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PROVINCE SUD		ARRIVÉ LE : 19 JUIN 2015									
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AFFECTÉ		Dir.	CE	CE	CE	SGM	SAF	SICER	SCBT	PPRB	PZF
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COPIE											
OBSERVATIONS		✓M → BICPE → 26/06 → AR									

Direction de l'environnement

Nouméa le, 01 juin 2015

Objet : nouvelle machine

Madame,

Afin de compléter mon dossier ICPE déposé le 5 février 2015 sachez que nous avons reçu il y a un mois une machine de pulvérisation du verre industriel creux. Entrée en phase de test il y a un mois et à présent prête pour la production.

Cette machine de Marque Krysteline nous permet de produire de l'agrégat de construction mais également un complément en silice pour nos compost et amendements organiques.

Vous trouverez en pièce jointe un descriptif technique de la machine.

Le tonnage de verre traité n'excédera pas 7 tonnes mois

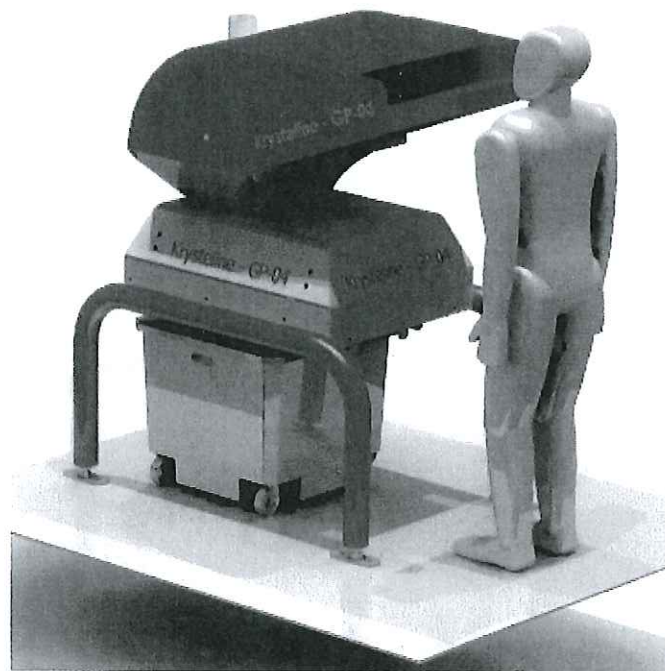
Vous en souhaitant bonne réception.

Je vous prie de croire, Madame, à l'assurance de mes salutations distinguées.

Operation and Maintenance Manual

Glass Processor

Type GP4





**Thank you for selecting the Krysteline GP4
Glass Imploder to satisfy your glass
processing requirements. If used correctly
this quality product will provide you with
years of trouble free service.**

**Please read this instruction manual carefully
to ensure proper operation and maintenance
of your machine.**

**Your GP4 Glass Processor has been built to
meet your specifications and individually
numbered.**

**Please quote the model and serial number in
all correspondence.**



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1. Introduction

1.1. Description of the GP4

All Krysteline glass processors are designed to the highest standards and will operate safely and economically should the instructions given here be followed. Krysteline provide the Processor with as many safeguards as possible but the onus is on the user to ensure that all relevant safety regulations are complied with in relation to the safety of such an installation.

1.2. Intended use of the GP4

The GP4 Glass Processor has been designed and constructed to implode glass from bottles or float glass up to a thickness of 10mm at a max rate of 4 tonnes an hour. The GP4 is designed for freestanding installation. The inner walls of the imploder chamber are lined with hard plate - 500 BN hardness.

The inlet hopper of the Processor has been designed to receive a continuous flow of glass from either a loading conveyor (optional) or manual feeding.

