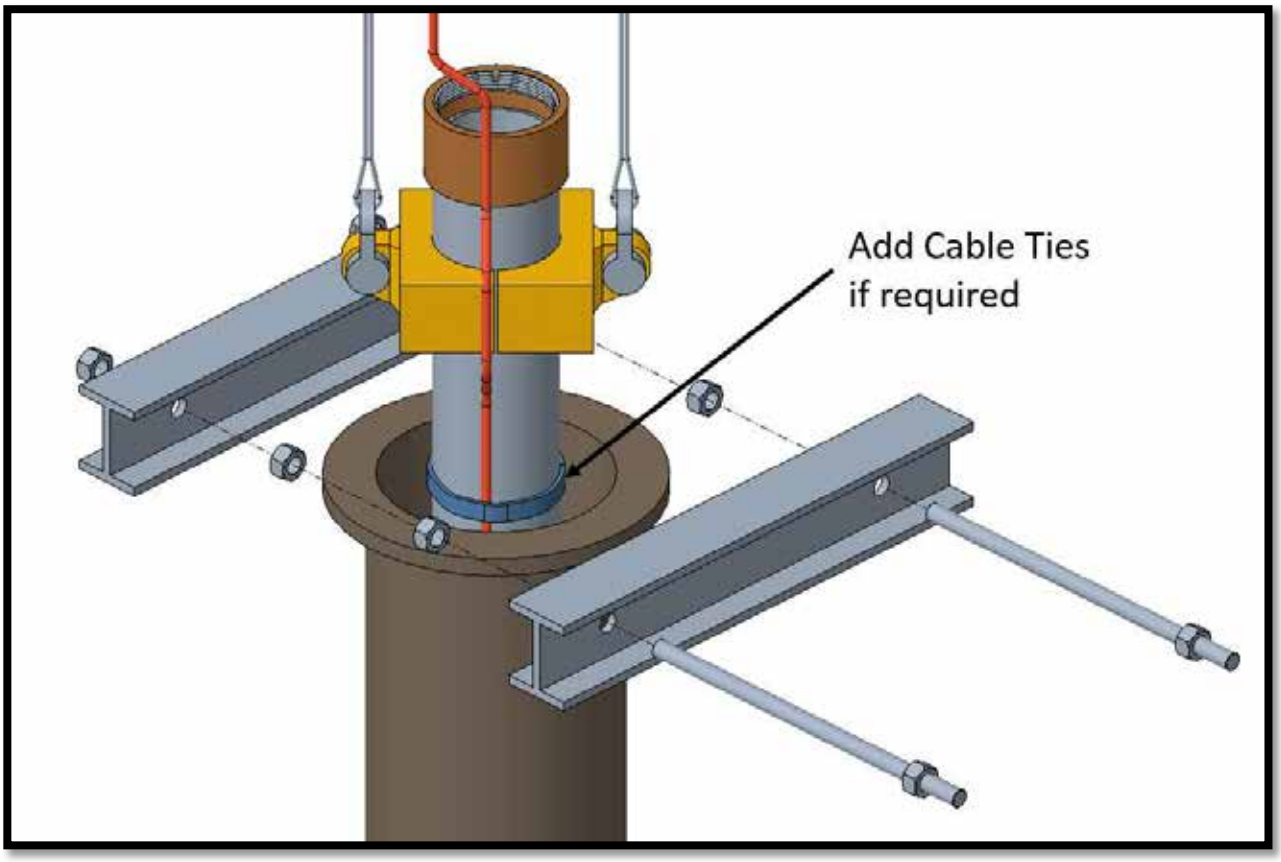


Figure 18: The Threaded Rod (9) and Hex Nuts (10) are used to stabilize the I-Beams (6) so that they don't move relative to each other once they have been located. This will ensure that the platform is stable while installing the next column.

