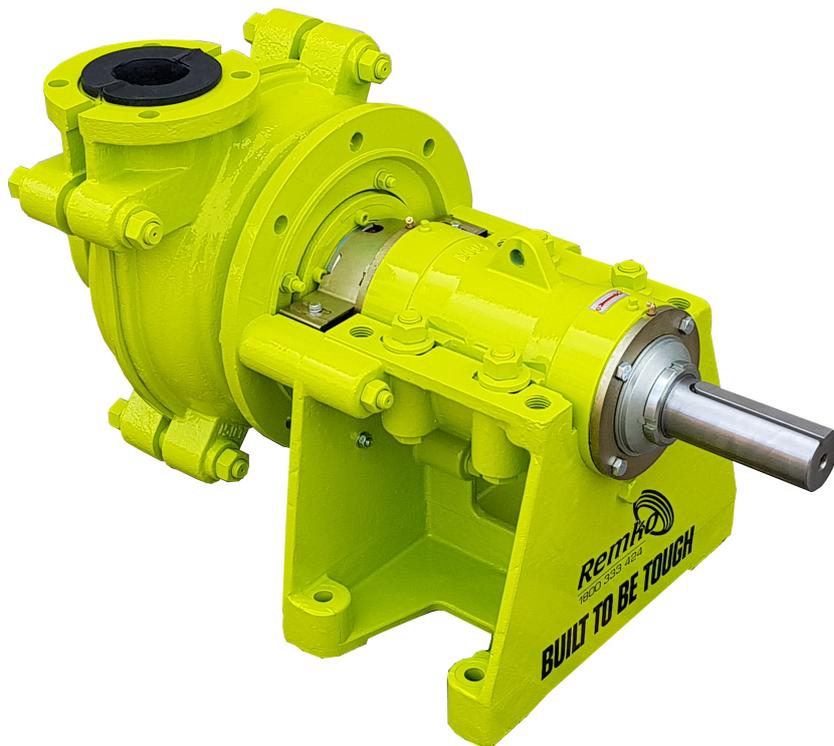




REMKO SLURRY TOUGH PUMPS

Heavy Duty Slurry Pumps

ASSEMBLY, MAINTENANCE AND
OPERATION MANUAL



FOR TITANIUM SERIES PUMPS (Rubber lined)

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1. Disclaimer of Warranty and Limitations of Liability

Remko pumps are warranted against defects in workmanship and material under normal use (rental use excluded) for 2 years from date of purchase. This is to the extent that Remko will at its option replace, repair or refund, in full, the purchase price of the instrument of any part thereof manufactured by Remko, which in our opinion is defective. Also provided the instrument has been operated in strict accordance with this document, and has not been subjected to tampering, abuse or exposed to highly corrosive and/or unspecified explosive conditions.

- This warranty does not cover the conditions arising as follows:
- Failure of Remko manufactured parts or components including wearing parts, due to normal wear or any damage or failure; that in Remko judgment arises from misuse.
- Failure to implement the necessary safety procedures for use in the European Community (EC) of a pump within an explosive atmosphere as laid down in the latest EC ATEX directive from 1st July 2003. The Remko pumps are not currently ATEX accredited.
- Failure to disclose the use of a pump (intended or unauthorized) within a known explosive atmosphere.
- Failure to use Original Remko spare parts

REMKO MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF FITNESS OR MERCHANTABILITY, EXCEPT AS EXPRESSLY SET FORTH ABOVE. REMKO SHALL NOT BE LIABLE FOR ANY INJURIES, LOSSES OR DAMAGES INCLUDING, BUT NOT LIMITED TO ANY PERSONAL INJURIES, ANTICIPATED OR LOST PROFITS, INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, COSTS, TIME CHARGES, OR OTHER DAMAGES OR LOSSES, IN CONNECTION WITH THE INSTRUMENT, ITS USE OR ANY REPLACEMENT PARTS THEREFORE:

Full completion of the warranty card is essential in order to be covered by Remko outstanding warranty schemes. Please be aware of the declaration that you undertake to use only original Remko spare parts - this is an essential part of the warranty scheme and is legally binding. The card will also act as a record of your dealings with Remko and its distributors.

This warranty is voided if the customer fails to follow any and all instructions, warnings or cautions in this document. Remko has made every effort to illustrate and describe the product(s) in this document. Such illustrations and descriptions are, however, for the sole purpose of identification and do not express or imply a warranty that the products are merchantable or fit for a particular purpose, or that the products will necessarily conform to the illustration or descriptions.

If a manufacturing defect is found, Remko will replace or repair the instrument or replace any defective part thereof without charge. However, Remko's obligation hereunder does not include the cost of transportation of the instrument to Remko or its return to the customer; these costs must be borne by the customer. Remko assumes no responsibility for damage in transit; any claims for such damage should be presented to the carrier by the purchaser.

In addition, instead of replacing or repairing the instrument as aforesaid, Remko may, at its sole option, take back the defective instrument and reimburse the customer for the purchase price in full settlement of any and all potential claims related to the purchase or use of the Remko pump.

2. Safety Issues

2.1 Safety Alert Symbol



The symbol shown above is used to identify topics of primary safety concern and call attention to instructions concerning your personal safety. Watch for this symbol, it involves important safety precautions, and means "ATTENTION! BE ALERT! YOUR PERSONAL SAFETY IS INVOLVED!"

Read the message that follows and be alert to the possibility of personal injury or death.

2.2 Signal Words

Signal words designate a degree or level of hazard seriousness. They are used in this manual in accordance with ANSI Z535.4-1991 and are defined as follows:



This indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.



This indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.



This indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. It may also be used for property damage-only accidents.

2.3 Safety First

- The information in this manual is essential for the safe operation and servicing of the Remko pumps. This manual must be read and fully understood before operating or servicing such pumps.
- The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure likely to cause injury.
- It is understood that safety rules within individual companies vary. If a conflict exists between the material contained in this manual and the rules of a using company, the more stringent rules should take precedence.
- This manual should be kept available to operating and maintenance personnel. Additional copies of this manual may be obtained from Remko via your local distributor or downloaded from our website at www.remko.com.au
- Safety suggestions from users will be given the most serious consideration. This is especially true of advice for minimizing problems associated with safety misuse.
- Throughout this manual these safety instructions are repeated, together with other safety notes and tips. The relevant information will act as a guideline for you in operating the pump; alternative courses of action are also described should you for any reason be unable to follow those procedures initially given. You are advised to follow these guidelines to achieve maximum efficiency.

2.4 Operational Safety



Always isolate the power supply before working on the pump.



Static hazard. Clean only with a damp cloth.

Never place hands or other parts of the body inside or near any part of the pump when it is in operation or when the power is not totally isolated.

Maintain a clean environment around the pump - slipping or falling against the pump may cause serious injury.



When the pump is running, you should not touch the pump and should maintain an adequate safe distance around it.

Do not climb onto the pump or connecting pipe work.

Wear safety clothing (glasses, hats, gloves, boots, etc.) when operating or working on the pump or in its immediate vicinity.

2.5 Maintenance Safety



Always isolate the power supply before working on the pump.

Verify drive motor rotation direction prior to fitting of drive belts or couplings. Incorrect motor rotation may cause personnel injury or equipment damage.



Always follow the safety procedures for handling the product being pumped (Refer to Materials Safety Data Sheet, MSDS, for product being pumped).

Always use lifting equipment safely in accordance with the manufacturer's recommendations.

Extreme care must be taken when changing the wearing parts. Loads must be properly supported to prevent injury.

Do not run the pump for an extended time with zero or very low flow rate. Failure to observe this warning could result in overheating of the pump, and vaporisation of the pumped fluid, with generation of very high pressures. Serious injury to personnel or damage to equipment may result from such action.

Do not feed very hot or very cold fluid into a pump at ambient temperature. Thermal shock may result in fracture of pump wet-end parts.

A Remko pump is both an item of rotating machinery and a pressure vessel, and must be regarded as such. All relevant safety precautions and procedures for such equipment should be observed during pump installation, operation and maintenance, as serious injury or damage could occur otherwise.



Do not strike the pump shaft, the inner race or the bearings.

Do not use heat to assist with the impeller removal. This may cause a shattering or melting of the impeller, resulting in serious injury or equipment damage.

Where periphery equipment is associated with a pump (for example the motors, drive belts, drive couplings, speed reducers, variable speed drives, etc.), all relevant instruction manuals should be consulted, and recommended procedures implemented, during installation, operation and maintenance of the pump system.

2.6 Assembly, Installation and Commissioning

A qualified electrician should be consulted on operations where there may be risk of electrical hazard.



Ensure adequate lifting precautions are taken when a pump is being lifted/lowered into position. The pump should be securely slung, using suitable rated slings, ensuring that the load is equally balanced and cannot work loose.

Always isolate the power supply before working on the pump.
Check compatibility of the parts in contact with the product being pumped.
Check all nuts and bolts are tightened to the required torque settings laid down within this manual. (**Appendix B** unless otherwise stated)



YOU ARE ADVISED TO FOLLOW AND COMPLY WITH THE SAFETY INSTRUCTIONS FROM REMKO FULLY – IF YOU DO NOT, YOU RUN THE RISK OF SERIOUS OR FATAL INJURY. IF YOU DO NOT UNDERSTAND ANY OF THE POINTS, YOU SHOULD NOT PROCEED UNTIL YOU HAVE CLARIFIED THE POINTS WITH YOUR DISTRIBUTOR.

3. Safety, Operation and Maintenance Instructions

3.1 General – Facilities

Care should be taken at all times to ensure that any tools are used safely for the purpose for which they are designed and in accordance with the manufacturer's instructions. For the tools that will be required for maintenance work, please see **Appendix C**.



Specialist lifting equipment may be required for several of the procedures outlined within this document. The lifting equipment to be used should be checked for suitability for the task and capability of lifting the combined weight of the pump components. Always follow the manufacturer's instructions for safe operation of lifting equipment.