1.3 The Invention and Development of the Krysteline Imploder

As with many great inventions the glass imploder was conceived out of necessity. In the early 1990's the P&O Regal Princess cruise ship was caught by a US spotter plane illegally discharging garbage in the Caribbean Sea. P&O was subsequently fined \$1m, half of which was refundable if P&O commissioned and installed a marine Waste Management System.

The P&O management team approached Steve Whettingsteel (Technical Director) to undertake a complete evaluation of the waste processing systems installed across their entire fleet. Whettingsteel who was at that time employed by a Marine Refrigeration company based in Southampton subsequently set up a specialist Consulting Engineering Company to focus on the project.

The contract was initially awarded to assess environmental equipment on eleven vessels over a 12-month period. This resulted in winning a project to develop and install a closed loop, total waste management system comprising eleven separate systems.

Glass waste is created at the rate of 2.2 kilos per person per day on a cruise liner, and with an all up compliment of 4000 persons this represents an enormous storage and handling issue. So as part of the project, significant densification and safe handling was required to cope with the immense volume of glass waste. A number of new designs of glass crushers were developed and prototyped and it was clear during testing that a significant breakthrough had been made in glass re-processing technology.



Thus the glass “imploder” was invented and perfected, and ten machines were provided free of charge to Royal Caribbean Cruise Line to test the processor in a hostile environment. Over 165,000 hours of testing was undertaken on these machines with very few problems.

This glass imploder is now used extensively in the world cruise ships. As a result Krysteline was founded to take the product to market, and the Krysteline process has been patented worldwide. The basis of this original design is now incorporated within all of the Krysteline glass processing machines.

1.4 The Krysteline Product

Technical Appraisal

The patented processor, which Krysteline has developed, produces a unique product profile. The traditional glass “impact” processors are reliant on technology used for breaking stone in the base of a quarry.

These traditional processors create a product, which has a profile similar to the result of dropping a crate of glass bottles on the kitchen floor. The profile will normally have many longitudinal sharp shards extending from each glass particle. These are the characteristics, which cause laceration whilst handling.

All glass processed by Krysteline is Imploded, which causes the opposite effect of the normal impact machines. The final shape of the glass particle is angular to sub-angular. This means that the general profile of the particle provides many significant benefits over and above any known natural or recycled aggregate.

Glass processed by Krysteline can be in the form of containers, float or flat glass. The hardness of these glass types vary significantly with the hardest glass such as tempered having a PSV of 55 which equates to 6.5 Ohms, glass containers and stock flat glass has a PSV of 35 which equates to 5.5 Ohms.

All Krysteline equipment is designed, manufactured and supplied to conform with the requirements of The Supply of Machinery (safety) Regulations 1992 and Amended 1994 and BS EN 60204-1; 1993 “Safety and Machinery – Electrical Equipment and Machines”.

The equipment is constructed to the quality management system standard BS EN ISO9001: 1994, approved by Lloyds Register Quality Assurance.



2. TECHNICAL SPECIFICATIONS OF PLANT

TYPE: GP4

Year of Construction: 2008

Measurements: Depth: 1.203 m Width: 0.940 m

Height: Hopper closed: 1.75 m Hopper open: 1.95 m

Weight: 320 kg

Rotor Revolutions: 1750 rpm

Number of Rotating Blades: 8

Number of Stationary Blades: 2

Capacity: Max peak 4 tonnes/hr

Rotor Pulley: Twin V belt pulley 125mm dia - 40mm bore.

Motor Pulley: Twin V belt pulley 132mm dia - 39mm bore.

Belt: SPA1285

Bearing: NP40 UCP208-40 40mm Dia.

Drive motor

Capacity: 6 pole, 5.5 kW

Volt: 440V

Revolutions: 1450RPM

Hertz: 50/60Hz



3. Safety Instructions

3.1 Introduction

The plant has been manufactured according to the safety requirements of the Machinery Directive 89/392/EEC and the amendments 91/368/EEC. This covers the safety of machinery. However danger can result if the instructions provided here are not adhered to. Therefore it is very important to follow exactly the safety instructions given here. Should any problems arise whilst operating the plant it is important that the manufacturer be notified immediately. So that he will be able to give you the necessary advice concerning the safe and economic use of the plant.