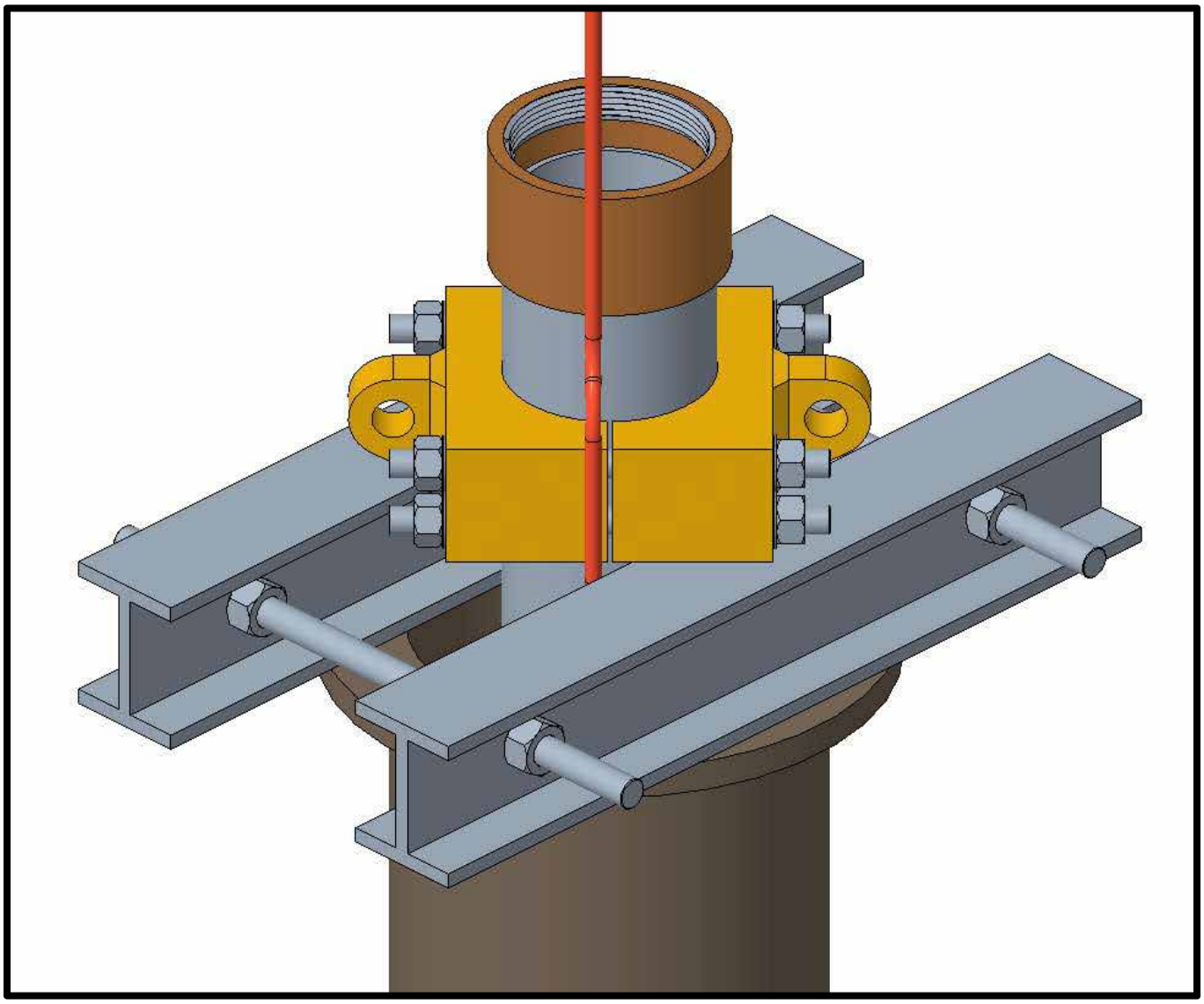
