

# Verderflex<sup>®</sup> Dura Peristaltic Hose Pump Product range Dura 10 to Dura 55



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## **Disclaimer of Warranty and Limitations of Liability**

This pump is warranted against defects in workmanship and material under normal use (rental use excluded) for two years from date of purchase. This is to the extent that VERDER will at its option replace, repair or refund, in full, the purchase price of the instrument or any part thereof manufactured by VERDER, which in our opinion is defective. Also provided the instrument has been operated in strict accordance with this manual, 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 VERDER manufactured parts or components including hose, due to normal wear or any damage or failure, that in VERDER's judgement, arises from misuse.

Failure to implement the necessary safety procedures for use in the European Community of a pump within an explosive atmosphere as laid down in latest EC Atex directive from 1st July 2003.

Failure to disclose the (intended or unauthorized) use of a pump within a known explosive atmosphere.

No warranty is offered on the hose or lubricant.

VERDER MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF FITNESS OR MERCHANTABILITY, EXCEPT AS EXPRESSLY SET FORTH ABOVE. VERDER 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 THEREOF.

Full completion of the warranty card is essential in order to be covered by Verderflex's outstanding warranty schemes. Please be aware of the declaration that you undertake to use only VERDER 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 Verderflex and its distributors.

This warranty is voided if the customer fails to follow any and all instructions, warnings or cautions in this Verderflex® Dura Hose Pump Safety, Operation and Maintenance Manual. VERDER has made every effort to illustrate and describe the product(s) in this manual. 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, VERDER will replace or repair the instrument or replace any defective part thereof without charge. However, VERDER'S obligation hereunder does not include the cost of transportation of the instrument to VERDER or its return to the customer; these costs must be borne by the customer. VERDER 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, VERDER 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 Verderflex® Dura hose pump.

## 1. Introduction

The Verder Group of companies has offices located in Austria, Belgium, China, Czech Republic, France, Germany, Hungary, Japan, Norway, Poland, Romania, Slovakia, South Africa, The Netherlands, United States and the United Kingdom. A network of worldwide distributors supports our products in other countries. A full list is available on [www.verderflex.com](http://www.verderflex.com). The Verder Group headquarters are in Holland.

Verderflex's in-house designers and application engineers have developed the Verderflex® Dura range of peristaltic tube pumps. Full product training and documentation is available. Verderflex will not accept responsibility for any malfunction of the pump caused by a failure to follow these operating procedures. If operators do not read and understand this manual, they are not considered by Verderflex to be qualified to assemble, install, operate or maintain this equipment. As pumps are an integral part of an overall process, it is essential for the successful completion of the total process for the pump to be working to its full potential, and for the operator to be fully conversant with the operating principles of the tube pump.

Verder Ltd, Verderflex is a business unit within, is accredited to both the ISO 9000:2000 quality & the ISO 14001:2004 environmental standards.

It is Verderflex's policy to supply all of its documentation in a number of languages and software options. Your Verderflex distributor will be able to assist you with the options available.

Verderflex recognizes its responsibilities to its customers around the world, and will always seek to meet or exceed their reasonable expectations. Verderflex welcomes customer comments, feedback and input into the development of procedures and products. Should you have any issues, which you wish to comment on, please return your comments to your local Verderflex distributor who will then forward them to Verderflex for further action.

The latest version of this manual, product updates & notifications can be found on our website at [www.verderflex.com](http://www.verderflex.com).

## 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:

**⚠ DANGER**

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.

**⚠ WARNING**

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

**⚠ CAUTION**

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 Verderflex® Dura range of pumps. This manual must be read and understood in particular all of **section 6** for operation in normal and explosive atmospheres, 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 Verderflex via your local distributor or downloaded from our website at [://www.verderflex.com/Product\\_Range/Peristaltic\\_Hose\\_Pumps/Verderflex\\_Dura](http://www.verderflex.com/Product_Range/Peristaltic_Hose_Pumps/Verderflex_Dura)
- 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 Pump Safety Features

The Verderflex® Dura has a number of built-in features, which have been designed specifically to ensure your safety during operation and maintenance of the unit:

- Disaster proof design, in the event of a hose failure the casing will contain spillage preventing leaks and contamination of product.
- Use of VERDER lubricant, which prolongs the working life of the pump.
- One-piece tapered hose connection giving quicker, simpler and more reliable hose change.
- Pressure relief plugs in casing to allow safe relief of any built up pressure inside the pump casing.
- Designed for safe and easy assembly and maintenance.
- Fast and simple Geared Motor Unit (GMU) change reducing downtime.

Safety instructions and guidance are divided into operational safety, maintenance safety and safety advice for assembly, installation and commissioning, with each category having its own rules and philosophy. This section covers operational functions that are reasonably foreseeable. Many warnings and admonishes are included in this manual, unfortunately there are too many to incorporate into “on unit” labels. For this reason it is essential that the manual be treated as part of the product and made mandatory reading for personnel associated with the product and system.

## 2.5 Operational Safety

### **⚠ DANGER**

- Always isolate the power supply before working on the pump.

### **⚠ WARNING**

- 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. The Verderflex® Dura pump is manufactured from cast steel or cast iron - slipping or falling against the pump may cause serious injury.

### **⚠ CAUTION**

- 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.

## 2.6 Maintenance Safety

### **⚠ DANGER**

- Always isolate the power supply before working on the pump.

### **⚠ WARNING**

- Always follow the safety procedures for handling the product being pumped (Refer to Materials Safety Data Sheet, MSDS, for product being pumped).
- If the hose has ruptured, the lubricant may be contaminated with product and the pump casing may be pressurised – care must be taken to handle the mixture appropriately and appropriate measures taken to relieve any pressure build up.
- Do not stand near the pump while the hose is being removed, if the hose is expelled too quickly, it could cause serious injury.
- Never try to install a hose without the front cover in place.
- Never remove the front cover when the hose is still in position.
- Always use lifting equipment safely in accordance with the manufacturer's recommendations.
- Do not stand in the immediate vicinity of the pump when operating with the inspection cover removed, follow safety procedures for operation of pump with cover off.
- Extreme care must be taken when removing the rotor and shaft from the pump casing & drive. Loads must be properly supported to prevent injury.

### **⚠ CAUTION**

- Do not strike the pump shaft, the inner race or the bearings.
- Once installed, the bearings are greased for life; do not lubricate after installation.

## 2.7 Assembly, Installation and Commissioning

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

### **DANGER**

- Always isolate the power supply before working on the pump.
- Check compatibility of the hose material with the product being pumped.
- Check compatibility of the lubricant with the product being pumped.
- Do not over grease the front cover O-ring. If the grease contaminates the VERDERLUBE, the performance of the hose may be affected.
- At all times the pump must be filled with adequate lubricant. Refer to section 4.8 for Lubrication levels.
- Check all nuts and bolts are tightened to the required torque settings laid down within this manual.



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

### 3. Theory of the Pump

#### 3.2 Working Principles

The pump is simple by design in its construction and operation. The product to be pumped does not come into contact with any moving parts and is totally contained within a robust, heavy duty hose, which consists of an inner liner, several reinforcement layers and an outer cover.

#### 3.2 Features of a Hose Pump

- Dry running, the pump will run dry without damage.
- The hose effectively forms an integral part of the suction & discharge lines, connected externally by flange or hose-tail connectors ensuring zero leakage.
- Self-priming, the D10-25 pumps will prime themselves to 80% vacuum (equivalent to a suction lift of 8m), at sea level, when pumping a liquid with an s.g. of 1 (i.e. water). Duras 35-55 will prime to 95% vacuum, equivalent to 9.5mWc.
- High solids content, the pump is capable of handling media with a high proportion of solids and with large particle sizes.
- Viscous liquids, the pump is capable of dealing with fluids up to 6,000 mPas (cPs).
- High differential pressure, the pump is capable of continuously running at pressures up to 6 bar with a standard pressure rotor & 12 bar with a high pressure rotor.
- Few moving parts, there are no valves or joints, reducing the possibility of malfunction.
- Low maintenance and minimal downtime, the main wearing part in the pump is the hose, which can be replaced quickly, easily and inexpensively.
- Low shear, delicate media can be pumped effectively with little or no damage.
- Highly abrasive products can be pumped with little detriment to the life of the hose.

#### 3.3 Advantages of Verderflex® Dura

- Physical separation between pump-head and GMU eliminating risk of contamination.
- Rigid casing design for heat dissipation and accurate hose compression.
- Quick fit tapered flange design clamps and seals in one easy movement to speed hose replacement.
- Breather tube on the rear of the pump acts as a filler tube.
- Flexible drive connection allowing the GMU to be fully removed without the need to drain the pump casing.
- No moving parts in contact with the product.
- 316L Stainless Steel Flanges.

The pump can also be supplied with the following additional features upon request: -

- High-pressure 12 bar rotor. Standard-pressure 6 bar rotor supplied as standard.
- Conforming to ATEX standard (upon request of specific Drive).
- PVDF or PP Flanges. 316 Stainless are standard.

### 3.4 Product Range

The Verderflex® Dura range of pumps are sized and named according to the internal bore diameter of the hose. The manual refers to the range that starts with the 10mm diameter Dura 10 unit, and incorporates a total of 6 models, up to the 55mm diameter Dura 55.

The Dura 5 – Dura 25 pumps are capable of operating at up to 12 bar / 174 PSI depending on the rotor that is fitted with a pumping capacity of:

		Dura 10	Dura 15	Dura 25	Dura 35	Dura 45	Dura 55
Litres / hour (US GPM)	SP	139 (0.62)	456 (2)	1535 (6.7)	3120 (13.7)	4250 (18.7)	8437 (37)
	HP	139 (0.6)	456 (2)	1108 (4.9)	1755 (7.7)	3400 (15)	5906 (26)
Continuous limits RPM	SP	95	95	90	80	50	50
	HP	95	95	65	45	40	35
Maximum Pressure	SP	6	6	6	6	6	6
	HP	12	12	12	12	12	12

### 3.5 Pump Construction

The Verderflex® Dura pump, Figure 1, is one of the most simple, yet most robust designs of its type, with few moving parts:

Figure 1



The pump casing is terminated with universal tapered flange connections that will allow connection to pipework with flanges to DIN PN16, ANSI150# and JIS20. Within the casing the rotor compresses the reinforced hose, this displaces the pumped media generating a peristaltic pumping action. The casing provides support for the hose whilst under compression from the rotor assembly. A tapered flange is used to retain the hose position within the casing whilst clamping and sealing the hose in the casing. The rotor runs in a lubricant bath, which is filled through the breather tube at the rear of the casing. The unit is designed to enable simple assembly and maintenance.

### 3.6 Limitations of the Pump

Some limitations of the Verderflex<sup>®</sup> Dura are: -

- Hoses are available in Natural Rubber (NR), Nitrile Buna rubber (NBR), Food grade (NBRF), EPDM rubber & CSM (Hypalon<sup>®</sup>). This selection is suitable for the majority of applications, but there remain some products, which are not compatible with these hose materials, please refer to [.verderflex.com](http://www.verderflex.com) for further information on hose compatibility,
- In some cases there is a need for a pulsation dampener to be used. These accessories should be used when:
  - Pipe work is hammering,
  - Severe pulsation is noticed.

However, good system design may reduce / eliminate the need for a pulsation dampener.

- The capacity of the pump may reduce / fall due to high impulse losses on the suction or discharge side. The following should be noted:
  - The maximum impulse loss possible on the suction side is 40 kPa/6 PSI,
  - The maximum impulse loss possible on the discharge side is 600 - 900 kPa/85 - 130 PSI, dependent on the rotor type.
  - Inlet pressure limitations of 20 kPa abs

### 3.7 Pump Selection

The higher flow rates given on performance curves are recommended for intermittent use only to enable the dissipation of heat, which is generated by the speed and pressure within the pump. The actual flow rate of the pump depends upon factors such as the speed at which the rotor revolves, hose bore size, product viscosity etc. The pump's speed and consequent output achieved will depend on many factors:

- Is the medium being pumped aggressive, abrasive, and viscous or shear sensitive?
- What type of use is required for the pump, constant or intermittent?
- Is the system a high or low-pressure system?
- Is the medium being pumped at a high or low temperature?
- What is the solid content - percentage of solids, shape and size of particles?
- Which lubricant is being used?