3.2 Definitions

Danger Zone: Refers to any zone within and/or around the machine in which an exposed person is subject to a risk to his/her safety or health as indicated below in Fig.1

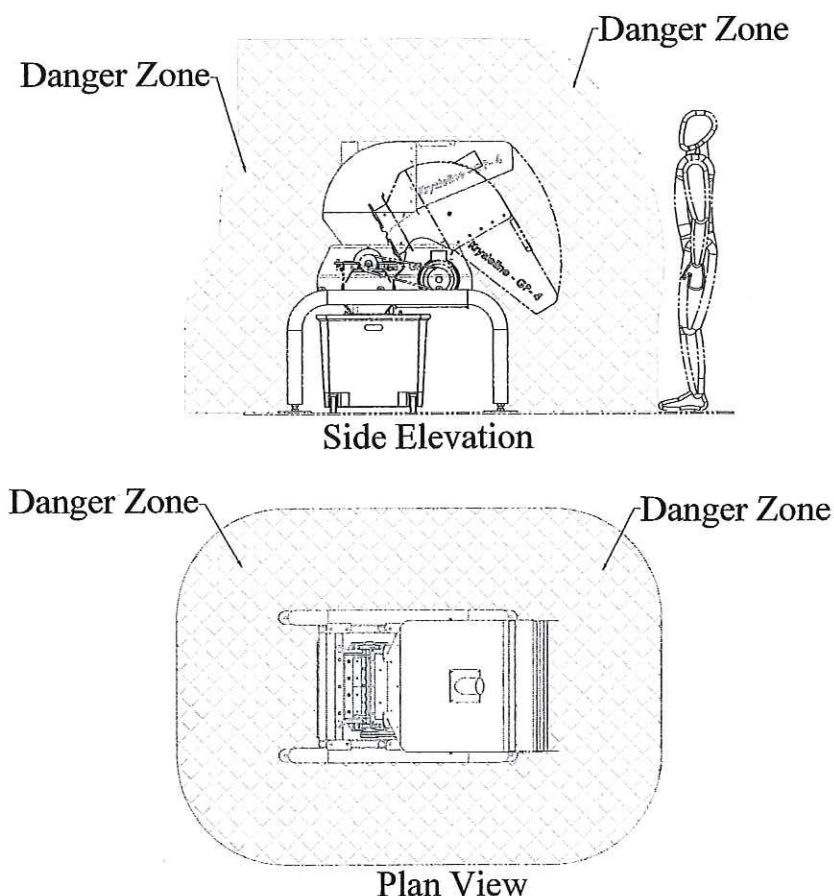


Figure 1

Exposed Person: Means any person wholly or partially in a danger zone



Operator: Means any person or persons given the task of installing, operating, adjusting, maintaining, cleaning, repairing or transporting the machine.

Qualified Operator: Means an operator who has been trained in safety and operation of this equipment.

3.3 Safety summary

Never	Install, maintain or operate this equipment without adequate training.
Never	Use the plant for any other purpose other than that specified by the manufacturer.
Never	Allow persons under 18 years of age to operate plant.
Never	Use spare parts that are not specified by the manufacturer.
Never	Attempt to repair something with which you have no experience.
Never	Climb onto the GP4 or look or reach into the Imploder chamber when the plant is in operation.
Never	Remove warning tags or labels.
Never	Remove or in any way override any safety or protection equipment installed on the plant.
Never	Operate without correct personal protective equipment.
Never	Operate the equipment whilst personnel are standing in the Danger Zone.
Never	Allow the equipment to operate whilst a knocking or pounding noise is heard.
Never	Allow the equipment to operate in an environment, which exceeds - 25°C to 40°C.
Never	Operate with incorrect motor rotation.
Never	Reverse rotor direction, as this will cause the blade support bolts to shear.
Never	Exceed any of the tolerances on any wear component.
Always	Allow only qualified operators to operate plant.
Always	Allow only qualified personnel to carry out any adjustment, maintenance or repair of the plant.
Always	Read the safety and operating instructions provided.
Always	Ensure all safety equipment is operating normally.
Always	Before operation ensure you have cleared and unobstructed view of the plant in order to ensure that no exposed persons are in danger zones.
Always	Take due care when around the plant.
Always	Use personnel protection equipment in particular boots and gloves.
Always	Undertake maintenance in accordance with the manufacturers recommendations.