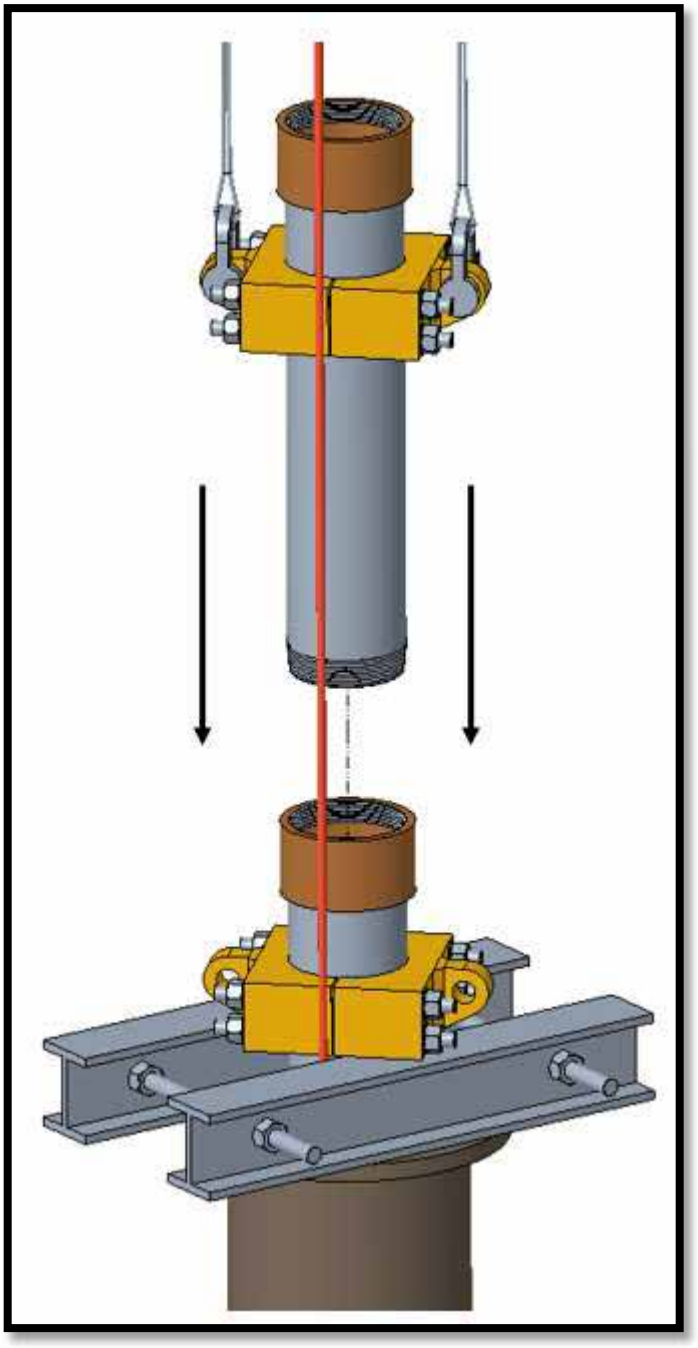