All these factors should be taken into consideration when selecting the pump size and speed of operation. If you have any reservations, do not hesitate to contact your local VERDER distributor, who will be more than pleased to offer professional, expert advice and recommendations to ensure you get the optimum pump for your application.

### 3.8 Verderflex<sup>®</sup> Dura Hose

To complement the hose pump, Verderflex has developed the Verderflex<sup>®</sup> Dura hose for continuous operation. Tests have shown that these hoses are highly durable and are able to achieve an 80% vacuum (equivalent to a suction lift of 8m water at sea level) on the Dura 10-25 and 95% Vacuum on the Dura 35-55 (9.5 mWc)

## **4. Safety, Operation and Maintenance Instructions**

### **4.1 General – tools and 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. Ideally the pump should be installed using a drive with facilities to inch the pump along and which is able to operate in reverse. Any maintenance work will require a complete set of metric spanners, a socket set, 4, 5, 6, 8 & 10mm hexagon or allen keys, a soft faced hammer and a torque wrench; please check your fastener kit to ensure you have all the correct sizes available.



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.

### **4.2 Assembly and Preparation**

#### **4.2.1 Assembly**

Verderflex® Dura hose pumps are sold worldwide and have been designed to be transported assembled and ready to be installed in the destination country. Verderflex has checked the assembly of the pump before it is delivered to you, but please note the following procedures for assembly of the pump. Please note that if the product is to be air freighted the Dura pump will be despatched in a wooden crate.

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

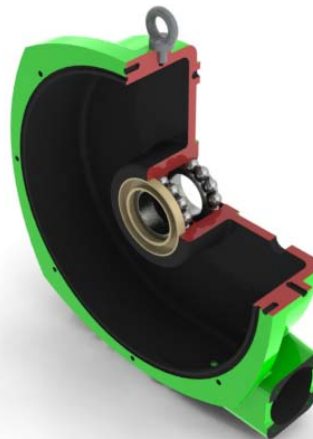
### 4.2.3 Assembling the pump

Before assembling the pump it is advisable to clean the pumps internals to remove any pumped product residue.

Firstly fit all lifting eyes and drain plugs to the pump. Then using a bearing press, press the bearings squarely into the front and rear of the pump body until they locate on the shoulders in the pump casing.



The shaft seal should be pressed squarely on top of the inner bearing with the sprung lip facing into the pump cavity.



It is also important at this point to attach the filler tube to the back of the pump as it could be difficult to attach once the GMU is in place. Line the thread of the breather tube with PTFE tape and tighten into position to give a leak free seal.

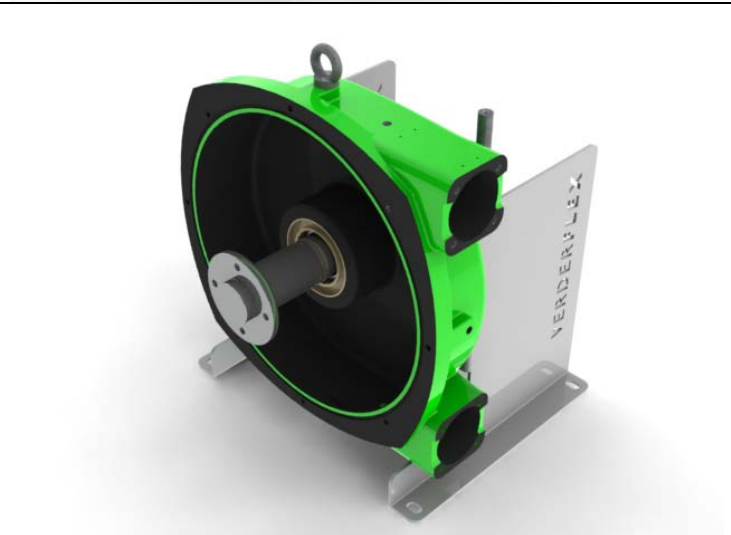


**⚠ CAUTION**

Mount the framework to pump casing using four of the cap head bolts tightened to a torque of 7Nm. Although this will give the assembly a certain amount of rigidity once stood upright, the pump could still tip forward.



Push the drive shaft through the bearing assembly. The drive shaft may need some food grade grease to slide through the shaft seal.

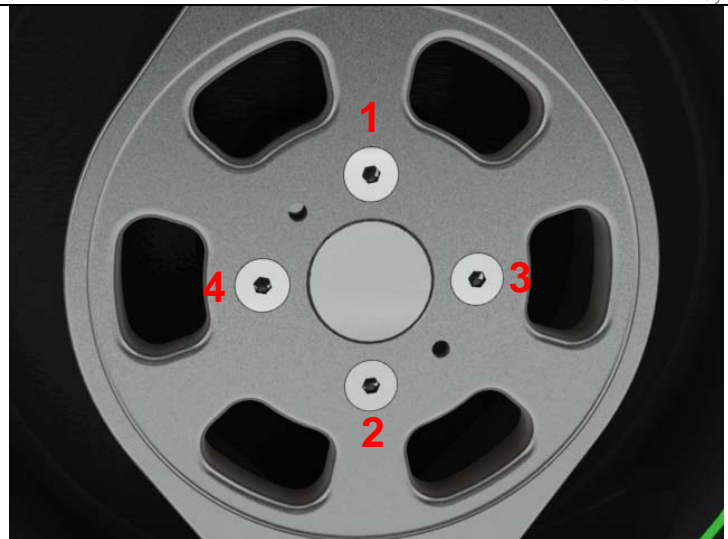


Once the drive shaft is in place the crescent ring groove should become visible at the rear of the pump. It is advisable to lock the drive shaft in place with the crescent ring before bolting the rotor in place.



Bolt the rotor to the drive shaft using all 4 of the countersunk socket cap head screws, observing the relevant torque of 7Nm. Failure to use all of the bolts could compromise the performance of the pump.

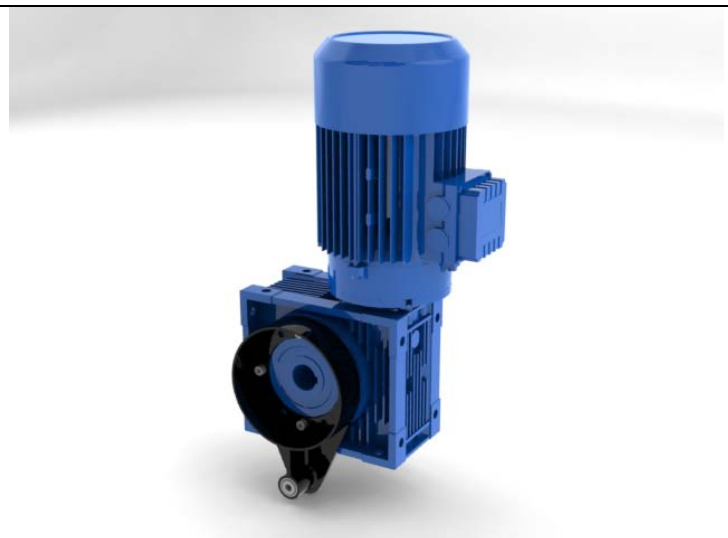
Tighten in a sequence as illustrated 1-2-3-4 to 4Nm and then retighten in the same sequence to 7Nm.



Before inserting the hose the O-ring and front cover needs attaching. The O-ring should sit securely in the groove located around the front of the pump casing. A small amount of grease may be required to hold the O-ring in place. The front cover should bolt in place with the use of 8 or 12 c'sink socket head, observe the relevant torque of 4Nm. Once the cover is attached to the front of the pump the hose is ready to be inserted. Refer to section 4.6 for Hose Installation.



Slide the torque arm bush into the torque arm and then fix the torque arm to the GMU with the shaft sleeve facing away from the gearbox before attempting to slide it onto the drive shaft, observe the relevant torque of 7Nm.



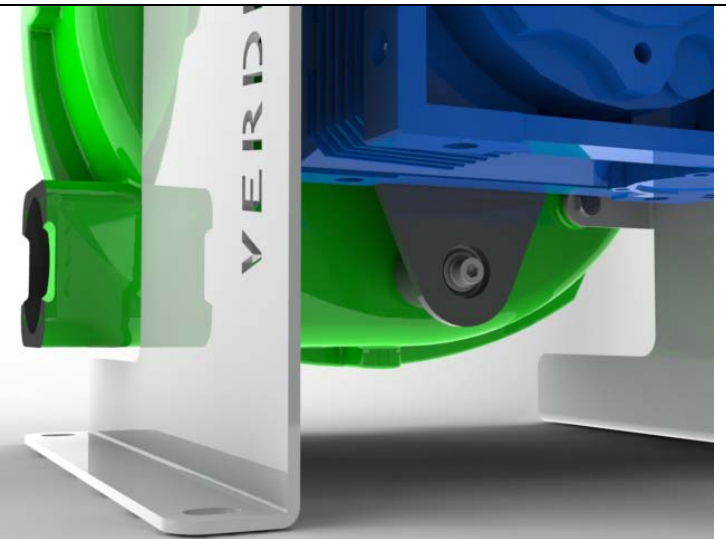
**Grease shaft before fitting the GMU.**

The fit between the shaft and the gearbox will have a H7/H8 tolerance and so this will give a relatively tight fit.

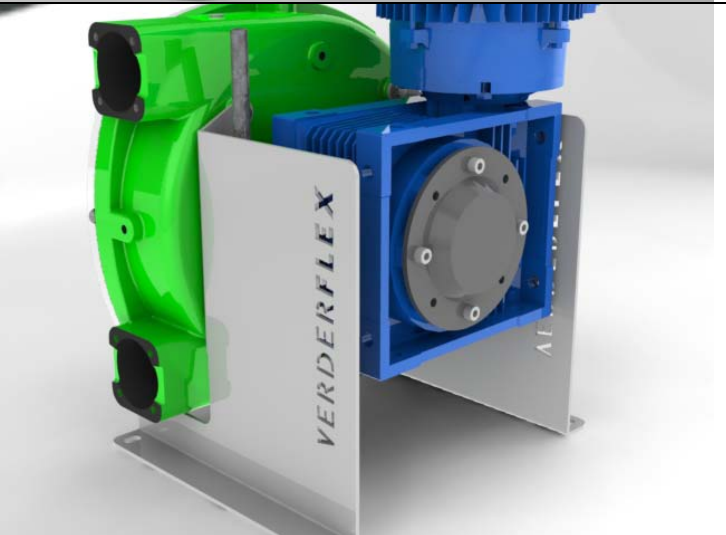
When sliding the GMU onto the drive shaft it is advisable to use suitable lifting equipment. To make the process of aligning the GMU easier, it may be advisable to remove the motor fan cowl and turn the fan until the key and keyway align with the end of the shaft. **Once completed, refit fan cowl before powering the GMU!**



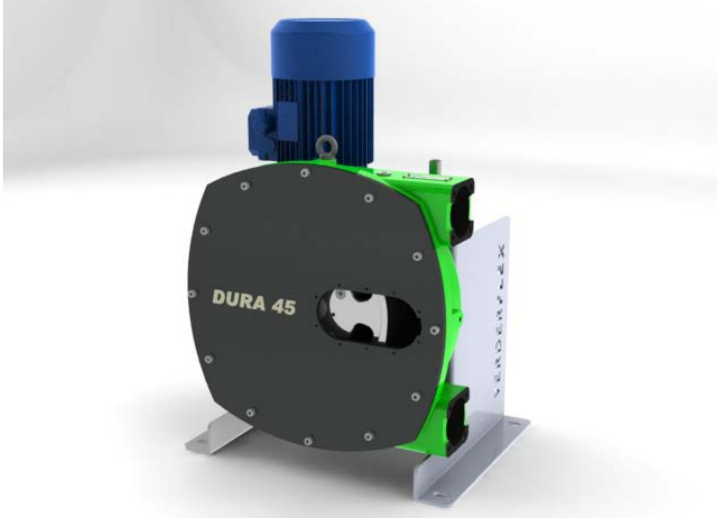


Use the Bolt to fasten the torque arm to the casing and complete installation of the GMU. Tighten to a torque of 7Nm. Use the crescent clip supplied to stop the GMU from sliding off the end of the shaft.