The Processor can be opened up to reveal the internal parts and in order to make this as safe as possible the Processor has been fitted with a Schmersal safety switch. The Schmersal is a highly reliable and tamper resistant interlock switch. However this device should not be used as an isolator and when any work is to be undertaken on the machine it should be isolated from its power supply. This safety switch



conforms to BS5304, BS4794 and to European standards and also bears the CE mark for machine safety.

Note: Particular attention should be taken of the safety requirements when opening the Processor. The Processor may contain glass particles and as such gloves should be worn to prevent injury from sharp pieces of the glass.

Failure to adhere to the safety instructions mentioned above might result in accidents, which could cause serious injury. The manufacturer cannot accept responsibility for such accidents if these safety instructions were not followed exactly. The operator must make sure that only authorised persons are allowed to work on the GP4. The operator should also be responsible for any other person's safety within the vicinity of the plant.

3.4 Motor

The motors supplied are CE marked to be in conformance with the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and as such is deemed to satisfy the requirements of the Machinery Directive 89/392/EEC for incorporation into machinery that will be CE marked under the requirements of Machinery Directive 89/392/EEC.

In order to operate the motors safely the following points should be considered by all persons who may be involved in the installation, operation, maintenance and repair of the Processor.

- The motors should not be stepped on.
- The temperature of the outside casing of the machine may be hot to the touch during normal operation.
- Lifting lugs shall be used for lifting only the motors.

3.5 Noise

The noise level around the machine is below the 70dB(A) level set in the Machinery directive.

4 Installation

4.1 Unpacking the equipment.

Carefully remove all crating from your Processor and thoroughly assess the machine has not been damaged in any way during transportation. Any damage should be photographed and a copy of the photograph emailed to eng@krysteline.net. It is imperative that the processor is not installed or operated until a formal written notification in relation to the damage has been received from Krysteline.



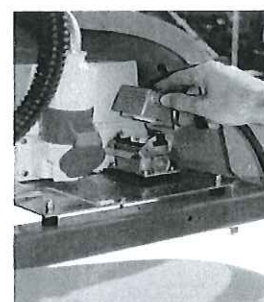
4.2 Inspection

Be sure to examine the imploder chamber to see that nothing has fallen into the chamber during delivery or installation, which could cause damage on start-up. This is achieved by removing the guards, starting with rear guard.



When the bolts are removed you will see that the power cable is connected to a power outlet socket. Remove the plug from the socket. The guard is now free for safe storage away from the machine.

The front panel may now be unbolted; when the bolts are removed you will notice the control cable is connected into a security plug. Slip the locking frame backward. This is a tight fit which will require a good push to open it. Once the locking frame is removed the plug can be pulled from the body. The front panel is now free for removal to a safe storage area.



fit

The two side panels can now be unbolted and removed.

If your GP4 is an earlier model installed with a steel dead plate cover, remove the dead plate protecting plate from around the hinges. It is imperative this is removed prior to opening the hopper as the plate may become damaged. Later models are installed with a rubber closing piece to negate the removal of the plate. If you would like the updated rubber closing piece contact the factory for this free issue part.

Remove the three hopper retaining bolts located on the flange at the rear of the Imploder. See figure 2a and 2b below.