Figure 19: Finished Assembly showing partial pump assembly resting on I-Beams.

Section 3-2-4: Additional Riser(s)

1. Prepare the next Riser (5) by installing the Lifting Clamps (3) per Section 3-2.
2. Connect the Lifting Sling (1) and Shackles (2) to the second clamp per Section 3-2-1.
3. Lower riser down.
4. In case of submersible pumps the motor electrical cabling should be properly handled to avoid damages. See ITT VIS IOM and submersible motor IOM recommendations.



Section 3-2-5: Column Tightening

1. Clean all threads and coat with thread lubricant.
2. Thread the pipe into the discharge case connection and make-up tight. The threaded couplings must be tight so that the motor torque won't loosen the joint during start-ups. Other information on VIT and VIS IOM's.

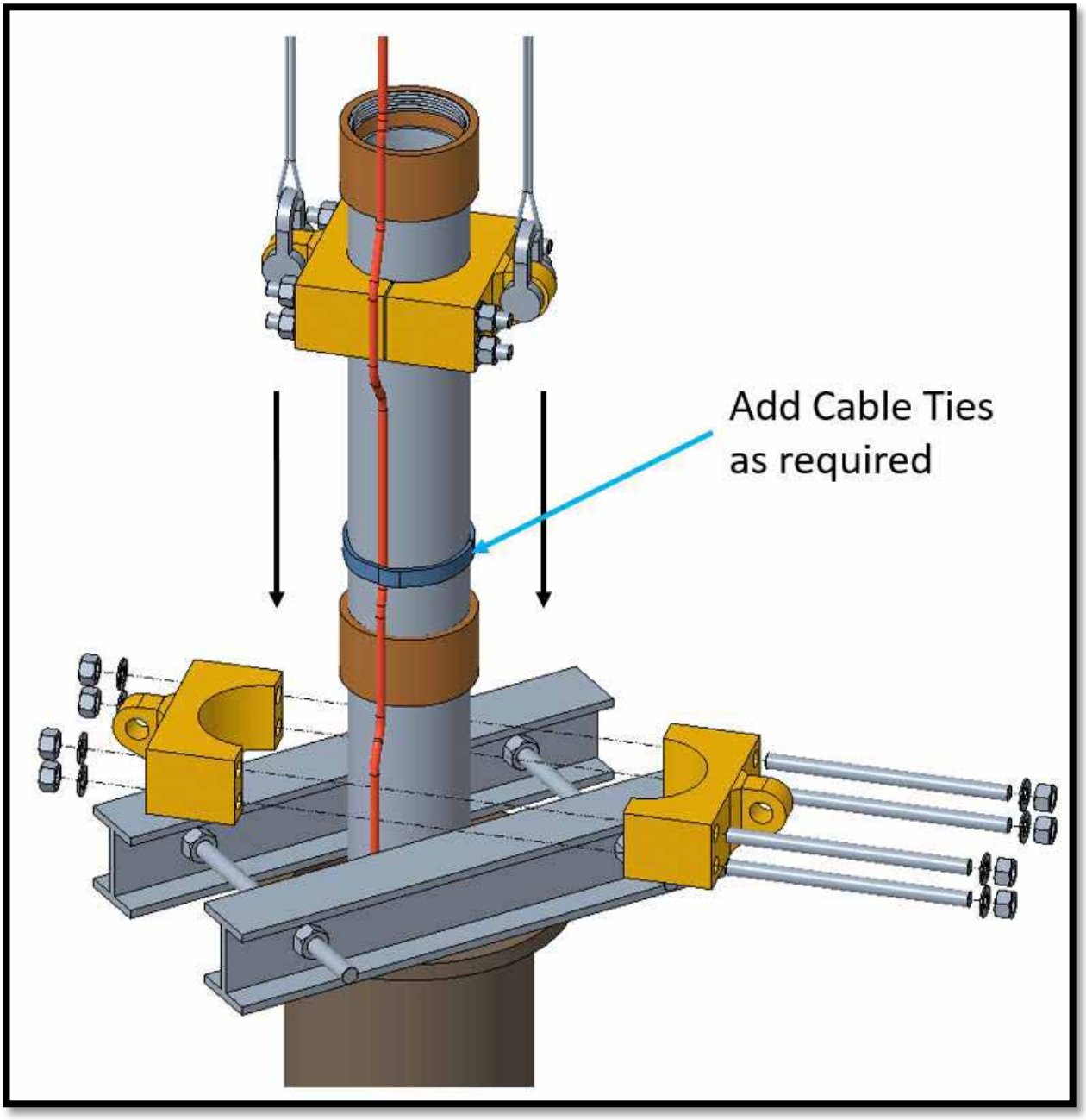


Figure 21

Section 3-3: Discharge Head or Discharge Elbow

Section 3-3-1: Install Discharge Head

1. Install the Head shaft per ITT Goulds Pumps VIT IOM.
2. Install the Discharge Head per ITT Goulds Pumps VIT IOM.

   In general:

   a. Install shackles (2) into each of the lifting eyes. Thread the shackle bolt through Lifting Clamps (3) making sure to tighten per manufacturer recommendations. The shackles should be free to rotate around the bolt axis.
   b. Install fasteners into the Discharge Head, as applicable.
   c. Attach Lifting Sling (1) to each shackle.
   d. Lift the discharge head and hoist it over the protruding head shaft.
   e. Lower discharge head onto Top Column (5), taking precaution not to damage the corresponding hardware.
   f. Tighten Hex nuts gradually in diametrically opposite pairs.