Finally to complete the assembly, mount the dust cover supplied on every Dura GMU using 4 of the cap head bolts supplied.



For pumps with metal front covers, please use the following instructions in place of step 8.

<p>Before inserting the hose the O-ring and front cover needs attaching. The O-ring should sit securely in the groove located around the front of the pump casing. A small amount of grease may be required to hold the O-ring in place. The front cover should bolt in place with the use of 8 or 12 socket head screws. Observe the relevant torque of 7Nm.</p>	
<p>With the front cover fixed in place, the gasket and inspection window need to be fitted.</p>	
<p>Using the M6 countersunk cap head screws fit the inspection window ensuring the gasket is located properly. Tighten to the specified torque of 3Nm.</p> <p>Do not over-tighten these screws.</p>	

### 4.3 Installation and Operation

#### CAUTION

Prepare the workspace in which the pump is to be installed, 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 for maintenance purposes and to fit pipe work etc.

#### DANGER

Only a qualified person should carry out electrical installation.

The power supply and control panel should have been pre-installed. If the pump is to be operated remotely, a separate control panel with suitable facilities should be installed.

Pipe work should:

- Be as short and direct as possible;
- Be oversized relative to the hose bore of the pump;
- Be aligned correctly, free from stress and securely anchored;
- Include a short, removable section adjacent to the port flanges to allow easy access when changing hoses, ideally this should be a flexible hose able to withstand the system pressure;
- Include suction and discharge valves (if a discharge valve is fitted, a high pressure safety device will also need to be installed to prevent excess pressure building up when the discharge valve is closed with the pump running);
- Include drainage taps to allow safe removal of product;
- Include a minimum number of long radius elbows where a change of direction is necessary;

To install the VERDER hose pump, follow the procedures below:

#### DANGER

- Only a qualified person should carry out electrical installation!
- Connect the motor to the power supply, following the manufacturer's instructions. Pay attention to the direction of rotation of the pump when wiring the motor.



- Check compatibility of the hose material with the product being pumped – this should have been verified with your distributor.
- If not already fitted, install the hose following the procedure described in Section 4.6 on Hose Installation.

#### WARNING

- Check compatibility of the lubricant with the product being pumped; VERDERLUBE® is a specially formulated food grade lubricant containing glycerine. In most cases this is a very stable compound, but can react when mixed with certain types of substance such as nitrogenous compounds including nitric acid and strong oxidising agents.

- If you are unsure of the chemical compatibility of your product with VERDERLUBE®, your VERDER distributor will offer advice and if necessary, supply an alternative such as VERDERSIL®, a silicone oil based lubricant.
- Check the level of lubricant, which should be filled to between the two markers on the front cover
- Lubricant may splash out of the breather tube at the rear of the pump if over filled.

#### 4.4 Commissioning



Check all nuts and bolts are tightened to their correct torque settings.



- Before connecting the pump to pipe work, ensure the pump is correctly filled with lubricant and run the pump dry for 10 - 20 revolutions in both directions to ensure that the hose is secured properly. Stop the pump immediately if there are any leaks or other problems.
- Connect the pipe work and tighten all fasteners securely,
- Close all drainage taps and open all valves,



- Start the pump running; it may take a few minutes to reach pressure and correct flow rate as the pump self primes. Stop the pump immediately if there are any leaks or other problems.
- Then run the pump for 10-20 revolutions. Stop the pump immediately if there are any leaks or other problems.

#### 4.5 Operation

The pump should only ever be used for the purpose for which it is sold.

For normal continuous operation the pump speed should not exceed the speeds in the following table, unless expressly advised by your VERDER distributor.

PUMP SIZE	SPEED	
	SP	HP
DURA 10	95	95
DURA 15	95	95
DURA 25	90	65
DURA 35	80	45
DURA 45	50	40
DURA 55	50	35

Operating pressure should not be altered to operate outside the tolerances recommended by your VERDER distributor.

**⚠ CAUTION**

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



Do not climb onto / on the pump or connecting pipe work.



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. The Verderflex<sup>®</sup> Dura pump is manufactured from cast steel - slipping or falling against the pump may cause serious injury.



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

## 4.6 Maintenance



It is good practice to wash down the external surfaces of the pump prior to carrying out any maintenance operations. This will prevent the interior of the pump being contaminated with dirt or debris.

### 4.6.1 Hose - Removal and Installation

This procedure involves removal and reinstallation of the tapered flange assembly - installation of the tapered flange assembly automatically clamps the hose to the pump casing.

### 4.6.2 Hose Removal

**⚠ CAUTION**

- Stop the pump drive and isolate electrical supply!
- Close suction and then discharge valves on piping
- Slowly open the upper most drain plug as there may be some residual pressure

**⚠ WARNING**

- If fitted, drain the remaining product from the inlet and outlet pipeline drain taps being aware that there will be some internal pressure and taking care to handle the product appropriately

**⚠ CAUTION**

- Always follow the safety procedures for handling and disposal of the product being pumped (Please refer to the relevant Material Safety Data Sheets (MSDS))



- Slacken the uppermost drain plug to relieve any internal casing pressure.
- Loosen the front cover being aware that there may be some internal pressure, and slowly let the lubricant drain from the bottom of the pump into a container for re-use or disposal (lubricant must not be re-used if it is contaminated with the product). Alternatively, open the lower drain plug and allow the product to flow into a suitable container.
- Note do not remove the front cover completely until the hose has been driven out of the pump casing.

**⚠ CAUTION**

- If the hose has ruptured, the lubricant may be contaminated with the product - care must be taken to handle the mixture appropriately.
- Remove the section of piping immediately connected to both inlet and outlet port flanges to allow access. Place a container below the port flange to catch any remaining lubricant that may be still in the pump.
- The suction tapered flange is held in place with four bolts that should be loosened and removed in a criss-cross formation.



- Pull out the tapered flange assembly. Clean all parts and check for wear or other damage. Note never re-use worn parts; contact your VERDER distributor for original spares.
- Repeat the above step for the other flange.
- Reconnect the power to the drive and slowly inch the drive forward a short distance. Check the hose is completely free at both ends, then continue to inch the drive forward slowly to expel the hose.

**⚠ WARNING**

- Do not stand near the pump during this operation. If the hose is expelled too quickly it could cause serious injury.
- Once the hose has been expelled from the pump casing isolate the electrical supply before inspecting the pump for any spillage of product. It is recommended that the pump casing should always be cleaned following hose removal, particularly if:
  - a. Leakage has occurred; or
  - b. The product is aggressive / corrosive.

Inspect the hose for wear and damage and maintain a record of its condition and hours of operation.

### 4.6.3 Hose Installation

#### **CAUTION**

- Never install a hose without the front cover in place
- Fully lubricate the outer wall of the hose with Verderlube or Verdertil (depending on choice) to aid installation. Insert one end of the hose in the mouth of the suction port (the hose should be fed into the pump in the direction of normal operation). Once the hose reaches the rotor, the drive can be inched forward to feed in the remainder of the hose into the pump casing.

Figure 3



- The hose should be inched forward until there is sufficient (10mm) hose protruding from the suction and discharge ports to fit the tapered flanges see Figure 4. If the hose passes this point the drive should be reversed and inched back into the correct position.

#### **TIP**

- For accurate positioning of the hose it may be possible to manually rotate the rotor by isolating power first, then removing the cooling fan cowl and turning the fan by hand.

Note: This is not always possible with the larger pumps.

Ensure that the rotor stops dead centre and bottom dead centre to limit the hose movement.

**To limit hose movement and the possibility of pulling the hose into the casing, observe the following procedure:**

- Loosely fit the suction side port flange into the hose then position the rotor so it sits at the top and bottom dead centre (6 & 12 o'clock)

With the hose in position tighten up the suction side flange and fit the discharge side port flange.

Figure 4



- With the hose in position the tapered flanges can be fitted. Tightening the bolts in a 1-3-4-2 sequence, repeating the sequence until the flange is evenly fitted. The tapered flange should be pulled toward the casing for as close as is possible ensuring 5mm of the hose can be seen in the gap between the fixing holes. All 4 bolts should be fitted to each flange to avoid compromising the performance of the pump.

**! TIP**

- The holes have been drilled and tapped deep into the casing to accommodate long bolts. This is to aid assembly when pulling the tapered flanges into position
- Once the suction flange is fitted, it may be necessary to inch the pump in the forward direction to stretch/elongate the hose sufficiently enough to fit the discharge tapered flange in the correct position.

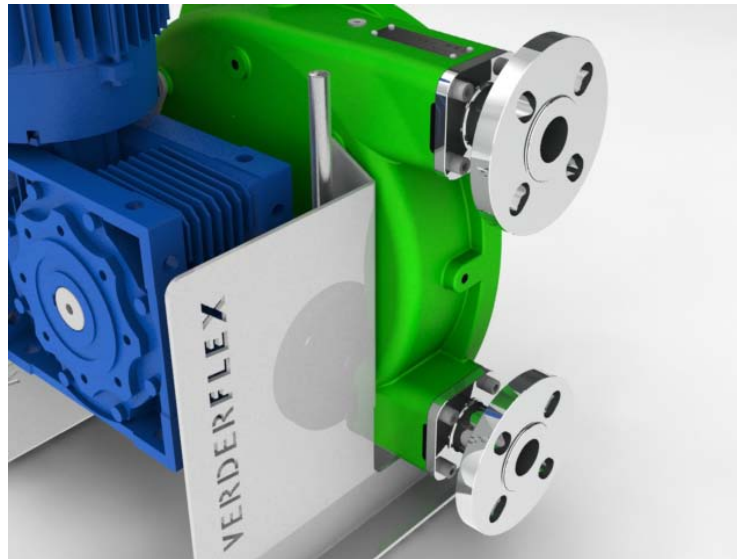
Figure 5





- It must be noted that the relationship between correct torque and finish gap can vary due to component tolerances. The torque figure is a maximum figure of 12Nm, and not the minimum requirement. The important factor is to achieve sufficient clamping of the hose. Do not over tighten to bring the flange flush against the casing as this could result in the bolts shearing.

Figure 6



- To fill the pump casing with the recommended amount of lubricant - refer to Section 4.8 on 'Lubrication': check for any leakage.
- Operate the drive forward for 10 - 20 revolutions to check the hose is securely clamped in the suction flange assembly. It is recommended that a container be placed below the suction port to catch any lubricant in the unlikely event that the hose should de-couple.
- When satisfied, repeat with the drive in reverse for 10 - 20 revolutions to check the hose is securely clamped with the outlet flange.

### **Hose storage and shelf life**

The shelf life for hose is two years for NR, NBR, NBRF and CSM. EPDM hoses are four years. The hose should be stored in a cool, dark location and should not be exposed to any ultra-violet light as this could cause degradation of the rubber.

- Hoses should be stored in their protective wrappers which provide UV protection

#### 4.6.4 Clear Front Cover Installation

### ⚠ CAUTION

The clear front cover sits against a Nitrile rubber O-Ring. Please note the plastic front covers could crack if the bolts attaching it to the casing are over tightened beyond the recommended maximum torque. It is therefore important that the instruction below is followed:

- Clean the front cover with a non-scratching cloth,
- Position the window taking care to ensure the O-Ring seal is sat in the groove all the way around,
- Tighten the socket head screws by hand until the O-Ring is trapped evenly. Observe the relevant torque of 4Nm, if a torque wrench is not available then the bolt should only be turned ½ a turn more to tighten, at this point there should be no gap between the rear of the front cover and front of the casing.