Note! To open chamber, first take weight off flange by supporting hopper. Loosen off the 3 No locking Studs as indicated, and lower hopper slowly

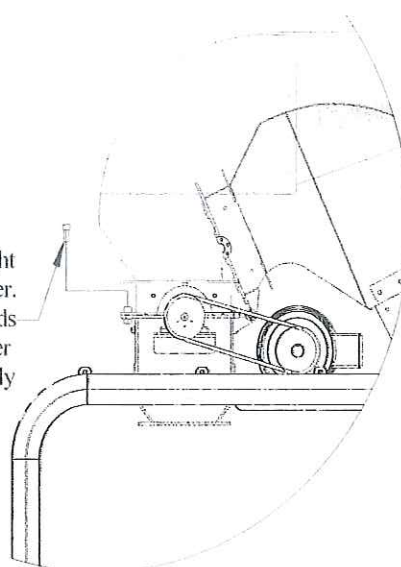
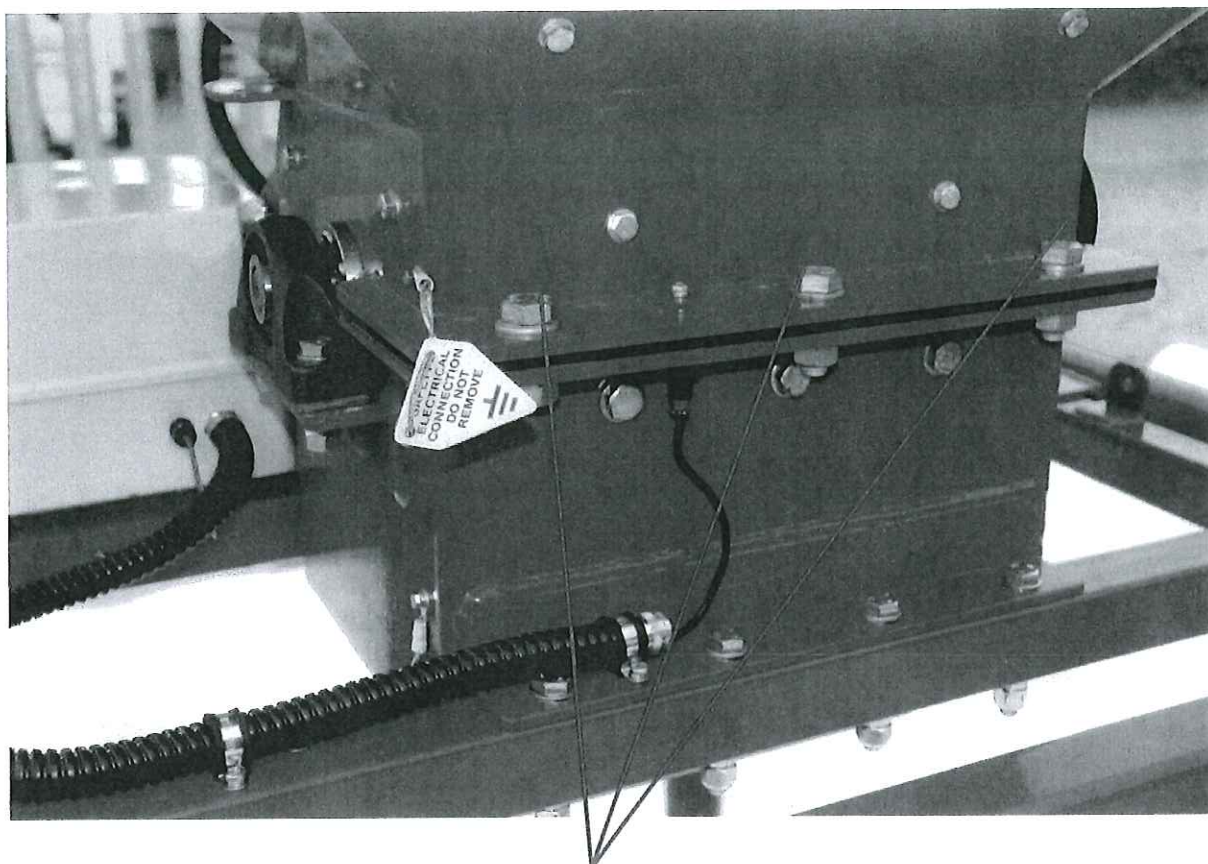