3.2 Assembly and Preparation

3.2.1 Assembly

Remko pumps are sold worldwide and have been designed to be transported assembled and ready to be installed in the destination country. We have checked the assembly of the pump before it is delivered to you, but please note the following procedures for assembly of the pump. If the product is to be air freighted the Remko pump will be despatched in a wooden crate.

3.2.2 Preparation



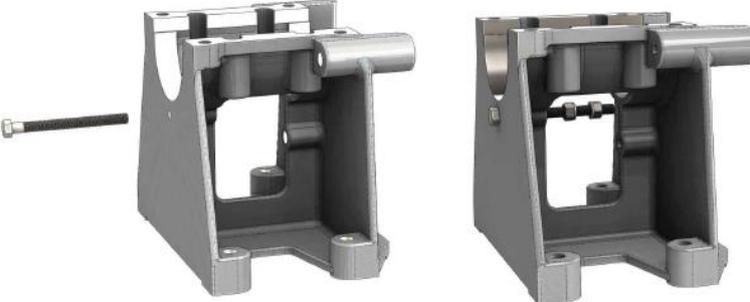
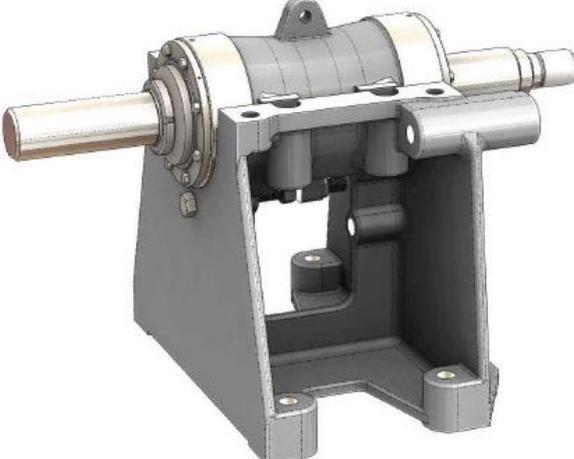
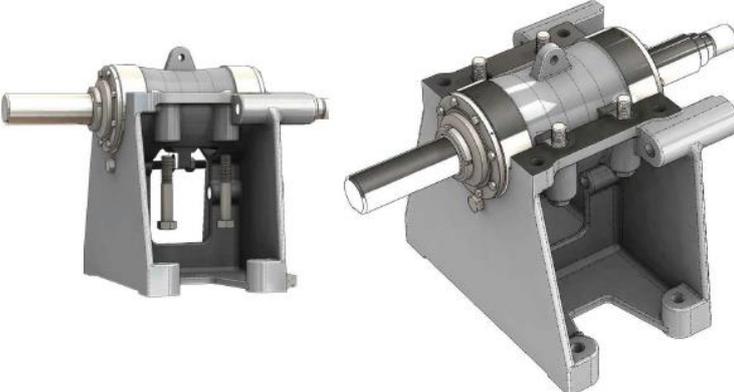
Prepare the workspace in which the pump is to be built, ensuring there is a clean and level work surface with sufficient room for not only the pump, but also to allow you sufficient access to the pump and to fit pipe work in safety. Carefully open the packaging and check for completeness / damage, remove any loose components and set them out on a workbench.

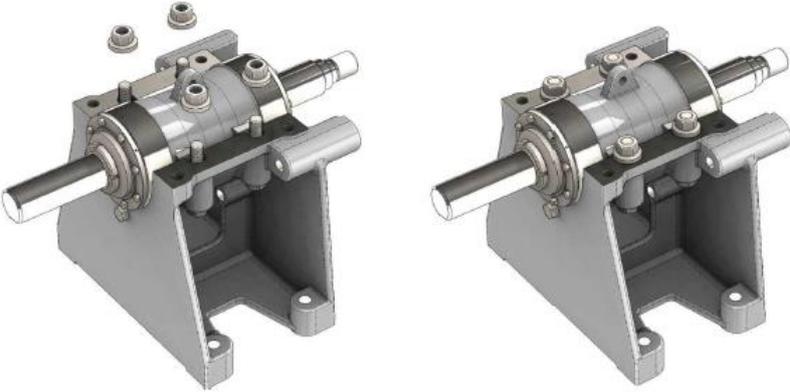
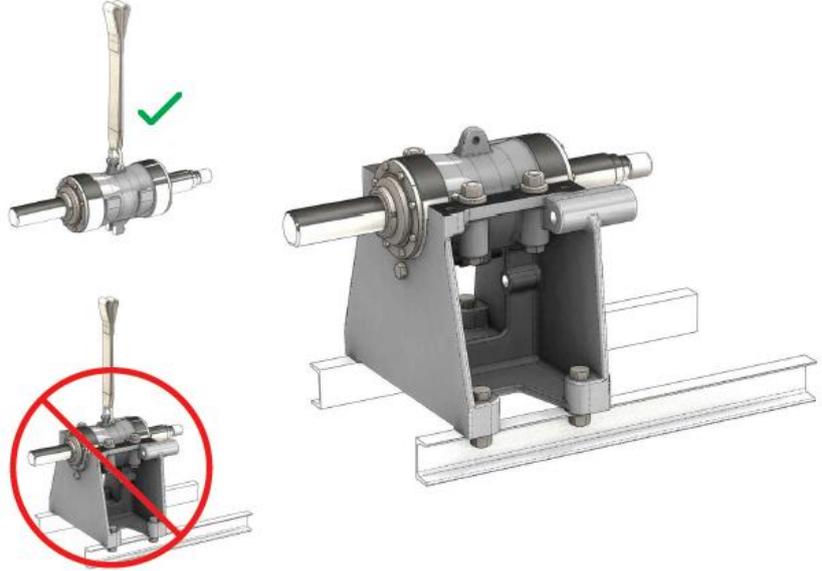
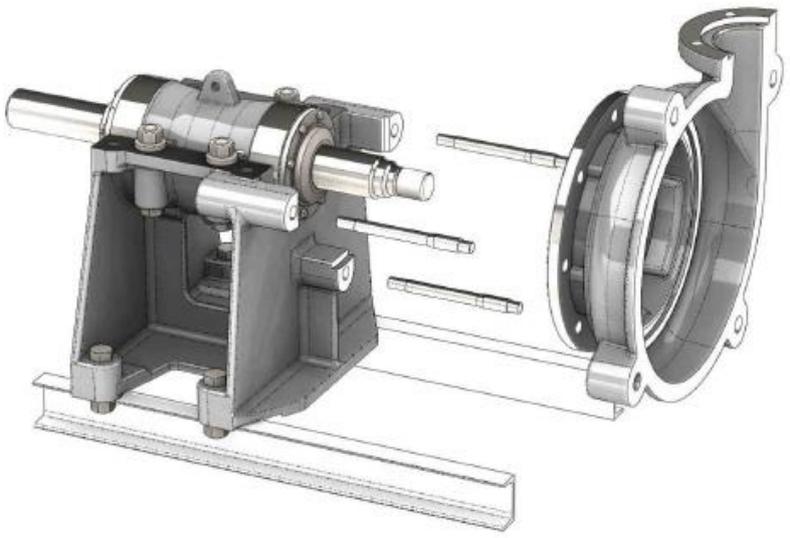
If the pump or any parts are found to be damaged / incorrect specification or missing, then please record the appropriate serial number from the identification plate and/or the quality check seal on the packaging, and inform your local distributor or Remko.

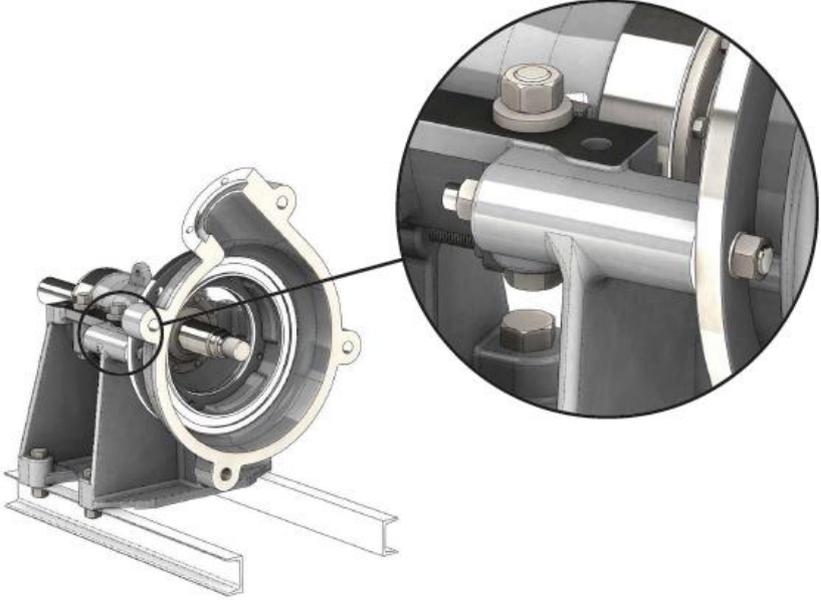
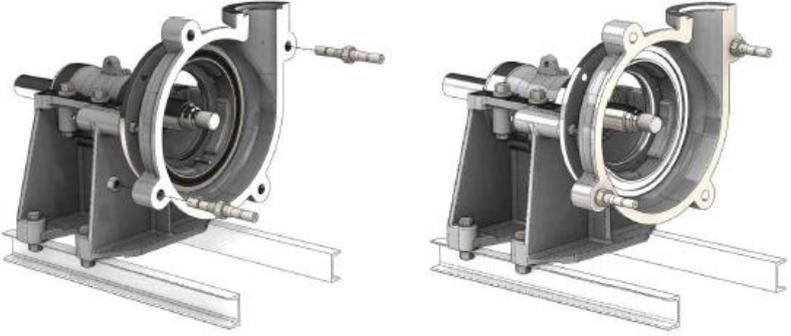
3.2.3 Assembling the Pump

Please follow the below steps to assemble the pumps. The first column is the step number, the second is the parts that will be needed for the step and the last is the illustration of what should be done with the parts in column 2.