Figure 7



In instances where a metal front cover is used, be sure to fit the gasket between the front cover and inspection window. Follow the torque settings of 7Nm when fitting the metal front cover and 3Nm when fitting the inspection window.

#### 4.6.5 Front Cover Removal

### ⚠ WARNING

- Always isolate the power before working on the pump.
- Never remove front cover when the hose is still in position. The hose must be removed following the procedures in the section 4.6.2 Hose Removal.

### ⚠ CAUTION

- Take care when lifting and removing the front cover.
- Remove front cover O-Ring
- Take care not to drop the front cover, as this may cause injury or damage the cover.

#### 4.6.6 Rotor Removal

The hose must first be removed following the procedures in the section 4.6.2 Hose Removal.

### **⚠ DANGER**

- Always isolate the power before working on the pump!
- Follow instructions in section 4.6.5 for removal of the front cover.
- Secure the rotor with suitable lifting equipment and/or support the weight. Follow manufacturer's instructions for safe operation of lifting equipment.
- Loosen the four countersunk allen socket bolts from the rotor and remove. When the rotor starts freeing from the drive shaft secure the weight of the rotor to avoid damage. This should now allow the rotor to move freely. **DO NOT** at any time hit the rotor with a hammer. The rotor is a precision engineered component and will be damaged if dropped or hit.

### **⚠ TIP**

- If the rotor becomes jammed onto the shaft, there are two tapped 8mm holes to jack the rotor from the shaft.

### **⚠ CAUTION**

Ensure that the weight of the rotor is being supported at all times during this procedure

#### 4.6.7 Rotor Installation

The installation process follows the removal process in reverse order, however, you should refer to Section 4.2 on 'Assembly' as a further guideline.

### 4.7 Drive Selection

Your VERDER distributor will be pleased to assist in selecting a suitable drive to best fulfil the needs of the duty you require.

You should ensure that the drive selected is sufficiently powerful to overcome the starting torque requirements of the pump at the pressure at which it to operate - refer to the starting torque settings below:

PUMP SIZE	STARTING TORQUE at 0Bar Discharge Pressure (Nm)
DURA 10	15 Nm
DURA 15	17 Nm
DURA 25	33 Nm
DURA 35	66 Nm
DURA 45	124 Nm
DURA 55	216 Nm

Additionally, allowance must be made for the gearbox efficiency. Typically, this varies with gearbox type and ratios on the worm gearbox supplied as standard on the Dura and to simplify this process

pumps are normally supplied completely assembled. Standard selections are available as per the pump datasheet

#### 4.8 Lubrication

The standard lubricant is VERDERLUBE®, which is a specially formulated food grade lubricant; The fundamental purpose of VERDERLUBE® is to provide a thermal transfer mechanism to get the heat generated in the hose away from it and to provide heat transfer from the lube to the casing and away. It is not to reduce friction or reduce wear (The difference in friction between a dry hose and a perfectly lubricated hose accounts for only 5% of the total radial load on a Verderflex® hose)

The lubricant is blue in colour and can be used at temperatures ranging from -40°C up to 100°C (-40°F up to 210°F)

### **WARNING**

Some products are not compatible with VERDERLUBE®. Please refer to the warning below and relevant Materials Safety Data Sheets, MSDS.

It is important that lubricant levels are monitored at all times - an increase in levels of lubricant might indicate hose failure. If this occurs, the product will be contained within the pump casing, but the performance of the pump will deteriorate and eventually cause product contamination. It is recommended that you fit a hose burst detection unit, see Section 5.

The pump must always be filled with the correct amount of lubricant. If in doubt, fill to the mid level of the front cover:



PUMP SIZE	CAPACITY	
	Pints	Litres
DURA 10	0.35	0.2
DURA 15	0.88	0.5
DURA 25	1.75	1
DURA 35	5.3	2.5
DURA 45	6.3	3
DURA 55	16.9	8

Lubricant Bottle Volume (Litres)	Part Number	
	Verderlube	Verdersil
0.5 L	129.1418	129.1372
1 L	129.1419	129.1373
2.5 L	129.2379	129.2505
5 L	129.1420	129.1375
10 L	129.1421	129.1376

The safety data sheet for VERDERLUBE<sup>®</sup> is contained in Appendix A - you should consult your VERDER distributor on any queries. The VERDERSIL<sup>®</sup> datasheet is contained in Appendix B.



At all times the pump casing needs to be filled with VERDERLUBE<sup>®</sup> or VERDERSIL lubricant. As a guide it is recommended that the pump casing be filled between the two marks indicated on the front cover.

### **⚠ WARNING**

Check compatibility of the lubricant with the product being pumped; VERDERLUBE<sup>®</sup> is a specially formulated food grade lubricant containing glycerine. In most cases this is a very stable compound, but can react when mixed with certain types of nitrogenous or oxidising substances such as nitric acid. If you are unsure of the chemical compatibility of your product with VERDERLUBE<sup>®</sup>, your VERDER distributor will offer advice and if necessary, supply an alternative lubricant such as VERDERSIL<sup>®</sup>.

## 4.9 Fault Finding

PROBLEM	CAUSE	CORRECTIVE ACTION
Abnormally high pump temperature	<p>Non-standard lubricant</p> <p>Low lubricant level</p> <p>Product temperature too high</p> <p>Internal friction on hose caused by blocked suction or poor suction characteristics</p> <p>High pump speed</p>	<p><i>Consult VERDER distributor to obtain correct lubricant</i></p> <p><i>See lubrication levels in section 4.8, add required amount</i></p> <p><i>Consult VERDER distributor regarding maximum temperature</i></p> <p><i>Check pipe-work/valves for blockages; check that the suction pipe-work is as short and as large in diameter as feasible; consult VERDER distributor for advice</i></p> <p><i>Reduce speed to a minimum; consult a VERDER distributor for advice on recommended pump speeds</i></p>
Low flow/pressure	<p>Suction / discharge valve closed</p> <p>Hose failure</p> <p>Blocked suction/no product</p> <p>Poor pump selection</p> <p>Suction line too long, pump speed too high, suction line bore too small.</p> <p>High product viscosity</p>	<p><i>Open suction/discharge valve</i></p> <p><i>Determine cause &amp; replace hose. Contact a VERDER distributor for advice</i></p> <p><i>Check suction pipe-work for blockages and product; remove any blockage</i></p> <p><i>Consult VERDER distributor to check pump selection</i></p> <p><i>Consult VERDER distributor for advice</i></p> <p><i>Reduce pump speed and use larger pump size, re-size pipework</i></p>
Pump and pipe-work vibrating	<p>Suction/discharge lines not secured properly</p> <p>High pump speed, long suction/discharge lines, high product specific gravity, or a combination of them all</p> <p>Under-sized suction /discharge line diameters</p>	<p><i>Check and secure suction/discharge lines</i></p> <p><i>Reduce pump speed, shorten suction/discharge line wherever possible; consult VERDER distributor</i></p> <p><i>Increase suction/discharge pipe-work internal diameter</i></p>
Hose pulled in to pump casing	<p>Insufficient lubricant in the casing</p> <p>Inlet pressure too high</p> <p>Blocked hose</p> <p>Large particles in the product</p> <p>Poorly fitted port flange</p>	<p><i>Check lubrication chart and add the required amount of lubrication</i></p> <p><i>Reduce the inlet pressure</i></p> <p><i>Check the hose and remove any blockages</i></p> <p><i>Mount sieve/filter in suction line to avoid particles entering the hose</i></p> <p><i>Check flange connection and ensure the hose is not set too far into the casing when the flanges are fitted</i></p>

## **5 Accessories and Options**

There are a number of accessories available to complement the VERDER range of hose pumps, all of which are available through your local VERDER distributor. Your VERDER distributor will be able to advise you further by referring to the separate sales literature available

### **5.1 Multi Standard Port Flanges**

The Dura is supplied with a cast 316 stainless steel Universal slotted port flange that accommodates pipe work connections including DIN PN16, ANSI 150lb & JIS. The flanges are resistant to many chemicals but for more aggressive chemicals they can be manufactured in PP or PVDF for maximum corrosion resistance.

### **5.2 Hose Failure Detection**

One of the VERDER's many advantages is the exceptional lifetime of the hoses. The Dura pump and its associated hoses are designed to maximize the hose's fatigue life, the primary cause of normal peristaltic hose failures. Periodically, however, hoses will need to be replaced as a consequence of such failures as they are the main consumable part of the Dura Pump.

Throughout the hose's lifetime, it is important that any possible failure be noticed in sufficient time to prevent leakage into and damage to the pump casing and unit

In order to prevent this VERDER has developed a pressure switch sensor which detects high-level discharge failures. Please contact your VERDER distributor for further details.

### **5.3 Future Developments**

VERDER's in-house team of engineers are continuously striving to develop the hose pump and its application to new areas; naturally this covers the development of accessories and complementary versions of the hose pump to achieve maximum efficiency and performance. Feedback from operators and customers is always welcomed therefore, and any comments or queries concerning your particular application should be forwarded to your local VERDER distributor, who will then forward them to Verderflex.

### **5.4 Hazardous Environments (ATEX)**

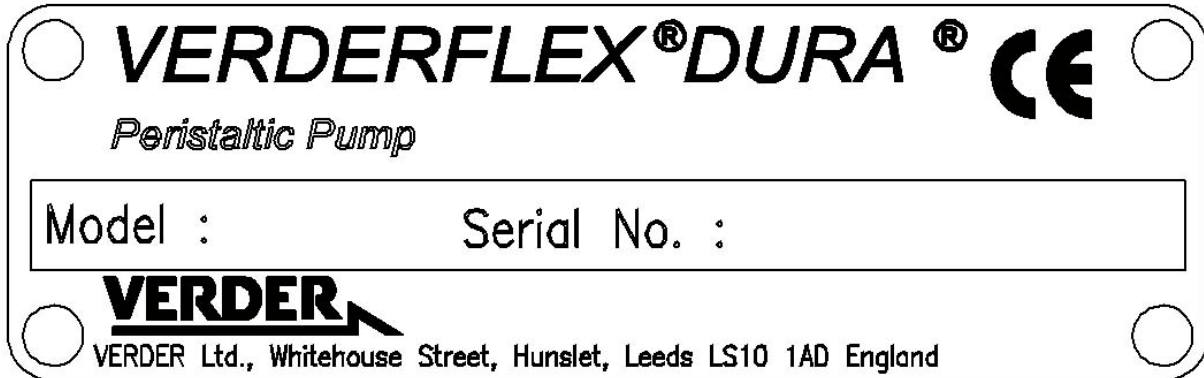
#### **ATEX Compliance**

All Peristaltic Hose pumps manufactured by Verderflex are compliant with CE Directive 94/9/EC (Equipment intended for use in Potentially Explosive Atmospheres). All Verderflex Dura Hose pumps comply to: Zone 1 / 21, Group II Category 2GD.

**ATEX Pumps must be fitted with a suitably rated GMU. Please contact Verderflex to ensure that selections are compliant with ATEX requirements.**

## 6. Verderflex Dura Name Plate

Example of Name Plate



Each Verderflex Dura carries a name plate similar to the example above. This name plate is located on the top of the casing near the discharge flange. If you have any need to contact your Verderflex 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.

## 7 Pump & Hose Storage: Introduction

Verderflex<sup>®</sup> Dura 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 weeks. We recommend certain pre-storage actions and precautions be taken when pumps and their components are not in use. Similarly, hoses and lubricants may be held as stock to service working pumps and their recommended storage conditions are advised.