WARNING

Size lifting fixtures according to the full weight of the equipment provided with appropriate factor of safety. If lifting equipment is not sized correctly, it could result in personal injury or loss of life.

CAUTION

If lifting equipment is not sized correctly, it could result in damage or destruction of equipment.

Figure 22: Discharge Head lowering.

Section 3-3-1-1: Remove Tooling

1. With the shackles still installed on the discharge head, lift the full pump assembly such that there is adequate space to remove the ITT Goulds Pump supplied lifting equipment.
2. Remove I-Beams (6) by unthreading Hex Nuts (10) and taking out Threaded Rods (9).
3. Loose Bolts (7) and Nuts (8) and remove the Lifting Clamps (3).
4. Lower down the assembly engaging the Discharge Head with the Caisson (11) or pit opening or sub base.
5. Attach Discharge Head to or pit opening or sub base per design requirements.

NOTICE: This completes the lifting clamp assembly procedure. The user can now continue assembling the rest of the pump.

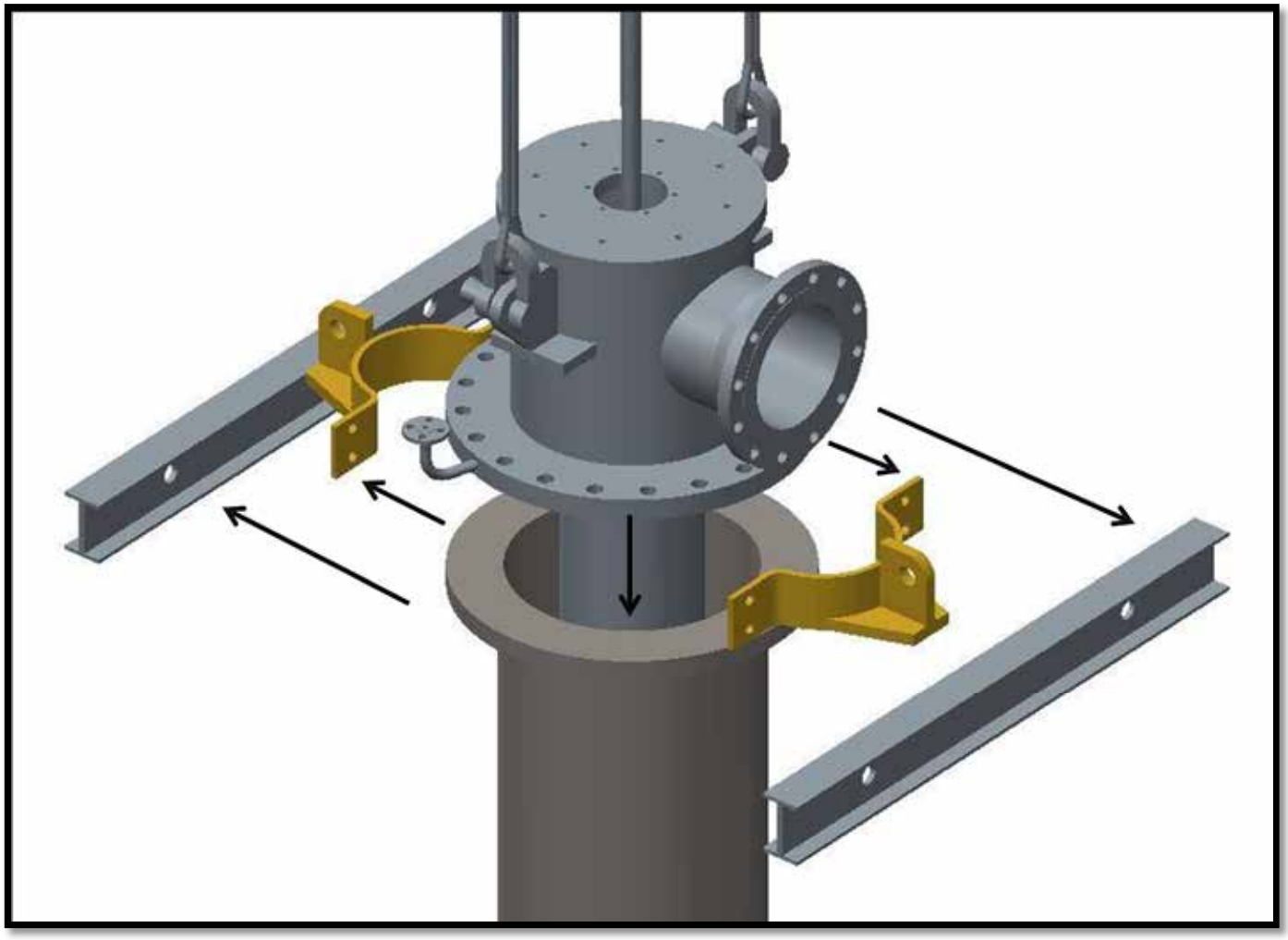


Figure 23: This configuration may vary on a pump to pump basis. Take care to lower slowly and with caution to avoid damaging the pump.

Section 3-3-2: Install Discharge Elbow

1. In general:
    a. Install shackles (2) into each of the lifting eyes. Thread the shackle bolt through Lifting Clamps (3) making sure to tighten per manufacturer recommendations. The shackles should be free to rotate around the bolt axis.
    b. Attach Lifting Sling (1) to each shackle.
    c. Lift the discharge elbow (well head) and hoist it over coupling.
    d. Lower discharge elbow onto Top Column (5), taking precaution not to damage the threads.
    e. Clean all threads and coat with thread lubricant.
    f. Tighten the threaded discharge elbow with the threaded coupling.
    g. In case of submersible pumps pass the motor cabling through the openings on the discharge elbow.