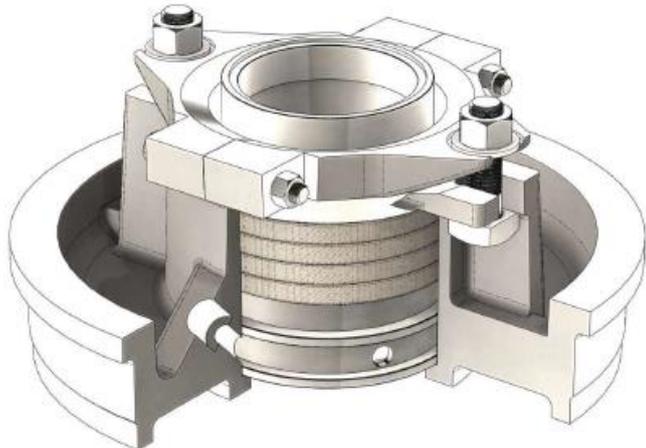
Note: An anti-seize Lubricant should be applied to the Threads and nuts of any bolts or studs used. Apply also to the bare shaft before installing the shaft sleeve or spacer. Avoid contact with elastomer components such as rubber liners, rubber seals, etc. as most lubricants are petroleum based.

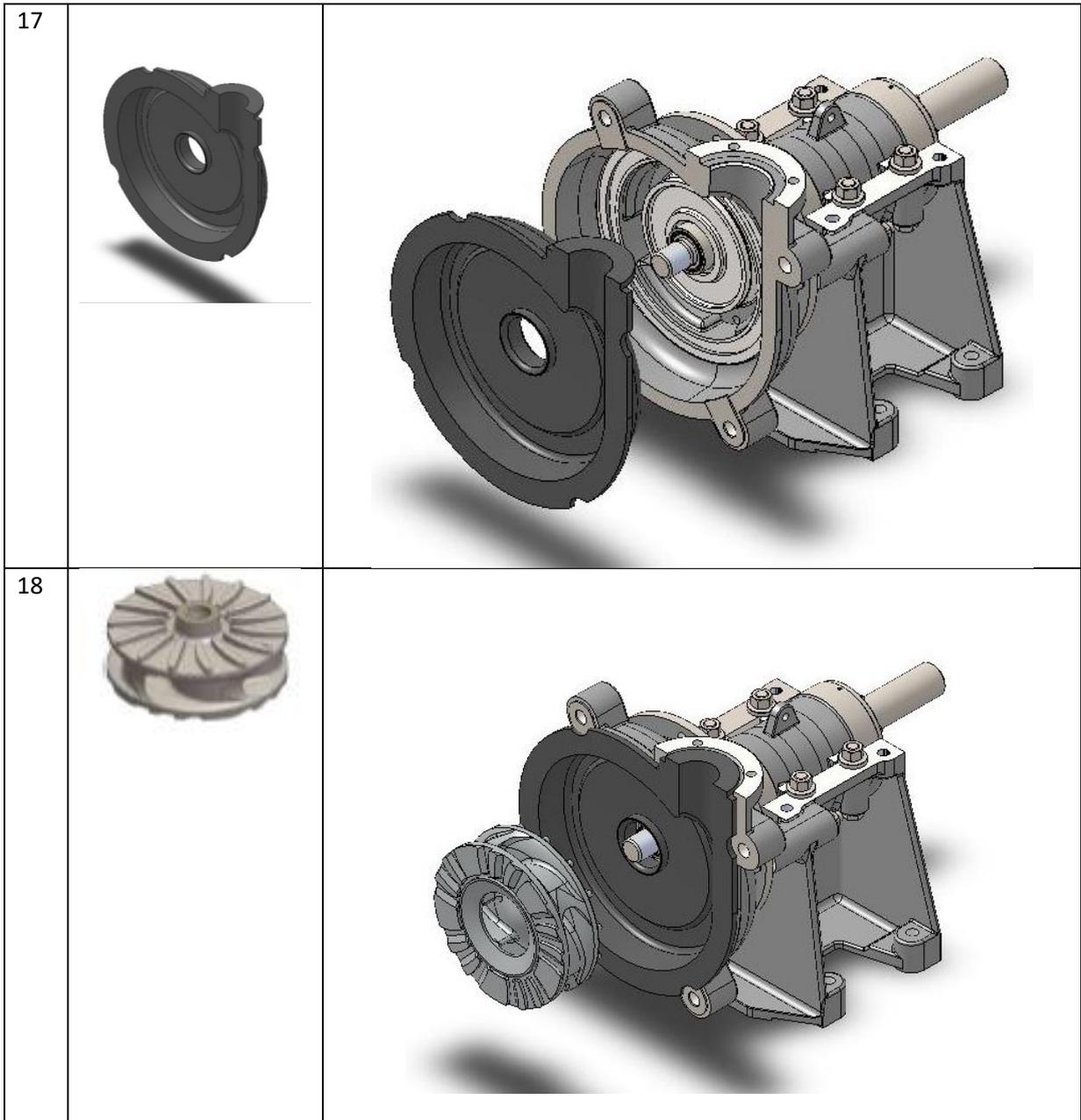
#	Parts required	Assembly
1	 <p>x2</p> <p>x2</p>	
2		
3	<p>x4</p> 	

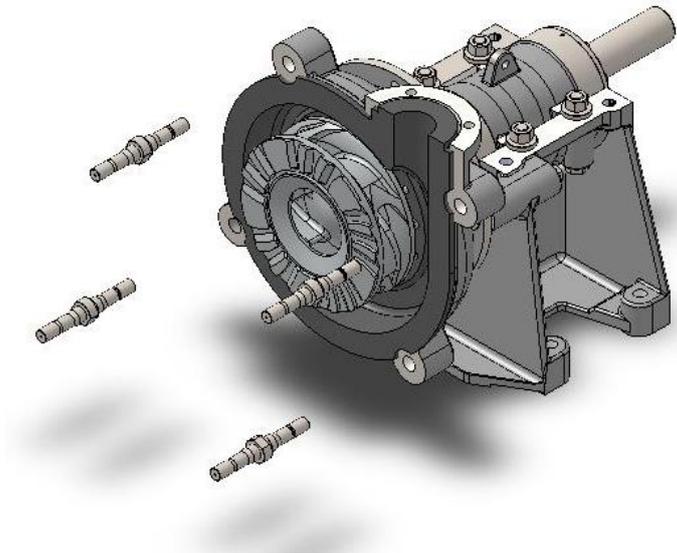
<p>4</p>		
<p>5</p>		
<p>6</p>	<p>x3</p> 	

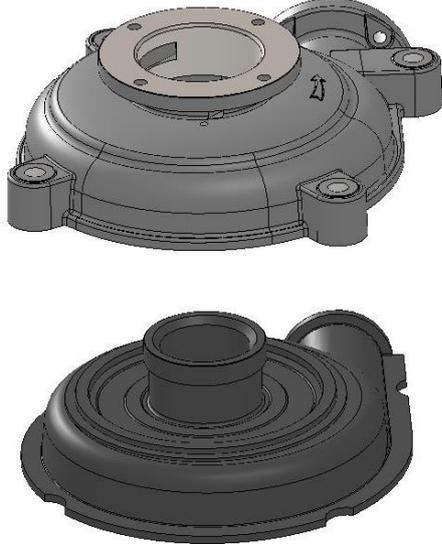
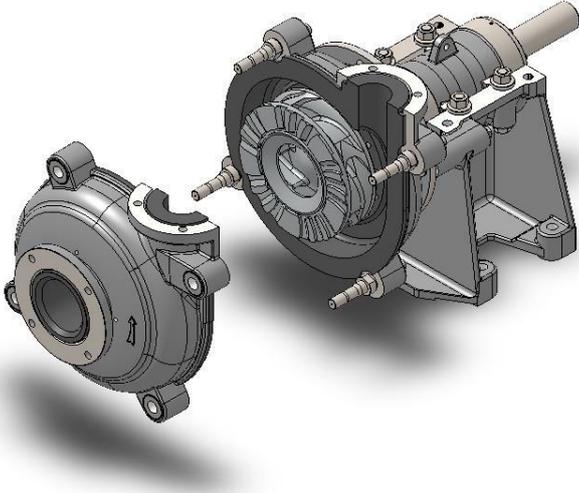
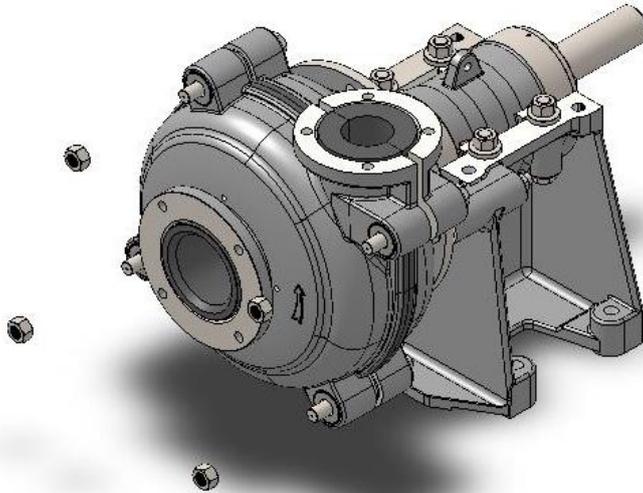
7		
8	<p>x6</p> 	
9	<p>x2</p> 	