### 7.1.1 Pre-Storage Actions

- The hose should be removed from the pump and the lubricant drained out of the pump casing.
- The pump casing should be washed out and allowed to dry and any external build up of product removed.
- The gearbox should be maintained in accordance with the manufacturers recommendations.
- Rinse the hose carefully to remove any aggressive chemicals.

### 7.1.2 Storage Conditions

#### Storage Conditions

- Pumps should be stored in a dry environment. Depending on these conditions, it may be advisable to place a moisture-absorbing product, such as Silica gel, inside the pump's casing or to coat the pump's inner surfaces with moisture-repelling oil, such as WD40, whilst the pump is stored.
- Gearboxes may require intermittent attention as indicated by the gearbox manufacturer's recommendations.
- Hoses should be stored as supplied in their wrapper and should be stored away from direct sunlight and at room temperature.
- Lubricants should be stored under normal warehouse conditions in containers with the caps securely fastened.
- When pumps are ready to be returned to service, pumps should be cleaned thoroughly to remove any trace of protective coatings, such as WD40, as these may contaminate the lubricant and could affect hose life.

### 7.1.3 Shelf Life

ITEM	RECOMMENDED SHELF LIFE
Pump assembly without hose fitted	No shelf life providing pump stored in a dry atmosphere
Natural Rubber (NR), Nitrile Buna Rubber (NBR), Nitrile Buna Rubber Food Grade (NBRF), (CSM) Hypalon® Hoses	2 years from date of supply
(EPDM) Hose	4 years from date of supply
VERDERLUBE Lubricant	1 year from date of supply
VERDERSIL Lubricant	3 years from date of supply
GMU	In accordance with manufacturer's recommendations

For further information, please contact your local Verderflex distributor or contact the Verderflex directly on [info@verderflex.com](mailto:info@verderflex.com)

### 7.1.4 Standby Pumps

Many Verderflex® pumps are successfully used on standby or back-up duties. To avoid possible start-up overloads, caused by the hose being compressed at a given point for a prolonged period, it is recommended that such pumps be run for a minimum period of ten minutes every 2 weeks.

## 8 Warranty & Contact Details

Your VERDER distributor should have completed a warranty card on your behalf, which is returned to Verderflex 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
- VERDER reference

Full completion of this card is essential for you to be covered by Verderflex's warranty schemes. Please be aware of the declaration that you undertake to use only VERDER spare parts including lubricant - 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 Verderflex and its distributors.

This information will similarly be required if and when you should need to order spare parts from your local VERDER distributor.

Should you have cause to return the pump for any reason, please ensure that you inform the local distributor as fully as possible of the details of the problem; the distributor has the necessary documentation for completion of the warranty application to Verderflex and is aware that this has to be completed in full before Verderflex can examine the application.

### 8.1 Complaints Procedure

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

The distributor will then take the matter up with Verderflex, 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 Verderflex'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 Verderflex directly at the address given overleaf.

## 8.2 VERDER Group Literature

VERDER supplies its range of Group literature and product documentation in a number of languages and variety of software packages - please advise your VERDER distributor if you are interested in receiving other information on VERDER, indicating in which languages and format.

VERDER and its distributors undertake to conduct all its dealings with you as comprehensively, courteously and promptly as possible. Customer care is one of VERDER's top priorities

## 8.3 Distributor Contact Details:

## 8.4 VERDER Contact Details:

Verderflex  
Whitehouse Street  
Leeds LS10 1AD  
ENGLAND, UK  
Tel: (+44) 113 222 0250  
Fax: (+44) 113 222 0291  
E-mail: [info@verderflex.com](mailto:info@verderflex.com)  
Web Site: [.verderflex.com](http://.verderflex.com)

## Appendix A - VERDERLUBE Safety Data Sheet

According to directive 91/155/EC  
Edition: 03 July 2007

**Verderlube is the lubricant / coolant used with the Verderflex<sup>®</sup> range of and other peristaltic or hose pumps**

### **⚠ WARNING**

Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information

## **1 Identification of the Substance/Preparation and of the Company/Undertaking**

### **1.1 Identification of Substance or Preparation**

PRODUCT NAME	Verderlube <sup>®</sup>
CHEMICAL IDENTIFICATION	Glycerine based blend
CAS NUMBER	Preparation
USE	Food Grade - Pump Lubricant / Coolant

### **1.2 Company Identification**

PRODUCER / SUPPLIER	VERDER LIMITED WHITEHOUSE STREET HUNSLET LEEDS LS10 1AD GREAT BRITAIN
TEL NUMBER	+44 (0) 113 222 0250
FAX NUMBER	+44 (0) 113 246 5649
EMERGENCY TEL NUMBER	
For advice on this product call:	+44 (0) 113 222 0250

## **2 Composition / Information on Ingredients**

- This product contains no substances classified as hazardous to health in concentrations that should be taken into account according to EC directive 91/155/EC
- Main constituent may cause irritation to eyes and skin.
- Irritating to respiratory system in the form of a mist.

### 3 Hazardous Identification

This product is not classified as hazardous according to EC directive 91/155/EC

#### **⚠ WARNING**

- May cause irritation to eyes and skin.
- Irritating to respiratory system in the form of a mist.
- Contact with hot product may cause burns.
- Product is a lubricant and in the event of untreated spillage, can cause external surfaces to become slippery when wet

### 4 First Aid Measures

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

#### 4.1 Ingestion

- Give 500 ml of Water to drink
- DO NOT INDUCE VOMITING!
- Except as a deliberate act, the ingestion of large amounts of product is unlikely. If this should occur, do not; induce vomiting, obtain medical advice.

#### 4.2 Inhalation

- If inhalation of fumes from overheated material causes irritation to the nose or throat, or coughing, remove to fresh air. Obtain medical advice if any symptoms persist.

#### 4.3 Skin Contact

- Wash thoroughly with mild soap and water as soon as reasonably practical.
- Remove heavily contaminated clothing and wash underlying skin

#### 4.4 Eye Contact

- Wash eye thoroughly with copious amounts of water, ensuring eyelids are held open.
- Obtain medical advice if any pain or redness develops or persists.

### 5 Fire Fighting Measures

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

#### 5.1 Extinguishing Media

- Alcohol resistant foam, dry powder or water fog

## 5.2 Extinguishing Media To Avoid

- Do not use water jets

## 5.3 Unusual Fire and Explosion Hazards

- Avoid spraying directly into storage containers because of danger of boil over

## 5.4 Special Protective Equipment for Fire fighters

- Protective clothing and approved breathing apparatus when in close proximity of fire
- During burning, poisonous acrolein may be found

## 6 Accidental Release Measures

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant appropriate product information***

### 6.1 Personal Protection

- Wear goggles and gloves. If spillage has occurred in a confined space, ensure sufficient ventilation and check that a safe, breathable atmosphere is present before entry.

### 6.2 Environmental Precautions

- Protect drains from spills and prevent entry of product. Treated effluent may be biodegradable. Recover cleaning water for later treatment.

### 6.3 Methods for Cleaning Up

- Contain and recover liquid, soak up with absorbent material (sand, peat, etc.) or contain and shovel into drums or containers. Remove residue by spraying with water

## 7 Handling and Storage

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 7.1 Handling

- Contact with hot product causes burns.
- Avoid contact with eyes. If splashing is likely to occur wear a full visor or chemical goggles to appropriate local national standards.
- Avoid frequent or prolonged skin contact with fresh or used product.
- Wash hands thoroughly after use.

## 7.2 Storage

- Store under cover away from moisture and sources of ignition. Do not overheat in storage.
- The lubricant/coolant is hygroscopic; keep the container tightly closed

## 8 Exposure Controls / Personal Protection

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 8.1 Personal Protection

- Hand Protection           PVC or Rubber Gloves
- Eye Protection            Chemical goggles
- Respiratory Protection   Respiratory protection is unnecessary, providing concentration of vapour, mists or fumes is adequately controlled.

### 8.2 Occupational Exposure Limits

- Ensure good ventilation.
- Threshold limit Not tested

## 9 Physical and Chemical Properties

FORM	Viscous liquid
COLOUR	Blue. Colourless may be supplied to special order
ODOUR	Odourless
SOLIDIFICATION POINT	-40°C / -40°F approx.
FLASH POINT	177°C / 350°F approx. (COC: ISO 2592)
BOILING POINT	290°C / 554°F
SOLUBILITY IN WATER	Miscible (at 20°C)
VAPOUR PRESSURE	(20°C / 68°F) <0.01 mbar (100°C / 210°F) <1mbar
VISCOCITY	700 mPaS approx. @ 20°C / 68°F
pH	7 approx.
AUTO IGNITION TEMPERATURE	400°C / 750°F approx.
EXPLOSION LIMITS	Not established
DENSITY (20°C/68°F)	1245 kg/m <sup>3</sup> approx.
BEHAVIOUR WITH WATER AT 20°C	Hygroscopic

## 10 Stability and Reactivity

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 10.1 Conditions to Avoid

- Preparation is stable and unlikely to react in a hazardous manner under normal conditions of use.
- No special precautions other than good housekeeping of chemicals.
- Hazardous polymerisation reactions are unlikely to occur.
- This material is combustible.

### 10.2 Materials to Avoid

- Avoid contact with strong oxidizing agents, nitrogenous compounds and strong acids: risk of violent and or explosive reactions with pure compounds.

### 10.3 Hazardous Decomposition Products

- During burning, poisonous acrolein may be found – very toxic by inhalation.
- Incomplete combustion / thermal decomposition will generate smoke, carbon dioxide and hazardous gases, including carbon monoxide.

## 11 Toxicological Information

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 11.1 Toxicity Data

- General purpose food grade lubricant /coolant
- LD<sub>50</sub> oral (rat) 12600 mg/kg (not harmful) \*

### 11.2 Significant Data with Possible Relevance to Human Health

- Eyes - Unlikely to cause more than transient stinging or redness if accidental eye contact occurs
- Skin - Unlikely to cause harm to the skin
- Ingestion - Unlikely to cause harm if accidentally swallowed in small doses, although larger quantities should be avoided
- Inhalation - At ambient temperatures this product will be unlikely to present an inhalation hazard

## 12 Ecological Information

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 12.1 Mobility

- Spillage may penetrate the soil; unused preparation is food grade and is inherently harmless.

### 12.2 Persistence and Degradability

- This preparation is inherently biodegradable.

### 12.3 Bio Accumulative Potential

- There is no evidence to suggest that bioaccumulation will occur.

### 12.4 Aquatic Toxicity

- Verderlube is miscible in water. It is not considered harmful in low concentrations.

Water pollution reactors	gO <sub>2</sub> /g
BOD <sup>5</sup> :	0,87 (NEN 3235-5.4)
BOD <sup>1</sup> :	1.16 (NEN 3235-5.3)
Fish: goldfish	LC50 (24h):>5000 mg/1 (modified ASTM D1345)

- The aquatic toxicity (TLm<sub>96</sub>) is >1000mg/1, which is defined by NIOSH as an insignificant hazard

## 13 Disposal Considerations

***Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information***

### 13.1 Waste Disposal Method(s)

- Where possible, arrange for unused product to be recycled.
- Disposal of preparation should be via an authorized person/licensed waste disposal contractor in accordance with local regulations.
- Incineration may be carried out under controlled conditions provided that local regulations are met.
- Dispose of preparation and container carefully and responsibly. Do not dispose of preparation near ponds, ditches, down drains onto soil.

## 14 Transport Information

- Not classified as dangerous for transport (RID/ADR-ADNE-IATA-IMDG-MARPOL-ICAO)

## 15 Regulatory Information

- Classification - Classification not required

## 16 Other Information

- Employees of the Verder group have not experienced any harmful effect during normal handling and production.
- Verderlube<sup>®</sup> and Verderflex<sup>®</sup> are registered trademarks.