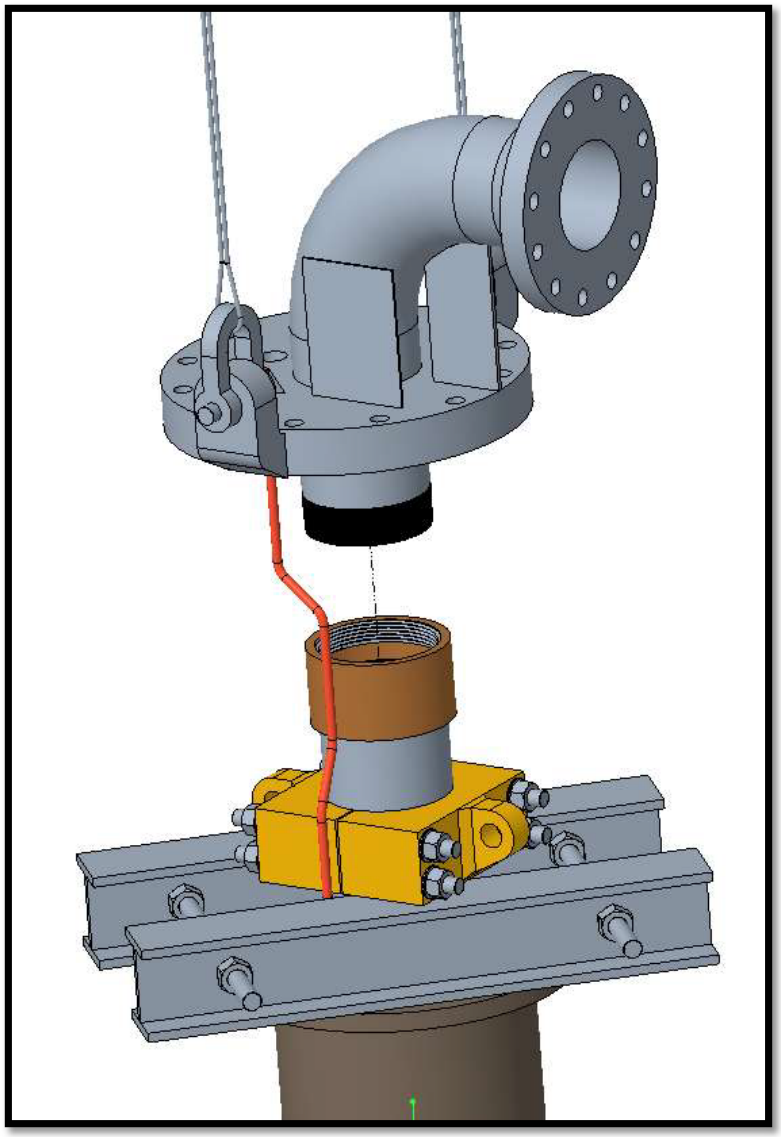


Figure 24

Section 3-3-2-1: Remove Tooling

1. With the shackles still installed on the discharge elbow, lift the full pump assembly such that there is adequate space to remove the ITT Goulds Pump supplied lifting equipment.
2. Remove I-Beams (6) by unthreading Hex Nuts (10) and taking out Threaded Rods (9).
3. Loose Bolts (7) and Nuts (8) and remove the Lifting Clamps (3).
4. Lower down the assembly engaging the Discharge elbow with the Caisson (11) or pit opening or sub base.
5. Attach Discharge elbow to caisson or pit opening or sub base per design requirements.

NOTICE: This completes the lifting clamp assembly procedure.