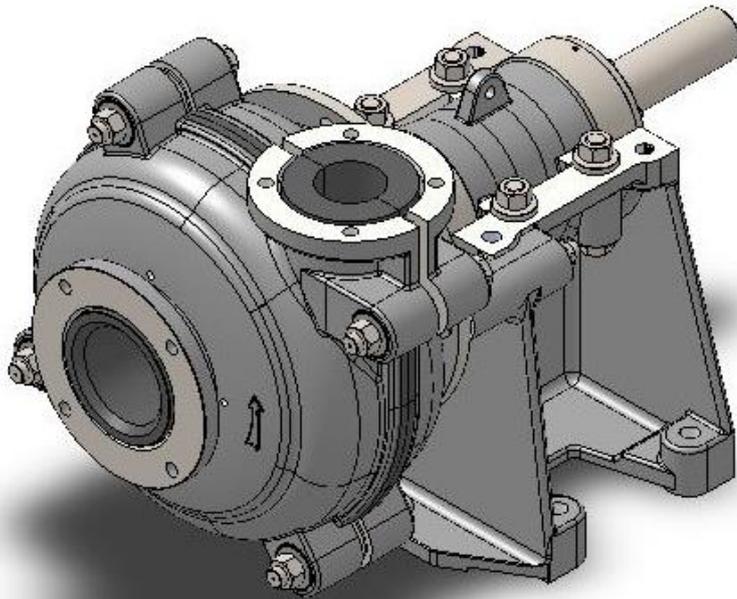
10	<p>x2</p> 	
11	<p>x4</p>      <p>x2</p>  <p>x2</p> 	
12		

<p>13</p>	<p>x2</p> 	
<p>14</p>	<p>x2</p>  <p>x2</p>  <p>x2</p> 	
<p>15</p>		
<p>16</p>		



<p>19</p>	<p>x4</p> 	
<p>20</p>	<p>x4</p> 	
<p>21</p>		

22		
23		
24	<p>x4</p> 	



3.3 Installation Recommendations

Please remember that the below are recommendations. Whether or not they are respected depends on the application/conditions and discretion of the user/installer.

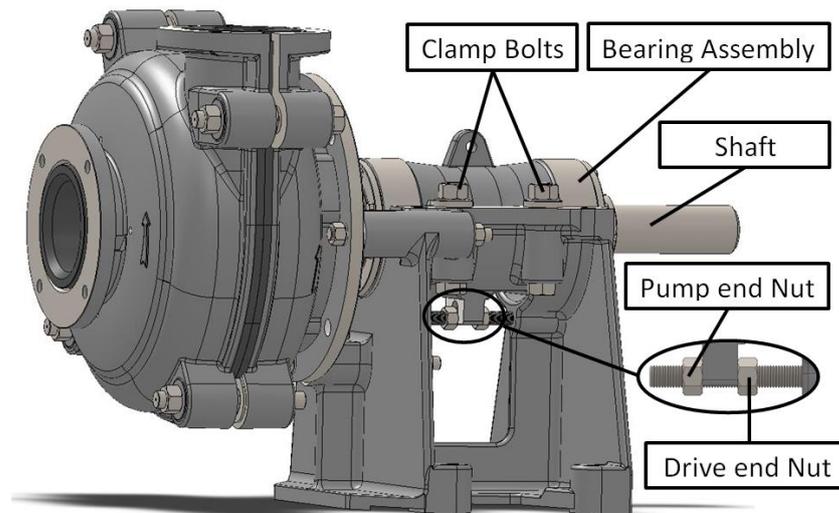
- The pump should be installed on a level concrete or steel foundation, designed to take the entire load from the pump and motor – it should be remembered that an electric motor can exert double the rated power during start-up.
- If the foundation isn't level, shims should be used to level the pump base – if it is distorted it could cause the pump/motor to become unaligned.
- Sufficient space should be allowed around the pump for inspection and maintenance purposes.
- Clean flushing water for the sealing system may be required – this should be available at around 0.35 kg/cm^2 (5 PSI) more than the pump's discharge pressure with a controllable flow.
- Piping recommendations:
 - a. The Pump should be installed as close to the supply of fluid as possible, to reduce the possibilities of problems in the suction line and improve performance.
 - b. The suction pipe should be as short as possible, with as few bends as possible.
 - c. On some pumps, rubber joint rings (they are supplied with the pump) are required between the pump casing and pipework – these are to seal between the two metal surfaces, and should not be used to rectify pipework that doesn't but up squarely.

- d. Do not attempt to rectify badly fitting or unaligned pipework by using excessive force to tighten the bolts/studs connecting the flanges. The mating flanges should but up to each other squarely with the bolt holes lined up.
- e. A removable piece of pipe should be connected to the suction and discharge of the pump – this should be long enough to allow the removal of the front casing.
- f. If using a flexible expansion joint on the suction and discharge, ensure that it is well anchored as reaction forces could cause damage to the pump or other equipment.
- g. If the pipe connected to the suction is of a larger diameter than the pumps suction, an eccentric reducer is recommended to avoid air pockets.
- h. If the pipe connected to the discharge is of a larger diameter than the pumps discharge, a concentric reducer is recommended.
- i. A valve on the pumps discharge is recommended to prevent overloading the motor, bearings, drive and pump – this could occur when the pump is working at a lower flow or head than the curve at the relevant RPM or when the pump is discharging into an empty system.

3.4 Commissioning

1. Sealing system check:
 - a. For gland sealed pumps:
 - i. If the pump requires gland flushing water, verify that it is available at the correct pressure and volume. Do not activate the flushing water pump yet.
 - ii. The gland water pressure should be approx. 0.35 kg/cm² or 5 PSI² more than the discharge pressure.
 - iii. To effectively seal and avoid damage to the pump, the water should be clean (any contaminant in the water should be smaller than 40 microns and there should be less than 200 parts per million)
 - b. For pumps with a centrifugal seal, simply screw the grease cup down 2-3 turns to fill the static chamber with grease.
2. Verification of direction of shaft rotation:
 - a. Remove belts/couplings between the pump and the motor.
 - b. Start the motor and verify the direction rotation of the shaft. If necessary, correct the rotation to comply with the arrow on the pump casing.
 - c. Reconnect the belts/couplings between the pump.
3. Verify that there are no loose objects within the pumps casing. If there are, remove them.
4. Verify that the impeller turns freely. If it doesn't, make sure that the gland packing isn't too tight and that the impeller isn't touching the front of the casing.
5. Adjust the impeller to allow maximum efficiency: the impeller is factory adjusted but should be checked on site. These instructions on impeller adjustment are relevant to gland packing and expeller sealing systems. For impeller adjustment on pumps with mechanical seals, please consult factory.
 - a. Loosen the clamp bolts on one side of the pump (see image 3.4.5 (f)).

- b. Loosen the pump end nut on the adjusting screw and use the drive end nut to move the bearing assembly towards the pump end (while rotating the shaft in the direction indicated by the arrow on the casing) until the impeller rubs against the liner.
- c. Release the drive end nut 1/3 of a turn, and adjust the pump end nut tight up against it (this will move the bearing assembly back so that the impeller doesn't touch the liner when in operation)
- d. Retighten the clamp bolts and verify that all the nuts on the adjusting screw are tight.
- e. Verify by hand rotating the shaft that the impeller doesn't scrape against the liner.
- f. Image 3.4.5 (f):



6. Verify suction conditions:
 - a. Open the suction valve (if applicable).
 - b. If the pump is in a flooded suction application, verify that there are no air locks in the pipework leading to the pump and that the fluid to be pumped is available at the pumps suction inlet.
 - c. If the pump isn't in a flooded suction application, it will have to be primed. It is very important that all the joints in the pipework leading to the pump are air tight as otherwise air pockets could form and the pump could run dry, causing serious damage.
 - d. If possible, run the pump first with water before introducing the slurry or solids.
7. Verify discharge conditions:
 - a. Verify that the discharge valve is closed or slightly open
 - b. Verify that the valves along the discharge piping are open (except for the one on the pumps discharge) and that the system is ready to start (i.e. Controls, etc.)
8. Turn on the gland flushing water and adjust the external regulator and/or the gland bolts to regulate the flow until a small flow is obtained along the shaft.
9. Start the motor.
10. Once the pump has reached its maximum speed, slowly open the discharge valve (if it is opened too rapidly, it will cause a serious overload on the motor and drive system) and carefully adjust it according to the flow, suction and discharge pressures until the pumps readings comply with the designed duty point.

11. Verify the flushing water leakage on the sealing system (for gland packed and Expeller pumps) – if the leakage is excessive, tighten the gland bolts until the flow is reduced to the required level and regulate the flow on the external control if needed. If the flow is insufficient, loosen the gland bolts until the desired flow is obtained **but do not loosen so far as to be able to disengage the gland assembly from the stuffing box**. It may be necessary to increase the flow on the external flushing water control if loosening the gland bolts doesn't have the desired effect.
12. If the temperature in the sealing system has risen and continues to rise after adjusting the flushing water flow, it may be necessary to stop the pump and allow the temperature to drop (on low pressure duty points, it will only be necessary to stop the pump if it issues steam or smoke from the sealing area, but when running at high pressure it is better to stop before this occurs). This should only be necessary during the start-up as once the pump has run for a while the packing will accommodate itself and will no longer overheat – to overcome the "start-up heat", it is preferable to have excessive flushing water, which can later (after 8-10 hours of operation) be reduced to the correct flow.
13. If the sealing system continues heated after 8-10 hours of running time, please replace the packing (see maintenance of the Sealing System 3.5.4.1)
14. Bearing checks: during the first few hours of operation, the bearing temperatures should be checked frequently, especially if the bearing assembly has been dismantled and reassembled since the pumps last use.
 - a. If the bearing assembly components are in good order and are well greased, there should be little temperature rise in the bearing area during operation. If, however, some of the parts are worn, the pump has excessive or insufficient grease, or foreign particles in the grease, they could heat up excessively. Please see below parameters (all temperatures stated are at the surface):
 - i. If, after a few hours of operation, temperatures remain below 75°C the temperature should be checked periodically to verify that it doesn't exceed this value.
 - ii. If the temperature is in the 75-85°C range, monitor it continuously.
 - iii. If the temperature is in the 85-95°C range, stop the pump and allow the bearings to cool down. If they continue to create high temperatures when the pump is started again, dismantle the bearing assembly and verify:
 1. The condition of the parts – if they are worn/damaged replace them with original Remko spare parts or Remko recommended parts.
 2. That the grease has no foreign particles.
 - iv. If the temperature exceeds 95°C, stop the pump and consult factory.