\*The information contained in this sheet is based on our knowledge of the preparation at its delivery date and that the information contained herein is current as of the date of this data sheet. Since the use of this information, and of these opinions and the conditions of use of this preparation is not within the control of Verder Limited, it is the user's obligation to determine the conditions of safe use of the preparation.



The information contained in this sheet is based on our knowledge of the product at its delivery date

## Appendix B - VERDERSIL Safety Data Sheet

According to directive 91/155/EC  
Edition: 03 July 2007

**VERDERSIL is an alternative lubricant / coolant used with the VERDERFLEX<sup>®</sup> range of and other peristaltic or hose pumps**

### **⚠ WARNING**

Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information

## 1 Identification of the Substance/Preparation and of the Company/Undertaking

### 1.1 Identification of Substance or Preparation

PRODUCT NAME	Verdersil
CHEMICAL IDENTIFICATION	Silicone fluid (Polydimethyl siloxane 350 CPS)
CAS NUMBER	Preparation
USE	Pump Lubricant / Coolant

### 1.2 Company Identification

PRODUCER / SUPPLIER	VERDER LIMITED WHITEHOUSE STREET HUNSLET LEEDS LS10 1AD GREAT BRITAIN
TEL NUMBER	+44 (0) 113 222 0250
FAX NUMBER	+44 (0) 113 246 5649
EMERGENCY TEL NUMBER	
For advice on this product call:	+44 (0) 113 222 0250

## 2 Composition / Information on Ingredients

- This product, Polydimethyl siloxane, contains no substances classified as hazardous to health in concentrations that should be taken into account according to EC directive 91/155/EC
- Main constituent may cause irritation to eyes and skin.
- Irritating to respiratory system in the form of a mist.

### 3 Hazardous Identification

This product is not classified as hazardous according to EC directive 91/155/EC

#### **⚠ WARNING**

- May cause irritation to eyes and skin.
- Irritating to respiratory system in the form of a mist.
- Contact with hot product may cause burns.
- Product is a lubricant and in the event of untreated spillage, can cause external surfaces to become slippery when wet

### 4 First Aid Measures

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

#### 4.1 Ingestion

- No first aid should be required but should any symptoms persist, seek medical advice

#### 4.2 Inhalation

- No first aid should be required but should any symptoms persist, seek medical advice

#### 4.3 Skin Contact

- No first aid should be required but should any symptoms persist, seek medical advice
- Wash thoroughly with mild soap and water as soon as reasonably practical.
- Remove heavily contaminated clothing and wash underlying skin

#### 4.4 Eye Contact

- Direct contact may cause temporary redness and discomfort
- Wash eyes thoroughly with copious amounts of water for at least 10 minutes, ensuring that eyelids are held open
- Obtain medical advice if any pain or redness develops or persists

### 5 Fire Fighting Measures

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

#### 5.1 Extinguishing Media

- Carbon dioxide, foam, dry powder or water spray
- Water can be used to cool fire-exposed containers

## 5.2 Extinguishing Media To Avoid

- None known

## 5.3 Unusual Fire and Explosion Hazards

- None known

## 5.4 Special Protective Equipment for Fire fighters

- A self-contained respirator and protective clothing should be worn. Keep containers cool with water spray until well after the fire is out. Determine the need to evacuate or isolate any area in accordance with local emergency plans.
- Hazardous combustion products include Silica, Carbon Oxides and traces of incompletely burned carbon compounds may form. Formaldehyde may also be found

## 5.5 NFPA Profile

- Health: 0            Flammability: 1            Instability/Reactivity: 0

Note: NFPA = National Fire Protection Association

## 6 Accidental Release Measures

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant appropriate product information*

### 6.1 Personal Protection

- Wear goggles and gloves. If spillage has occurred in a confined space, ensure sufficient ventilation and check that a safe, breathable atmosphere is present before entry.

### 6.2 Environmental Precautions

- Prevent from spreading or entering drains, ditches or rivers by using sand, earth or other appropriate barriers

### 6.3 Methods for Cleaning Up

- Determine the need to evacuate or isolate the area in accordance with local emergency plan. Very large spills should be contained by bunding or similar methods. Contain and recover liquid, soak up with absorbent material (sand, peat, etc.) or contain and shovel into drums or containers.
- Small spillages may be washed to drains with detergent and water.
- **Caution** : Spilled product will produce an extremely slippery surface

## 7 Handling and Storage

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

## **7.1 Handling**

- Contact with hot product causes burns.
- Avoid contact with eyes. If splashing is likely to occur wear a full visor or chemical goggles to appropriate local national standards.
- Avoid frequent or prolonged skin contact with fresh or used product.
- Wash hands thoroughly after use.

## **7.2 Storage**

- Store under cover away from moisture and sources of ignition. Do not overheat in storage.

## **8 Exposure Controls / Personal Protection**

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

None of the components have assigned exposure limits

### **8.1 Personal Protection**

- Hand Protection           PVC or Rubber Gloves
- Eye Protection            Safety glasses should be worn
- Respiratory Protection   Respiratory protection is unnecessary, providing concentration of vapour, mists or fumes is adequately controlled.

### **8.2 Occupational Exposure Limits**

- Ensure good ventilation.
- No known assigned exposure limits

### **8.3 Additional Information**

*These precautions are for room temperature handling*

*Use at elevated temperatures may require additional precautions*

## 9 Physical and Chemical Properties

FORM	Viscous liquid
COLOUR	Colourless
ODOUR	Odourless
SOLIDIFICATION POINT	< -45°C / <-60°F approx.
FLASH POINT	121°C / 250°F approx. (Closed cup)
BOILING POINT	>200°C / >390°F
SOLUBILITY IN WATER	0 g/litre at 20°C
VISCOACITY	350 mPas approx. at 20°C / 68°F
AUTO IGNITION TEMPERATURE	>200°C / >390°F.
EXPLOSION LIMITS	Not explosive
DENSITY (20°C/68°F)	970 kg/m <sup>3</sup> approx.

## 10 Stability and Reactivity

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

### 10.1 Conditions to Avoid

- Preparation is stable and unlikely to react in a hazardous manner under normal conditions of use.
- No special precautions other than good housekeeping of chemicals.

### 10.2 Materials to Avoid

- Can react with strong oxidizing agents

### 10.3 Hazardous Decomposition Products

- Hazardous decomposition products including Formaldehyde and Silica can be formed, refer to Toxicology Information, section 11.

## 11 Toxicological Information

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

### 11.1 Toxicity Data

- General non-toxic lubricant /coolant
- Other than temporary discomfort on contact with the eyes, no adverse effects are normally expected

## 11.2 Significant Data with Possible Relevance to Human Health

- Eyes - Unlikely to cause more than transient stinging or redness if accidental eye contact occurs
- Skin - Unlikely to cause harm to the skin
- Ingestion - Unlikely to cause harm if accidentally swallowed in small doses, although larger quantities should be avoided
- Inhalation - At ambient temperatures this product will be unlikely to present an inhalation hazard

## 11.3 Other Health Hazard Information

- Product may emit Formaldehyde vapours at temperatures above 150°C/302°F in the presence of air. Formaldehyde vapour is harmful by inhalation and irritating to the eyes and respiratory system at breathing concentrations of less than 1ppm (1 part per million)

## 12 Ecological Information

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

### 12.1 Environmental Fate and Distribution

- Air: This product is a high molecular weight liquid polymer, which has a very low vapour pressure (<1mm Hg). As a result it is unlikely to become an atmospheric contaminant unless generated as an aerosol
- Water: This product has a very low water solubility (< 100 ppb). As it has a specific gravity of < 1, if discharged to water, it will initially form a surface film. As the product is non-volatile and has a high binding affinity for particulate matter, it will adsorb to particulates and sediment out.
- Soil: If discharged to surface water, this product will bind to sediment. If discharged in effluent to a waste water treatment plant, the product is removed from the aqueous phase by binding to sewage sludge. If the sewage sludge is subsequently spread on soil, the silicone product is expected to degrade.
- Degradation: This product, polydimethylsiloxane, degrades in soil abiotically to form smaller molecules. These in turn are either biodegraded in soil or volatilized into the air where they are broken down in the presence of sunlight. Under appropriate conditions, the ultimate degradation products are inorganic silica, carbon dioxide and water vapour. Due to the very low water solubility of this product, standard OECD protocols for ready and inherent biodegradability are not suitable for measuring the biodegradability of this product. The product is removed >80% during the sewage treatment process.

## 12.2 Environmental Effects

- **Toxicity to Water Organisms:** Based on analogy to similar materials this product is expected to exhibit low toxicity to aquatic organisms.
- **Toxicity to Soil Organisms:** Experiments show that when sewage sludge containing polydimethylsiloxane is added to soil, it has no effect on soil micro-organisms, earthworms or subsequent crops grown in the soil.

## 12.3 Bioaccumulative

- This product is a liquid and is a high molecular weight polymer. Due to its physical size it is unable to pass through, or be absorbed by biological membranes. This has been confirmed by testing or analogy with similar products.

## 12.4 Fate and Effects in Waste Water Treatment Plants

- This product or similar products has been shown to be non-toxic to sewage sludge bacteria.

### Ecotoxicity Classification Criteria

Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100
Acute Terrestrial Toxicity	<=100	>100 and <= 2000	>2000

*This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993. This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.*

## 13 Disposal Considerations

*Used lubricant may become contaminated with pumped product, also verify precautions and advice against relevant product information*

### 13.1 Waste Disposal Method(s)

- Where possible, arrange for unused product to be recycled.

### RCSA Hazard Class (40 CFR 261)

- When a decision is made to discard this material, as received, is it classified as a hazardous waste? – No
- State or local laws may impose additional regulatory requirements regarding disposal

## 14 Transport Information

- Not classified as dangerous for transport (RID/ADR-ADNE-IATA-IMDG-MARPOL-ICAO)
- DOT Road Shipment Information (49 CFR 172.101) – Not subject to DOT

## 15 Regulatory Information

- Labelling according to EEC Directive – No special packaging or labelling requirements
- National legislation/regulations Ozone depleting chemicals – No ozone depleting chemicals are present or used in manufacture

Status

**EINECS:** All ingredients listed or exempt

**TSCA:** All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical substances.

## 16 OSHA Hazard Regulatory Information to Standard CFR29 1910.1200

**Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.**

**TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.**

### 16.1 TSCA Status

All chemical substances in this material are included on or exempted from listing on the TSCA

### 16.2 EPA SARA Title III Chemical Listings

<b>Section 302 Extremely Hazardous Substances:</b>	None.
<b>Section 304 CERCLA Hazardous Substances:</b>	None.
<b>Section 312 Hazard Class:</b>	
Acute:	No
Chronic	No
Fire	No
Pressure	No
Reactive	No
<b>Section 313 Toxic Chemicals</b>	None present or none present in regulated quantities

### 16.3 Supplemental State Compliance Information for California

- **Warning:** This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer, birth defects or other reproductive harm

- None known.

### 16.4 Supplemental State Compliance Information for Massachusetts

No ingredient regulated by MA Right-to-Know Law present.