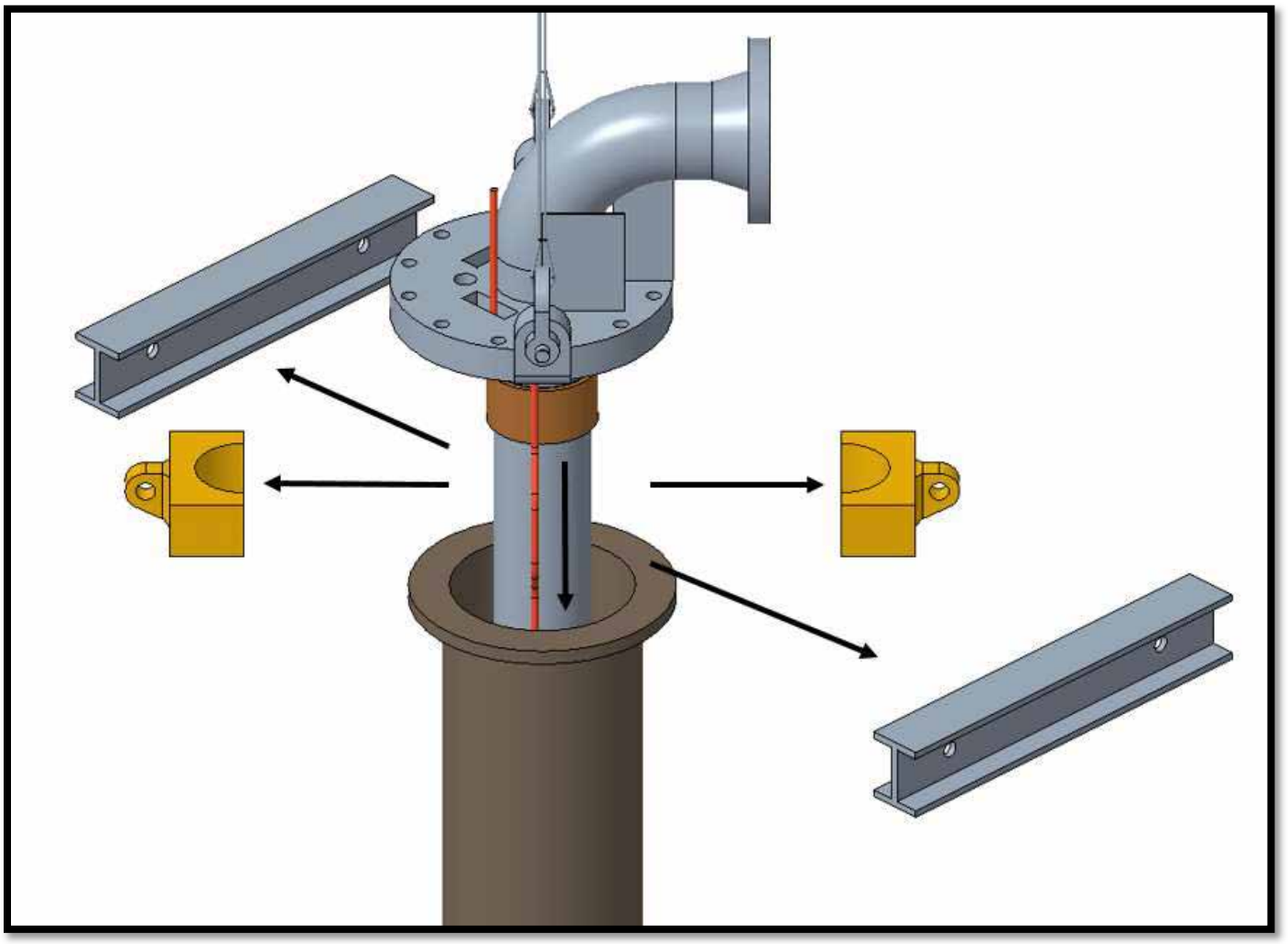


Figure 25: This configuration may vary on a pump to pump basis. Take care to lower slowly and with caution to avoid damaging the pump.

APPENDIX: BOLT TORQUE VALUES

Below are **recommended** torque and preload values based on a carbon steel fastener (typically, carbon steel fasteners are provided as a standard with the ITT Goulds Pumps lifting clamp assemblies). Refer to the factory for torque values for specific equipment not detailed in this manual. Measure the torque or preload during installation and verify it matches the values shown below.

Bolt Dia. (D) in. – threads/inch	Tensile Stress Area (Ab), sq-in	Max preload (lbs)	Torque (ft-lb) Dry, K=0.2	Torque (ft-lb) Std Lub, K=0.15	Torque (ft-lb) Hi Perf Lub, K=0.075
0.25-20	0.0318	801	3	3	1
0.3125-18	0.0524	1320	7	5	3
0.375-16	0.07749	1953	12	8	5
0.4375-14	0.1063	2679	20	13	8
0.5-13	0.1419	3576	30	20	11
0.5625-12	0.18195	4585	43	29	16
0.625-11	0.226	5695	59	39	22
0.75-10	0.33446	8428	105	70	39
0.875-9	0.462	11642	170	113	64
1-8	0.606	15271	255	170	96
1.125-7	0.763	19228	361	241	135
1.25-7	0.969	24419	509	339	191
1.375-6	1.155	29106	667	445	250
1.5-6	1.405	35406	885	590	332
1.75-5	1.9	47880	1397	931	524
2-4.5	2.5	63000	2100	1400	788
2.25-4.5	3.25	81900	3071	2303	1152
2.5-4	4	100800	4200	3150	1575
2.75-4	4.93	124236	5694	4271	2135
3-4	5.97	150444	7522	5642	2821

WARNING

Torque the fasteners to values shown. If these values are not correctly followed it could result in personal injury or loss of life.

CAUTION

Torque the fasteners to values shown. If these values are not correctly followed it could result in damage or destruction of equipment.

Visit our website for the latest version of this document and more information:
http://www.gouldspumps.com

ITT Goulds Pumps, Inc.
240 Fall Street
Seneca Falls, NY 13148
USA

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