3.5 Maintenance

3.5.1 General Notes on Maintenance

The Remko pumps are designed and specified to last as long as possible in the applications in which they work. However, there are some parts that are wear parts by the very nature of the pump and applications to which it is applied, such as:

- The Impeller
- The Volute Liner(s)
- Components of the Sealing system
- Components of the Bearing Assembly (Longer-term)

For the longevity of the pump life we recommend that you always use original Remko spare parts.

We carry stock of wearing parts at all times, but due to fluctuations in demand can give no assurance that we will have a part in stock at a given time – we recommend that the pump user carries a stock of the main wearing parts to minimize downtime. The main wearing parts are identified in **Appendix A**.

The frequency with which the pump needs servicing depends largely on the application, but we recommend that the pumps performance (head and flow) is verified monthly against the original or start-up duty point, as this will indicate the condition of the wearing parts. The following should also be checked monthly:

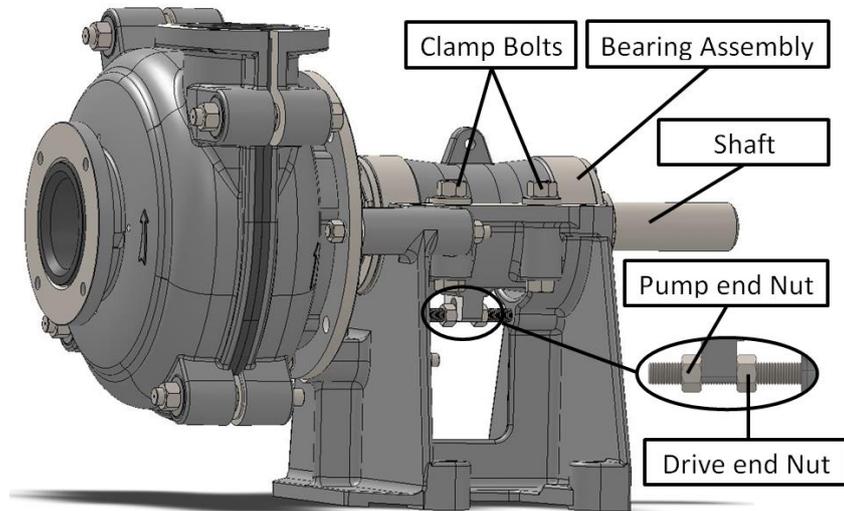
- The condition of the sealing system – see point 3.5.4 “The Sealing System”.
- The condition of the Bearing Assembly – see point 3.5.5 “The Bearing Assembly”.
- The Impeller adjustment – see point 3.5.2 “Impeller Adjustment”
- The condition of the wetted end wearing parts, (the Impeller and the pump liners) – see point 3.5.3 “Changing the Impeller and the Liner”

Once the wear life of the different wearing parts has been established, we recommend that the condition of the parts in question is verified once $\frac{3}{4}$ of their expected life has passed. If needed, the part should be changed – this will avoid unexpected downtime from part failure due to normal wear.

3.5.2 Impeller Adjustment

The Impeller in a Remko Slurry pump can be adjusted forwards and backwards in the pumps casing to compensate for part wear in abrasive applications. To allow maximum efficiency and part life the impeller in the Remko pump should be adjusted frequently, following the below instructions.

These instructions on impeller adjustment are relevant to gland packing and expeller sealing systems. For impeller adjustment on pumps with mechanical seals, please consult factory.



1. Loosen the two clamp bolts on one side of the pump.
2. Loosen the pump end nut on the adjusting screw and use the drive end nut to move the bearing assembly towards the pump end (while hand rotating the shaft in the direction indicated by the arrow on the casing) until the impeller rubs against the front of the liner (or the Throat bush).
3. Release the drive end nut 1/3 of a turn, and adjust the pump end nut tight up against it (this will move the bearing assembly back so that the impeller moves slightly away from the liner)
4. Retighten the clamp bolts and verify that both nuts on the adjusting screw are tight.
5. Verify by hand rotating the shaft that the impeller is no longer in contact with the liner.

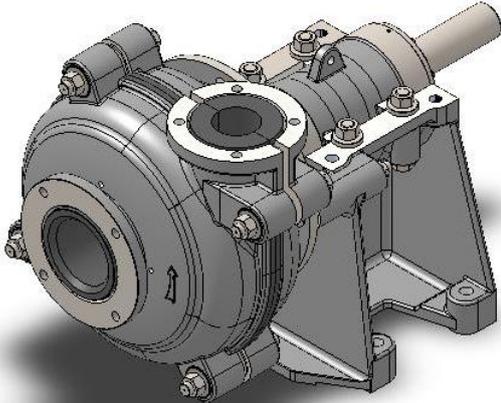
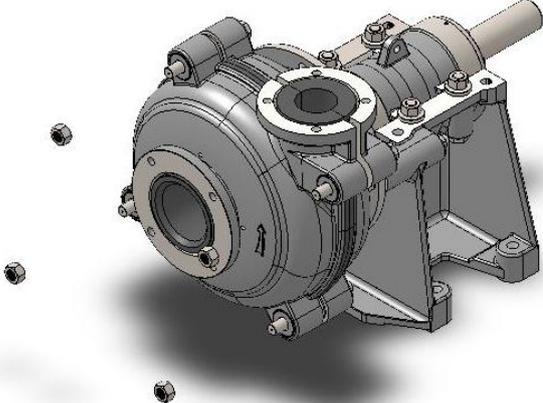
3.5.3 Changing the Impeller and the Liners

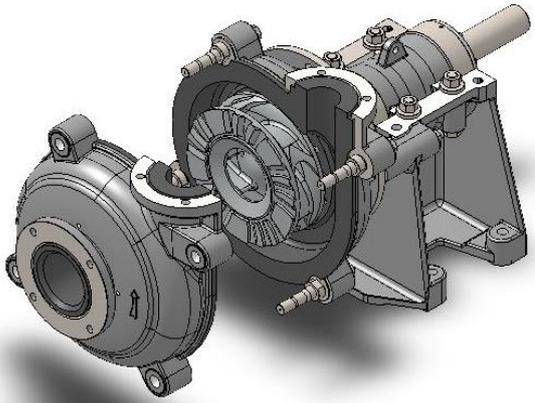
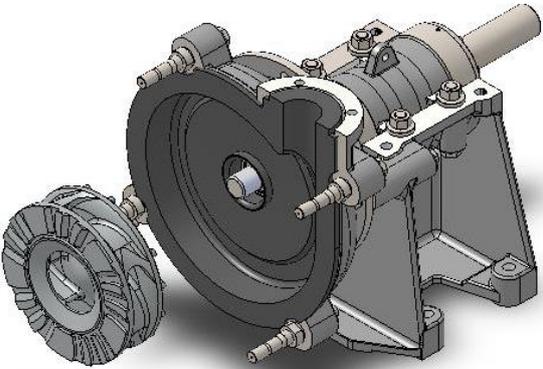
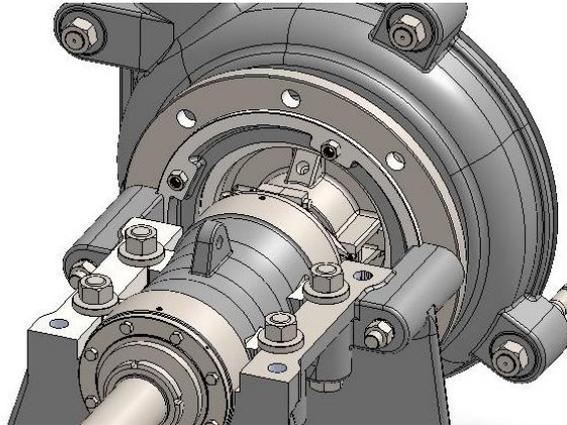


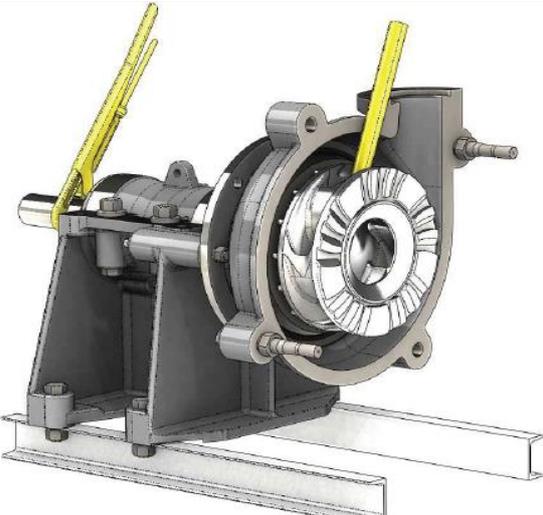
WARNING: DO NOT APPLY HEAT TO THE IMPELLER HUB OR INLET EYE TO ASSIST WITH THE REMOVAL OF THE IMPELLER. APPLICATION OF HEAT MAY RESULT IN SHATTERING OF THE IMPELLER, RESULTING IN INJURY OR EQUIPMENT DAMAGE.

WARNING: USED WEARING PARTS MAY HAVE EXTREMELY SHARP AREAS DUE TO THE WEAR THEY ENDURE. CAUTION SHOULD BE USED WHEN LIFTING OR HANDLING THEM.

Periodically the main Wearing parts (the Impeller and the Liners) of the Remko pump will need changing , as their condition will affect the performance of the pump (for frequencies of change see 3.5.1 “General Notes on Maintenance ”). Changing these parts is generally the inverse of the assembling of the pump, please see below:

Step	Description	Image
1	Using a “G” Clamp, clamp the Throat bush to the cover plate so it doesn’t come loose when the Cover plate is removed.	
2	Remove the Front cover bolts securing the pumps cover plate.	