**16.5 Supplemental State Compliance Information for New Jersey**

CAS Number	Wt %	Component Name
63148-62-9	> 60.0	Polydimethylsiloxane

**16.6 Supplemental State Compliance Information for Pennsylvania**

CAS Number	Wt %	Component Name
63148-62-9	> 60.0	Polydimethylsiloxane

**17 Other Information**

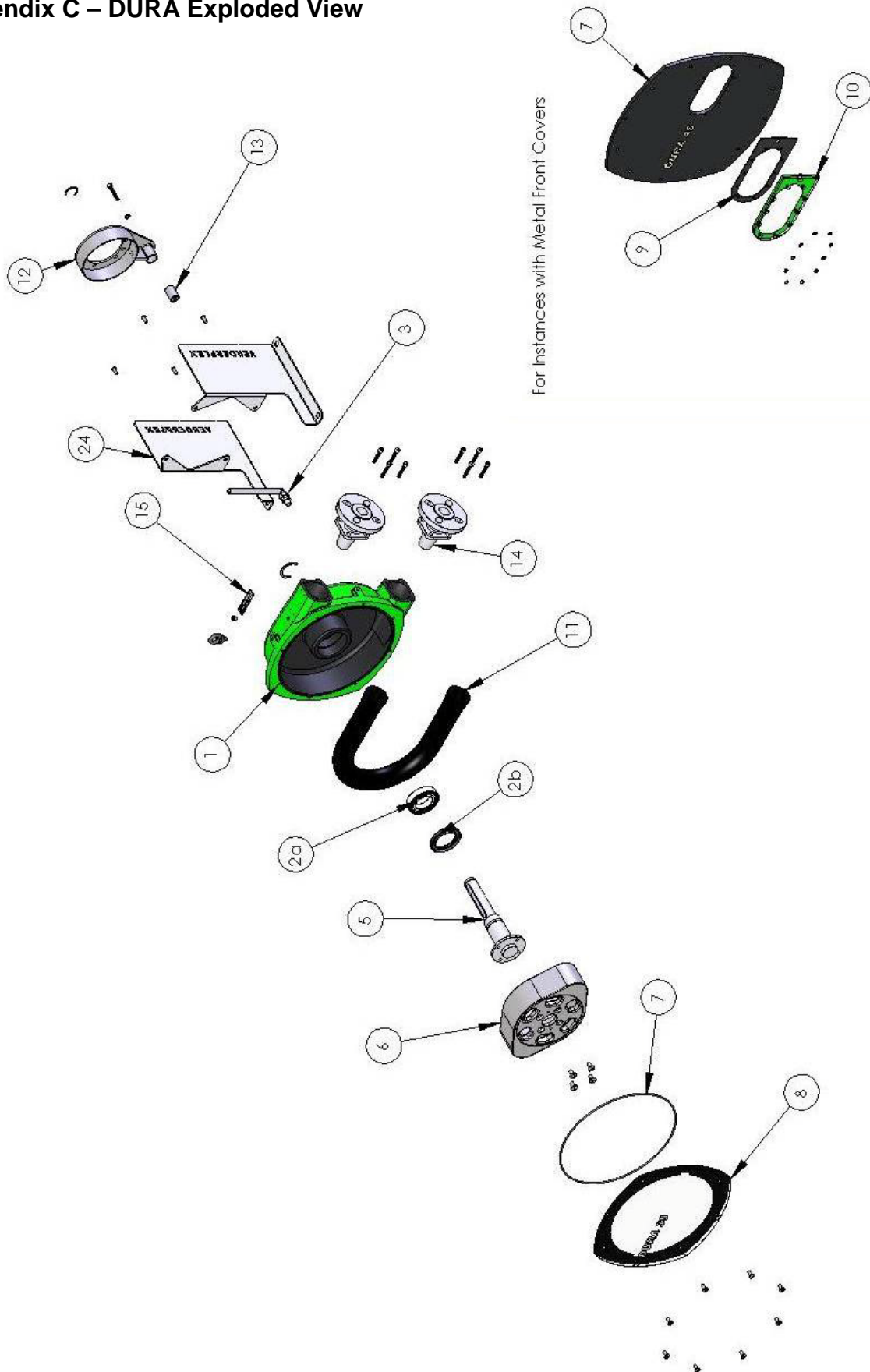
- Employees of the Verder group have not experienced any harmful effect during normal handling and production.
- Verdersil and Verderflex<sup>®</sup> are registered trademarks.

\*The information contained in this sheet is based on our knowledge of the preparation at its delivery date and that the information contained herein is current as of the date of this data sheet. Since the use of this information, and of these opinions and the conditions of use of this preparation is not within the control of Verder Limited, it is the user's obligation to determine the conditions of safe use of the preparation.



The information contained in this sheet is based on our knowledge of the product at its delivery date

**Appendix C – DURA Exploded View**



## Appendix D – DURA 10 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D10 Material Specification
1	Dura Casing	1	139.1095	RAL.6018 /GG25 CI
	Drain Plugs	2		St.Stl 1/8"BSP Drain Plug
	Sealing Tape	0.02		PTFE/1M
	Grease	0.01		Saphire X
2a	Bearings	2	139.1453	St.Stl/ 6210-2RSGL
2b	Lip Seal	1		NBR
	Bearings	2	139.1453.VI	St.Stl/ 6210-2RSGL
	Lip Seal	1		Viton
	Bearings	2	139.1453.PT	St.Stl/ 6210-2RSGL
	Lip Seal	1		PTFE
3	Filler Tube	1	129.0760	Bzp/Cp/Bra
4	Mounting Frames	1 Pair	139.2317	RAL.7035/M.Stl 4mm/310x320x155
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd
5	Drive Shaft Assembly	1	139.1161	Shaft Stl.EN24/Hardened
	Crescent clip	1 Large		M1800 H50
6	Rotor	SP	139.2050.3.CI	GG25 CI
		HP	139.2050.CI	GG25 CI
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd
7	Front Cover O-Ring	1	139.0078	NR
8	Front Cover	1	139.0042	T.Polycarb
	Front Cover Screws	8		Bzp Stl/Csk.Skt.Hd
11	Hose Option	1	139.0001	NR/White
	Hose Option	1	139.0512	NBR/Yellow
	Hose Option	1	139.2021	NBR/F - Yellow+White
	Hose Option	1	139.2010	Green/Hypalon
	Hose Option	1	139.0010	Red/EPDM
	Crescent clip	1 Small		M1800 H18
12	Torque Arm	1	139.1240	RAL.7021/M.Stl
13	Torque Arm Bush	1	139.1479	Stl / Rubber
	Spring Washer	1		Spg Stl 10mm Washer
	Torque Arm Bolt	1		M6 x 40 Shoulder Bolt
14	Universal Port Flanges	2	139.1337	316 St.Stl
	Universal Port Flanges	2	139.1337.PP	PP
	Universal Port Flanges	2	139.1337.PV	PVDF
	Port Flange Screws	8		St Stl/Skt.Cap.Hd
15	Nameplate	1	139.0293	St.Stl
	Rivets	4		St.Stl
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb
	Cardboard Box	1	139.XXXX	Cardboard
	Vederlube Blue	1	129.1418	Blue
	Vederlube Clear	1	129.1418.CL	Clear
	Vederlube Sil	1	129.1372	Sil
	Manual	1	129.1371.CD	Compact Disc/CDR

## Appendix E – DURA 15 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D15 Material Specification	
1	Dura Casing	1	139.1096	RAL.6018 /GG25 CI	
	Lifting Eye	1		Bzp M.Stl/M8 Eye Bolt/DIN580	
	Drain Plugs	2		St.Stl 1/2"BSP Drain Plug	
	Sealing Tape	0.02		PTFE/1M	
	Grease	0.01		Saphire X	
2a	Bearings	2	139.1454	St.Stl/ 6311-2RS	
2b	Lip Seal	1		NBR	
	Bearings	2	139.1454.VI	St.Stl/ 6311-2RS	
	Lip Seal	1		Viton	
	Bearings	2	139.1454.PT	St.Stl/ 6311-2RS	
	Lip Seal	1		PTFE	
3	Filler Tube	1	129.0761	Bzp/Cp/Bra/15Dia Elbowx175x1/2"BSP	
4	Mounting Frames	1 Pair	139.2318	RAL.7035/M.Stl	
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd	
5	Drive Shaft Assembly	1	139.1162	Shaft Stl.EN24/Hardened	
	Crescent clip	1 Large		M1800 H35	
6	Rotor	SP	1	139.2051.3.CI	GG25 CI
		HP		139.2051.CI	GG25 CI
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd	
7	Front Cover O-Ring	1	139.0079	NR	
8	Front Cover	1	139.0043	T.Polycarb	
	Front Cover Screws	8		Bzp Stl/Csk.Skt.Hd	
11	Hose Option	1	139.0002	NR/White	
	Hose Option	1	139.0513	NBR/Yellow	
	Hose Option	1	139.2022	NBR/F - Yellow+White	
	Hose Option	1	139.2011	Green/Hypalon	
	Hose Option	1	139.0011	Red/EPDM	
	Crescent clip	1 Small		M1800 H25	
12	Torque Arm	1	139.1241	RAL.7021/M.Stl	
13	Torque Arm Bush	1	139.1479	Stl / Rubber	
	Spring Washer	1		Spg Stl 10mm Washer	
	Torque Arm Bolt	1		M6 x 40 Shoulder Bolt	
14	Universal Port Flanges	2	139.1338	316 St.Stl	
	Universal Port Flanges	2	139.1338.PP	PP	
	Universal Port Flanges	2	139.1338.PV	PVDF	
	Port Flange Screws	8		St Stl/Skt.Cap.Hd	
15	Nameplate	1	139.0293	St.Stl	
	Rivets	4		St.Stl	
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb	
	Cardboard Box	1	139.XXXX	Cardboard	
	Vederlube Blue	1	129.1418	Blue	
	Vederlube Clear	1	129.1418.CL	Clear	
	Vederlube Sil	1	129.1372	Sil	
	Manual	1	129.1371.CD	Compact Disc/CDR	

## Appendix F – DURA 25 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D25 Material Specification	
1	Dura Casing	1	139.1097	RAL.6018 /GG25 CI	
	Lifting Eye	1		Bzp M.Stl/M8 Eye Bolt/DIN580	
	Drain Plugs	2		St.Stl 1/2"BSP Drain Plug	
	Sealing Tape	0.02		PTFE/1M	
	Grease	0.01		Saphire X	
2a	Bearings	2	139.1455	St.Stl/ 6311-2RS	
2b	Lip Seal	1		NBR	
	Bearings	2	139.1455.VI	St.Stl/ 6311-2RS	
	Lip Seal	1		Viton	
	Bearings	2	139.1455.PT	St.Stl/ 6311-2RS	
	Lip Seal	1		PTFE	
3	Filler Tube	1	129.0761	Bzp/Cp/Bra/15Dia Elbowx175x1/2"BSP	
4	Mounting Frames	1 Pair	139.2319	RAL.7035/M.Stl	
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd	
5	Drive Shaft Assembly	1	139.1163	Shaft Stl.EN24/Hardened	
	Crescent clip	1 Large		M1800 H40	
6	Rotor	SP	1	139.2052.3.CI	GG25 CI
		HP		139.2052.CI	GG25 CI
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd	
7	Front Cover O-Ring	1	139.0080	NR	
8	Front Cover	1	139.0044	T.Polycarb	
	Front Cover Screws	8		Bzp Stl/Csk.Skt.Hd	
11	Hose Option	1	139.0003	NR/White	
	Hose Option	1	139.0514	NBR/Yellow	
	Hose Option	1	139.2023	NBR/F - Yellow+White	
	Hose Option	1	139.2012	Green/Hypalon	
	Hose Option	1	139.0012	Red/EPDM	
	Crescent clip	1 Small		M1800 H25	
12	Torque Arm	1	132.1242	RAL.7021/M.Stl	
13	Torque Arm Bush	1	139.2479	Stl / Rubber	
	Spring Washer	1		Spg Stl 10mm Washer	
	Torque Arm Bolt	1		M8 x 50 Shoulder Bolt	
14	Universal Port Flanges	2	139.1339	316 St.Stl	
	Universal Port Flanges	2	139.1339.PP	PP	
	Universal Port Flanges	2	139.1339.PV	PVDF	
	Port Flange Screws	8		St Stl/Skt.Cap.Hd	
15	Nameplate	1	139.0293	St.Stl	
	Rivets	4		St.Stl	
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb	
	Cardboard Box	1	139.XXXX	Cardboard	
	Vederlube Blue	1	129.1418	Blue	
	Vederlube Clear	1	129.1418.CL	Clear	
	Vederlube Sil	1	129.1372	Sil	
	Manual	1	129.1371.CD	Compact Disc/CDR	