3	<p>Remove the Front Cover and from the front cover remove the worn front cover liner and throatbush.</p>	
4	<p>Impeller removal generally involves applying an impulsive torque loading to the Impeller, while separately restraining the Shaft from rotation using the shaft Brake – Remko pumps are equipped with a right hand screw thread connection between the Shaft and Impeller.</p>	
5	<p>Remove the 4 Nuts on the Frame Plate Liner studs and remove the Frame Plate Liner.</p>	

6	Follow steps 17 to 24 of 3.2.3 Assembling the pump.	
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3.5.4 The Sealing System

As with the main wearing parts, the components of the sealing system will periodically need changing to avoid negative effects on the pumps performance. For how frequently they need to be changed will depend upon the application, but the amount of gland water leakage (for expeller and gland pumps) will be an indication of the condition of the components. We recommend that the state of the components of the sealing system is verified every time the main wearing parts are changed, as changing the complete sealing system involves removing most of the wet end (however, what will need changing most frequently is the packing – this can be done without dismantling the wet end).

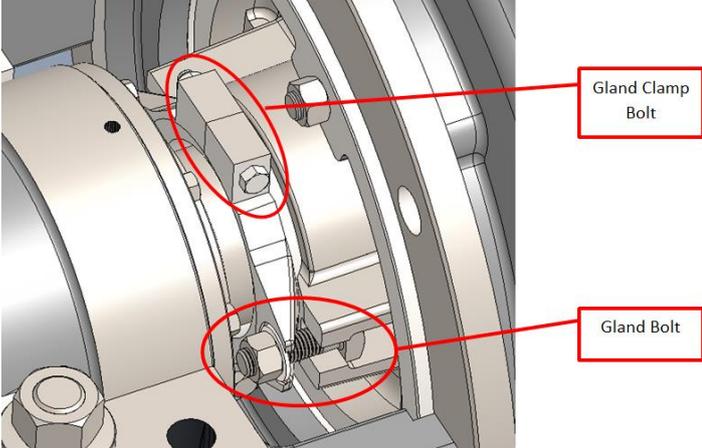
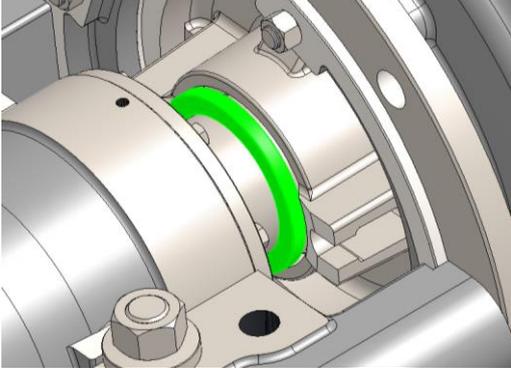
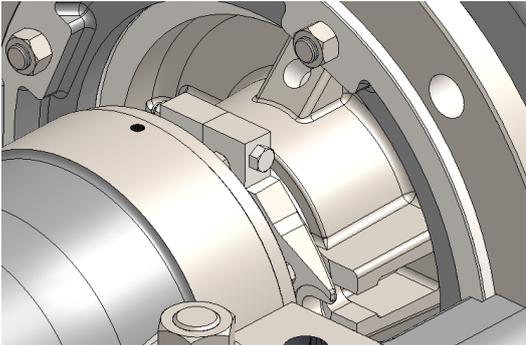
3.5.4.1 Gland Packing

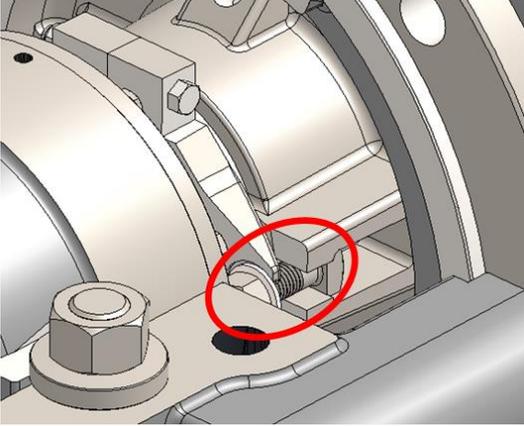
The Gland packing sealing system is comprised of the following components, of which the ones that are main wearing parts are marked with an asterisk:

1. Stuffing box
2. Shaft sleeve*
3. Gland assembly
4. Gland bolts
5. Packing*
6. Lantern Restrictor*

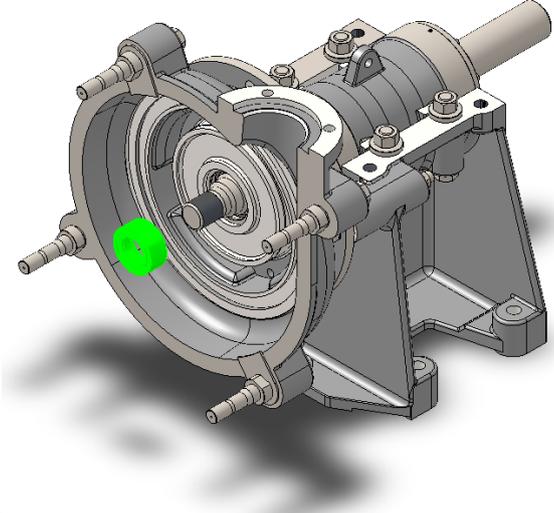
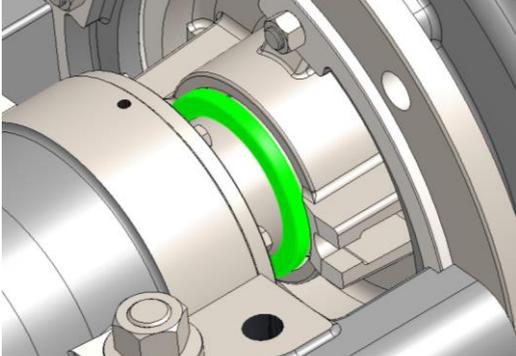
To change the Gland Packing (without dismantling the wet end), see below:

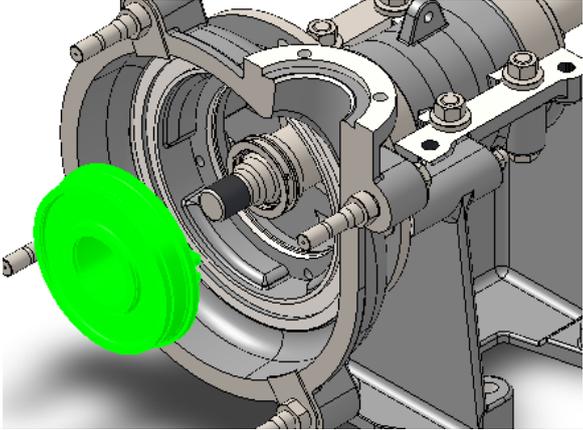
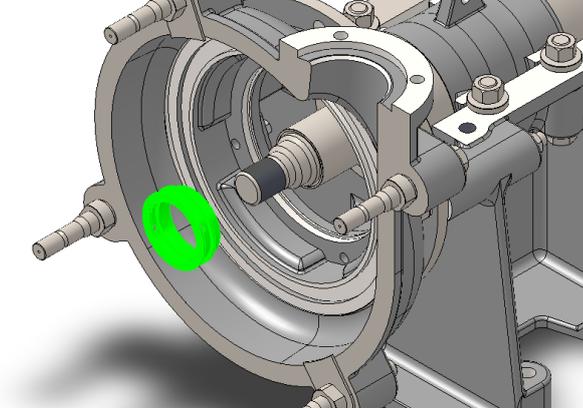
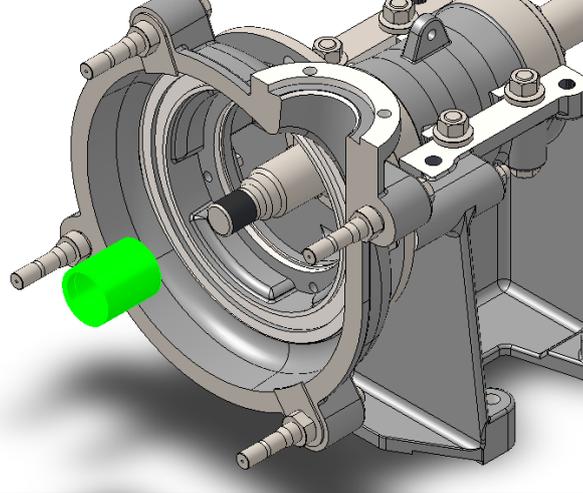
To change the complete gland sealing system, see page 31 – we recommend that this is done when the main wearing parts are being changed, to avoid extra downtime.

Step	Instructions	Image
1	Having stopped the pump, remove the two Gland bolts securing the Gland assembly to the Stuffing box, remove the two Gland Clamp bolts securing the Gland assembly, and remove the two parts of the Gland assembly.	
2	Remove the old Packing rings (marked in Green) from within the Stuffing box.	
3	Insert the new Packing rings 1 at a time, staggering the joints in the rings. Push each ring as far as it will go before entering the next one (it may be necessary to reassemble the gland assembly and use it to push the 3 rd ring in, and then remove it to insert the 4 th packing ring). There can be no space between each packing ring or at either end, as this will cause excessive leaking and could cause premature failure of some parts.	
4	Once the 4 Packing rings are installed in the Stuffing box, reassemble the Gland assembly around the shaft (using the Gland clamp bolts).	

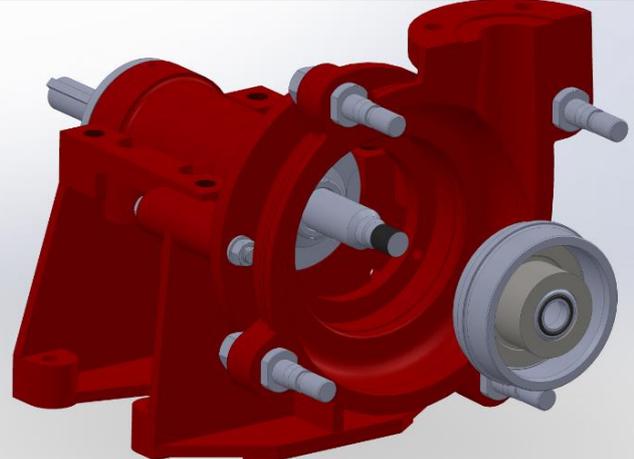
5	Secure the Gland assembly to the Stuffing box with the Gland bolts, but do not tighten these excessively. Hand tight is good enough, as long as the Gland assembly is resting against the packing rings and there is no space between each ring or between the last ring and the lantern restrictor.	
6	To restart the pump, follow steps 8 to 12 from 3.4 Commissioning	No Image

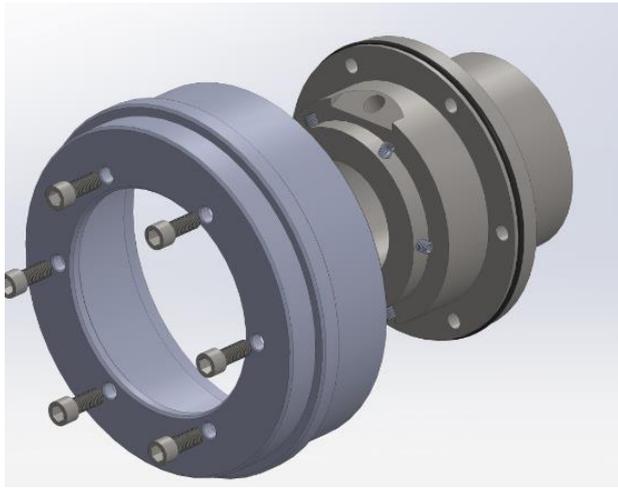
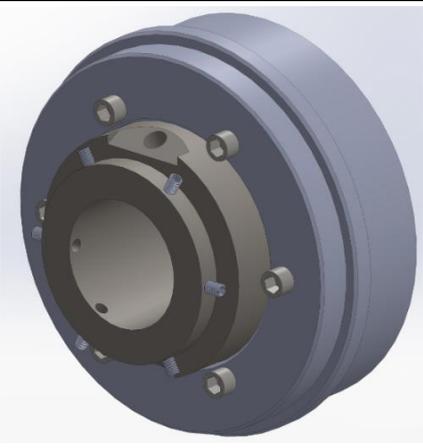
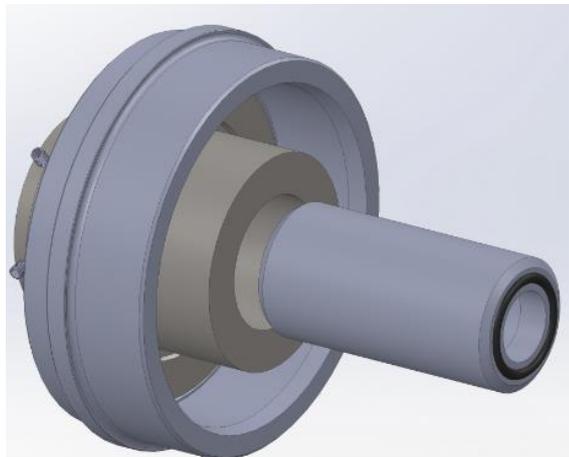
To Change the complete sealing System, see below:

Step	Instructions	Image
1	See steps 1 to 7 of 3.5.3 Changing the Impeller and the Liners to remove the wet end.	No Image
2	Remove the Shaft Spacer (marked in Green in the Image)	
3	Remove the Gland assembly, the gland bolts and use the packing ring extractor to remove the packing rings (marked in Green) from within the stuffing box	

4	Remove the Stuffing box (marked in Green) – this may have become fastened to the Frame Plate during the pumps operation, and may need a light tap from a rubber headed mallet to remove it.	
5	Remove the Lantern Restrictor (marked in Green)	
6	Remove the Shaft Sleeve (marked in Green)	
7	Assemble the new sealing assembly (see steps 11 to 15 of 3.2.3 Assembling the Pump) and install in the pump.	No Image
8	Reassemble the wet end (see steps 17 to 24 of 3.2.3 Assembling the Pump)	No Image
9	To restart the pump, follow steps 8 to 12 from 3.4 Commissioning	No Image

3.5.4.2 Replacing Mechanical Seals

Step	Instructions	Image
1	Having stopped the pump, remove the Cover Plate, Throatbush (If applicable), Cover Plate Liner & Frame Plate Liner. As detailed previously.	No Image
2	Remove the old Mechanical Seal by loosening the grub screws and flush ports then tapping the back side of the adaptor plate with a rubber mallet (or something similar)	
3	Place new mechanical seal on the shaft and compress it down to seal with the O-rings	No Image
4	Place the Cover Plate, Throatbush (If applicable), Cover Plate Liner & Frame Plate Liner back on.(as detailed previously)	No Image
5	Tighten the grub screws and screw in flush ports	No Image

Steps	Instructions	Image
1	Taking out all screws and flush ports, push the adapter plate on the mechanical seal until there is clear passage for flush ports on side of mechanical seal.	
2	Screw the adapter plate onto the mechanical seal.	
3	Put shaft sleeve in through the bottom of the mechanical seal (will require a bit of force) until it reached the end. (note; the shaft sleeve will not go all the way in)	

Make sure to clean the surfaces of the mechanical seal before installation.

3.6 Fault Finding

Problem	Cause	Corrective Action
Fluid discharge is less than it should be or is 0	Air is leaking into the suction joint or the sealing system	Tighten bolts on Flange and/or adjust the clamp bolts on the gland assembly. See Appendix B for correct adjustment torques.
	Direction of rotation incorrect	Check/Change direction of rotation.
	Impeller is worn	Adjust impeller using the adjustment bolt under the bearing housing. If this doesn't produce the needed result, replace the Impeller.
	Suction pipe is Blocked	Remove Obstacle/Blockage
The Pump is consuming too much Power	The Sealing system is adjusted too tightly	Loosen the clamp bolts on the sealing system
	Incorrect contact between a rotating part and a stationary part (for example the impeller against the Throat bush)	Adjust the pump accordingly, for example adjust the impeller distance from the throat bush with the adjustment bolt under the bearing housing. If necessary, replace the worn part(s).
	Bearings are worn	Replace the bearings
	Tension in the motor/pump coupling – incorrect alignment	Adjust the coupling or belts between the motor and the pump, realign the motor/pump
The Bearing is overheating	Insufficient Lubricant	Lubricate according the to the quantity and frequency indicated in Appendix D
	There are impurities in the lubricant	Replace the lubricant
	The Bearings are worn	Replace the bearings
The Bearings are not lasting as long as they should	Misaligned drive connection or shaft	Adjust drive and shaft
	The Lubricant contains impurities	Replace the lubricant
	There is insufficient lubrication	Lubricate according the to the quantity and frequency indicated in Appendix D
	Bearings incorrectly installed	Replace or re-fit the bearings
There is excessive	Gland assembly is too	Adjust gland assembly clamp bolts

leaking from the Stuffing box	loose	
	Packing rings or shaft are too worn	Replace packing rings or shaft sleeve
	The sealing water is too dirty – this causes the packing and shaft sleeve to wear out prematurely	Fit external flushing water or, if the pump already has an external supply, verify it is clean.
The pump is excessively noisy or vibrates	The Bearings are worn	Replace the bearings
	The impeller is unbalanced	Replace the impeller
	Air is leaking into the suction line	Turn off pump and drain out air. Tighten all bolts to the torque specified in Appendix B
	There are problems in the supply to the pump – the NPSHa could be too low or the pipework could be blocked/too small dimension	Improve the supply to the pump – if necessary, increase the pipe diameter leading to the pump and make sure there are no blockages.

4. Remko name plate



Each Remko pump carries a name plate similar to the example above. This name plate is located on the left hand side inside of the bearing pedestal. If you have any need to contact your Remko distributor please record the model number and serial number from this plate beforehand. This information will best enable your distributor to help you with any issues you may have.

5. Storage recommendations

Remko pumps are designed for continuous use, however, there may be instances when pumps are withdrawn from use and stored for periods of more than 2 months. We recommend certain actions and precautions before, during, and after the pump has been in storage/not in use.

- Recommendations for storage:
 - o Cover the suction and discharge flanges unless connected to pipework.
 - o Thoroughly drain pumps of any and all pumped fluid.
 - o Indoor storage is recommended, especially for Rubber lined pumps (for periods of more than 1 year, indoor storage is a necessity).
 - o If storing outside, please cover the pump with a protective cover such as a tarpaulin
 - o The pump needs to be protected from extremes in temperature and humidity, excessive dust, moisture and vibration.

- Maintenance during storage:

Maintenance Task	Frequency
Turn the Shaft several turns to avoid jamming	Every 4 weeks
Purge the Labyrinths with grease to prevent associated damage to the bearings	Every 6 months

- Before start-up:
 - o Verify if the gland packing is in a suitable state and replace if necessary – for storage longer than 2 years replacement will be required.

6. Warranty and contact details

Your Remko distributor should have completed a warranty card on your behalf, which is returned to Remko for registration on the warranty scheme. Please ensure that the distributor has the following details from your initial and any subsequent orders for pump(s) and / or spares:

- Pump / spares make and type
- Serial number
- Application
- Media being pumped including viscosity & SG.
- Discharge Pressure
- Temperature
- Capacity
- Suction Line Dimensions (ID, Length & Physical Lift/Head)
- Motor size, Operating Voltage & Frequency, Environmental Conditions & Accessories such as Thermistors or Forced Fan Cooling Systems
- Date of order and delivery

6.1 Complaints Procedure

Remko takes its responsibilities to its customers extremely seriously and prides itself on its comprehensive complaint procedures . Should you be dissatisfied with your Remko pump (s) or with any aspect of the service you have received , please contact your local Remko distributor in the first instance to discuss the matter fully.