## Appendix G – DURA 35 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D35 Material Specification
1	Dura Casing	1	139.1095	RAL.6018 /GG25 CI/22.5kg
	Lifting Eye	1		Bzp M.Stl/M10 Eye Bolt/DIN580
	Drain Plugs	2		St.Stl 1/8"BSP Drain Plug
	Sealing Tape	0.02		PTFE/1M
	Grease	0.01		Saphire X
2a	Bearings	2	139.1453	St.Stl/ 6210-2RSGL
2b	Lip Seal	1		NBR
	Bearings	2	139.1453.VI	St.Stl/ 6210-2RSGL
	Lip Seal	1		Viton
	Bearings	2	139.1453.PT	St.Stl/ 6210-2RSGL
	Lip Seal	1		PTFE
3	Filler Tube	1	129.0760	Bzp/Cp/Bra/15Dia Elbowx175x1/2"BSP
4	Mounting Frames	1 Pair	139.2317	RAL.7035/M.Stl 4mm/310x320x155
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd
5	Drive Shaft Assembly	1	139.1161	Shaft Stl.EN24/Hardened
	Crescent clip	1 Large		M1800 H50
6	Rotor	SP	139.2050.3.CI	GG25 CI
		HP	139.2050.CI	GG25 CI
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd
7	Front Cover O-Ring	1	139.0078	NR
8	Front Cover	1	139.0042	T.Polycarb
	Front Cover Screws	8		Bzp Stl/Csk.Skt.Hd
11	Hose Option	1	139.0004	NR/White
	Hose Option	1	139.0515	NBR/Yellow
	Hose Option	1	139.2024	NBR/F - Yellow+White
	Hose Option	1	139.2013	Green/Hypalon
	Hose Option	1	139.0013	Red/EPDM
	Crescent clip	1 Small		M1800 H35
12	Torque Arm	1	139.1240	RAL.7021/M.Stl
13	Torque Arm Bush	1	139.2479	Stl / Rubber
	Spring Washer	1		Spg Stl 10mm Washer
	Torque Arm Bolt	1		M10 x 50
14	Universal Port Flanges	2	139.1337	316 St.Stl
	Universal Port Flanges	2	139.1337.PP	PP
	Universal Port Flanges	2	139.1337.PV	PVDF
	Port Flange Screws	8		St Stl/Skt.Cap.Hd
15	Nameplate	1	139.0293	St.Stl
	Rivets	4		St.Stl
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb
	Cardboard Box	1	139.XXXX	Cardboard
	Vederlube Blue	1	129.1418	Blue
	Vederlube Clear	1	129.1418.CL	Clear
	Vederlube Sil	1	129.1372	Sil
	Manual	1	129.1371.CD	Compact Disc/CDR

## Appendix H – DURA 45 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D45 Material Specification
1	Dura Casing	1	139.1096	RAL.6018 /GG25 Cl/x50kg
	Lifting Eye	1		Bzp M.Stl/M10 Eye Bolt/DIN580
	Drain Plugs	2		St.Stl 1/2"BSP Drain Plug
	Sealing Tape	0.02		PTFE/1M
	Grease	0.01		Saphire X
2a	Bearings	2	139.1454	St.Stl/ 6311-2RS
2b	Lip Seal	1		NBR
	Bearings	2	139.1454.VI	St.Stl/ 6311-2RS
	Lip Seal	1		Viton
	Bearings	2	139.1454.PT	St.Stl/ 6311-2RS
	Lip Seal	1		PTFE
3	Filler Tube	1	129.0761	Bzp/Cp/Bra/15Dia Elbowx175x1/2"BSP
4	Mounting Frames	1 Pair	139.2318	RAL.7035/M.Stl
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd
5	Drive Shaft Assembly	1	139.1162	Shaft Stl.EN24/Hardened
	Crescent clip	1 Large		M1800 H55
6	Rotor	SP	139.2051.3.Cl	GG25 Cl
		HP	139.2051.Cl	GG25 Cl
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd
7	Front Cover O-Ring	1	139.0079	NR
8	Front Cover	1	139.0043	M.Stl / Powder Coated
	Front Cover Screws	12		Bzp Stl/Csk.Skt.Hd
9	Front Cover Inspection Window Gasket	1	139.1231	NR
10	Front Cover Inspection Window	1	139.1225.P	T.Polycarb
	Front Cover Inspection Window Fasteners	10		Bzp Stl/Csk.Skt.Hd
11	Hose Option	1	139.5000	NR/White
	Hose Option	1	139.0516	NBR/Yellow
	Hose Option	1	139.2025	NBR/F - Yellow+White
	Hose Option	1	139.2014	Green/Hypalon
	Hose Option	1	139.0014	Red/EPDM
	Crescent clip	1 Small		M1800 H45
12	Torque Arm	1	139.1241	RAL.7021/M.Stl
13	Torque Arm Bush	1	139.2479	Stl / Rubber
	Spring Washer	1		Spg Stl 10mm Washer
	Torque Arm Bolt	1		M10 x 50
14	Universal Port Flanges	2	139.1338	316 St.Stl
	Universal Port Flanges	2	139.1338.PP	PP
	Universal Port Flanges	2	139.1338.PV	PVDF
	Port Flange Screws	8		St Stl/Skt.Cap.Hd
15	Nameplate	1	139.0293	St.Stl
	Rivets	4		St.Stl
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb
	Cardboard Box	1	139.XXXX	Cardboard
	Vederlube Blue	1	129.1418	Blue
	Vederlube Clear	1	129.1418.CL	Clear
	Vederlube Sil	1	129.1372	Sil
	Manual	1	129.1371.CD	Compact Disc/CDR

## Appendix I – DURA 55 Replacement Parts & Kits

Item – Refers to parts of Exploded View in Appendix J

Item	Description	Qty	Code	D55 Material Specification
1	Dura Casing	1	139.1097	RAL.6018 /GG25 CI/x80kg
	Lifting Eye	1		Bzp M.Stl/M10 Eye Bolt/DIN580
	Drain Plugs	2		St.Stl 1/2"BSP Drain Plug
	Sealing Tape	0.02		PTFE/1M
	Grease	0.01		Saphire X
2a	Bearings	2	139.1455	St.Stl/ 6311-2RS
2b	Lip Seal	1		NBR
	Bearings	2	139.1455.VI	St.Stl/ 6311-2RS
	Lip Seal	1		Viton
	Bearings	2	139.1455.PT	St.Stl/ 6311-2RS
	Lip Seal	1		PTFE
3	Filler Tube	1	129.0761	Bzp/Cp/Bra/15Dia Elbowx175x1/2"BSP
4	Mounting Frames	1 Pair	139.2319	RAL.7035/M.Stl
	Mounting Frame Fasteners	4		Bzp M.stl/Skt.Cap.Hd
5	Drive Shaft Assembly	1	139.1163	Shaft Stl.EN24/Hardened
	Crescent clip	1 Large		M1800 H55
6	Rotor	SP	139.2052.3.CI	GG25 CI
		HP	139.2052.CI	GG25 CI
	Rotor Screws	4		Bzp Stl/Csk.Skt.Hd
7	Front Cover O-Ring	1	139.0080	NR
8	Front Cover	1	139.0044	M.Stl Powder Coated
	Front Cover Screws	12		Bzp Stl/Csk.Skt.Hd
9	Front Cover Inspection Window Gasket	1	139.1232	NR
10	Front Cover Inspection Window	1	139.1226.P	T.Polycarb
	Front Cover Inspection Window Fasteners	10		Bzp Stl/Csk.Skt.Hd
11	Hose Option	1	139.6000	NR/White
	Hose Option	1	139.0517	NBR/Yellow
	Hose Option	1	139.2026	NBR/F - Yellow+White
	Hose Option	1	139.2015	Green/Hypalon
	Hose Option	1	139.0015	Red/EPDM
	Crescent clip	1 Small		M1800 H50
12	Torque Arm	1	132.1242	RAL.7021/M.Stl
13	Torque Arm Bush	1	139.2479	Stl / Rubber
	Spring Washer	1		Spg Stl 10mm Washer
	Torque Arm Bolt	1		M10 x 50
14	Universal Port Flanges	2	139.1339	316 St.Stl
	Universal Port Flanges	2	139.1339.PP	PP
	Universal Port Flanges	2	139.1339.PV	PVDF
	Port Flange Screws	8		St Stl/Skt.Cap.Hd
15	Nameplate	1	139.0293	St.Stl
	Rivets	4		St.Stl
	Dura Pallet	0.25	129.XXXX	ISPM15 Stpd Timb
	Cardboard Box	1	139.XXXX	Cardboard
	Vederlube Blue	1	129.1418	Blue
	Vederlube Clear	1	129.1418.CL	Clear
	Vederlube Sil	1	129.1372	Sil
	Manual	1	129.1371.CD	Compact Disc/CDR

## **Appendix J - Operating Protocol for Dura Black NBR Food Grade Hose.**

Dura Black NBR Food Grade hoses are suitable for conveying oily and fatty foods in peristaltic pumps.

### **Cleaning Protocol**

Dura Black NBR food grade hoses should be cleaned with the following protocol:

- First flush: 2% Nitric Acid, (HNO<sub>3</sub>) solution for up to 3 minutes at up to 50°C.  
Second flush: 2% Caustic soda, (NaOH) solution for up to 20 minutes at up to 100°C.  
                  or: 5% Caustic soda, (NaOH) solution for up to 5 minutes at up to 100°C.  
                  or: 20% Caustic soda, (NaOH) solution for up to 20 minutes at ambient.  
Final flush: Flush with clean water to remove all traces of cleaning solutions.

Under no circumstances should Dura Black NBR food grade hoses be cleaned with Sodium Hypochlorite, (NaOCl) based cleaning solutions or the above concentrations, exposure Durations or temperatures be exceeded.

### **Food Grade Approval**

All Dura Black NBR food grade hoses' inner liners are certified as compliant to FDA – CFR 21 Parts 170 to 189 – Item 177.2600.

### **Hose Description**

All Dura Black NBR Food Grade hoses consist of a smooth black inner food grade liner bonded to a non-food grade outer. The inner liner is a taste-free and odour-less.

### **Hose Installation**

All Dura Black NBR Food Grade hoses must be installed in accordance with the procedures defined in the Dura Safety, Operating and Maintenance manual.

### **Identification**

Dura Black NBR Food Grade hoses can be identified by an external Yellow Coding / Identification tape and an additional white longitudinal stripe,

## Pump Installation

Verderflex Dura pumps using Black NBR Food Grade hoses must be installed in accordance with recommendations made by the pump's supplier. In particular, special care must be given to the suction and discharge line conditions in accordance with Verderflex's recommendations. Should there be any doubt about any installation details, these must be discussed with the pump's supplier.

## Verderflex Dura - Black NBR Food Grade Hose Part Numbers

PUMP SIZE	PART	MARKINGS	PART NUMBER
DURA 10	NBR (Food Grade)	Yellow writing & white stripe	139.2021
DURA 15			139.2022
DURA 25			139.2023
DURA 35			139.2024
DURA 45			139.2025
DURA 55			139.2026

## Particle Release



All hoses will release small quantities of rubber into the product stream, especially immediately after the hose installation and just prior to hose failure. Whilst the rubber released will be food grade particles, these may cause end-user concerns about contamination and so we recommend that suitable particle capturing devices such as filters are fitted into the pump's discharge line.

## VERDERLUBE

The associated VERDERLUBE lubricant is also a food-grade product and is made from food grade constituents. Refer to Appendix A for data sheet.

## Appendix K – EC Declaration of Conformity

**We the manufacturers,**

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[info@verder.nl](mailto:info@verder.nl)

**Hereby declare that,**

Verderflex Peristaltic Hose Pumps, Models VF10 through VF125

**Comply with,**

Machine Directive 98/37/EC

**Technical Reference File:**

Vflex 001/02

**Notified Body:**

Baseefa 1180 Buxton UK