The distributor will then take the matter up with Remko, acknowledging his actions to the customer and indicating a time scale by which he will reply . You will receive a response from the distributor with Remko's initial comments and proposed plan of any further action . If you feel that your complaint has still not been resolved satisfactorily, you should contact Remko directly (contact details overleaf).

6.2 Distributor contact details

6.3 Manufacturer Contact details

Allflo Pumps & Equipment
4 McHarry Place
Shepparton
VIC 3630
AUSTRALIA

T. +44 (0)114 229 3144

E. remkosales@allflo.com.au

W. www.remko.com.au

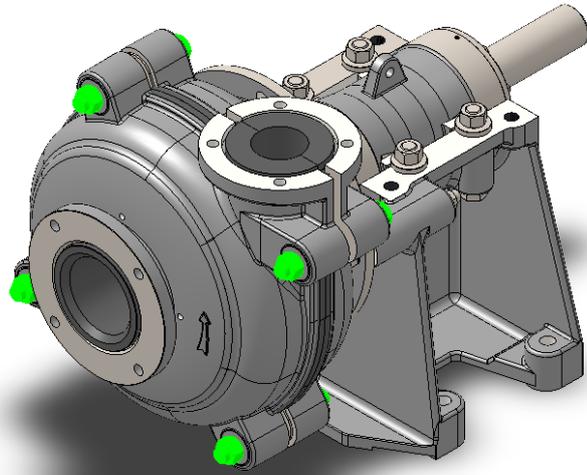
Appendix A – List of main wearing parts:

This page is blank. Wearing parts list can be provided on request.

Appendix B – Torque bolt tightening table

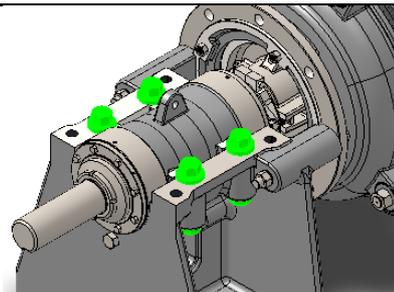
Cover Plate Bolts

Pump Series & Size	Minimum Torque (Nm)
TSH1.5x1	50
TSH2x1.5	50
TSH3x2	50
TSH4x3	110
TSH6x4	220
TSH8x6	220
TSH10x8	570
TSH12x10	570
TSH14x12	950
TSH16x14	1500
TSH20x18	1500



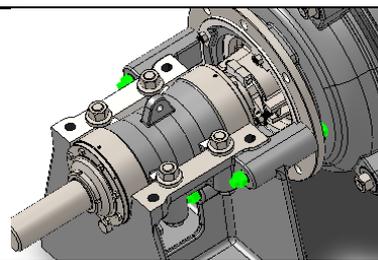
Bearing Housing Clamp Bolts

Last two digits of pump code	Minimum Torque (Nm)
05	10
10	45
20	45
30	185
45	185



Frame Plate Studs and Bolts

Last two digits of pump code	Minimum Torque (Nm)
05	10
10	45
20	45
30	185
45	185



Appendix C – Table of necessary tools for maintenance

The table below details the standard tools needed for maintenance of the Remko pumps and also the necessary Health and safety equipment.

WARNING

WARNING: REMKO PUMPS MAY CONTAIN HIGH INTERNAL PRESSURE. BEFORE BEGINNING SERVICING/MAINTENANCE, VERIFY THAT THE PUMP IS DISCONNECTED FROM THE ELECTRICAL SUPPLY AND SUCTION /DISCHARGE PIPES TO CONFIRM THAT THERE IS NO INTERNAL PRESSURE.

CAUTION

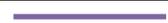
CAUTION SHOULD BE TAKEN AS USED WEARING PARTS MAY HAVE EXTREMELY SHARP EDGES.

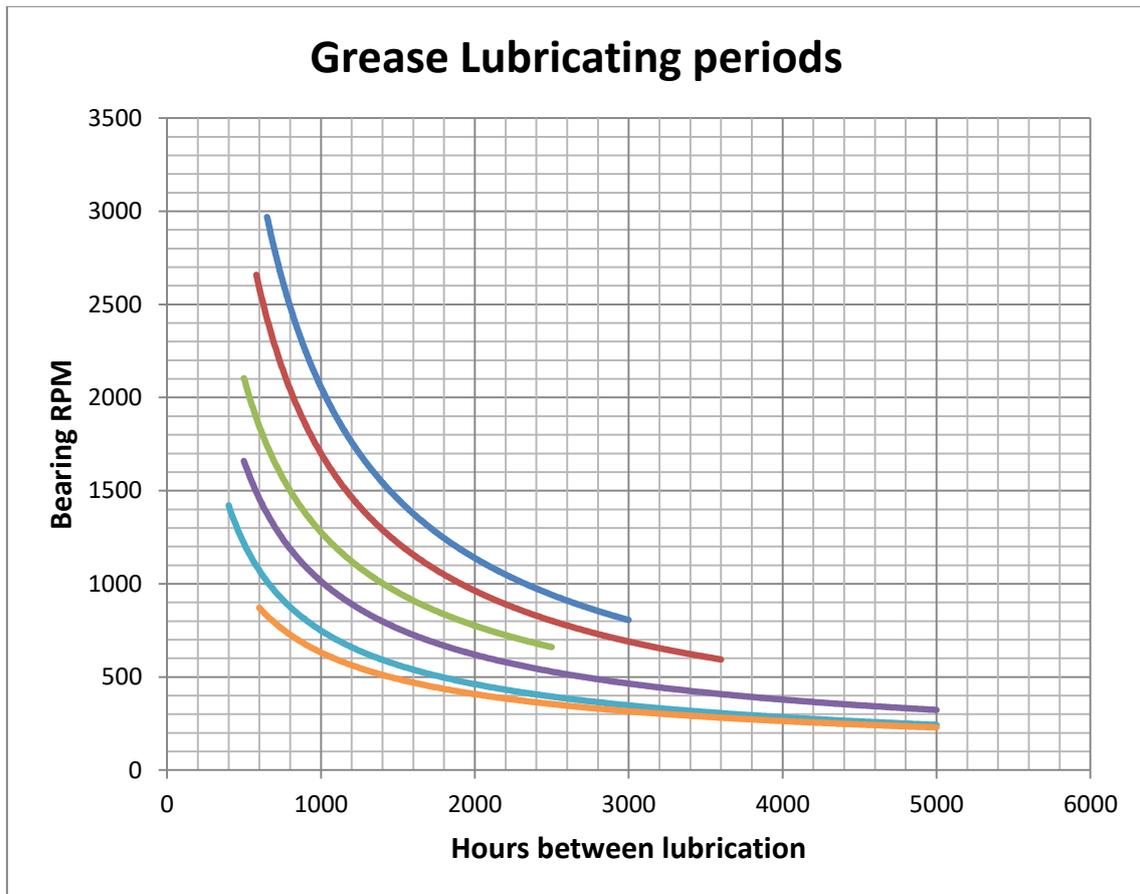
Description	Quantity
2" Adjustable Wrench	2
Remko Shaft Brake	1
Heavy duty lifting equipment, including but not necessarily limited to: <ul style="list-style-type: none"> - Heavy duty lifting device - Slings, shackles, etc. 	
4' Remko Heavy Duty lever	1
Standard 6" G-Clamp or similar	2
Tyre Iron or Flat Pry bar (with rounded edges)	1
Cut-proof Gloves	
Safety goggles	Per User
Protective Footwear	

Appendix D – Table(s) of grease lubrication details.

The Bearing Assembly’s in Remko pumps are factory greased , and will have a long, trouble-free working life as long as they are protected against the entrance of contaminants such as water and other foreign matter . We recommend that the condition of the bearings is verified periodically (When the wearing parts are being changed is an ideal time, they should be checked not longer than 12 months). The regularity of lubrication , bearing checks and quantity of lubricant to be used will become evident during the first checks . Care should be taken to not over grease bearings as this can damage them.

The following table is a recommendation of the quantity of grease to be used per lubrication, for recommended frequencies of lubrication please see the below Graph.

Colour on Graph	Last 2 digits of the Pump model number	Recommended quantity of Grease Per lubrication (Grams)
	05	6 (Both ends)
	10	9 (Both ends)
	20	14 (Both ends)
	30	24 (Both ends)
	45	35 (Both ends)
	65	60 (Both ends)



Note: One Shot from a Standard Grease gun is approximately 1 Gram

Return of Goods Form

CUSTOMER ADDRESS

CONTACT

PHONE NO
FAX NO
MOBILE NO
EMAIL

RETURNED FOR:	Estimate of Repair <input type="checkbox"/>	Warranty Claim <input type="checkbox"/>	Credit <input type="checkbox"/>	Transit Damage <input type="checkbox"/>	Other <input type="checkbox"/>
RETURNS METHOD:	Customer deliver <input type="checkbox"/>	to Collection Required <input type="checkbox"/>	Engineer to Collect <input type="checkbox"/>		
ITEM RETURNED:	Pump <input type="checkbox"/>	Spares <input type="checkbox"/>	Peripheral equipment <input type="checkbox"/>		

Return of item agreed with: _____
 _ from Remko or an authorized distributor

Remko Invoice Number (if applicable): _____

Remko Part Number/Pump Model: _____

Description: _____

If for Warranty/Repair, please provide a detailed fault description:

Has the Product been used? Yes No

If Yes, please advise Product/Media: _____

Please Supply the relevant Health and Safety Data

Please Tick the box to confirm if the unit has been decontaminated:

For Repairs to proceed with stripping the unit for ESTIMATE of repair, please use the following order reference:

Signature: _____ **Date:** _____

In the event of repairs not being actioned within 6 working weeks, the unit will be returned boxed in its stripped mode with costs being charged against the above order. Remko reserves the right to dispose of any item that arrives in a contaminated or unsafe condition and a disposal cost will be charged.

**Please send this form by Fax or Email to your local representative/distributor
 Please also include a copy of this document with the returned item**