Figure 2a



**Remove these three bolts to
access Imploder Chamber**

Figure2

4.3 External support

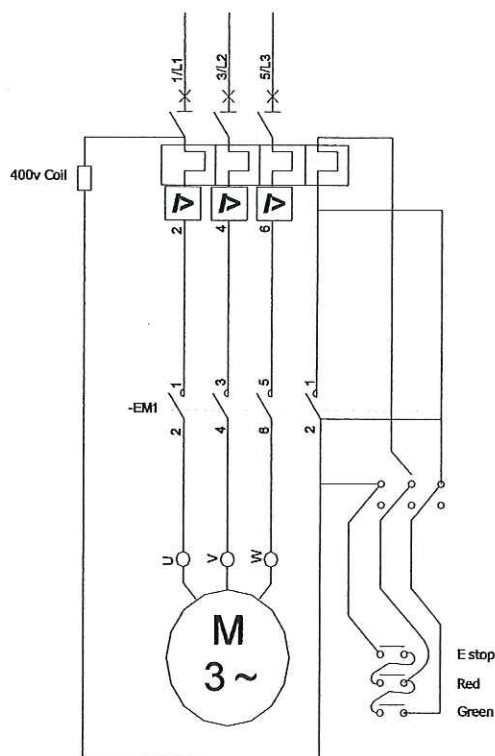
Whatever device is used to feed glass to the processor it should not be supported by the GP4. Supporting any ancillary equipment from the GP4 will nullify the manufacturer's warranty.

4.4 Electrical

The electric motors should be wired to 415v, 60Hz, 3pHz with suitable overload protection. A qualified electrician should carry out this installation.

Check the motors resistance with a 500 volt DC Megger, and if less than 1 megohm, do not use.

All work should be carried out to BS7671: 1992 "Requirement for Electrical Installation IEE Wiring Regulation 16th Edition" or other national or marine standard.



4.5 Securing

Poor installation will cause vibration and premature failure.

4.6 Rotation

When the Processor is run, make sure the direction of rotation is correct. Below is a view of the correct operational rotation. This can be checked by starting the Imploder and checking the rotation of the drive belts by looking below the support frame upwards on the left hand side.

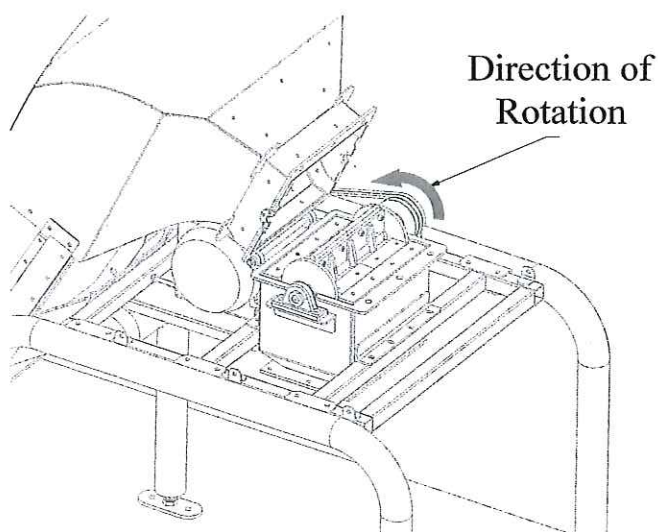
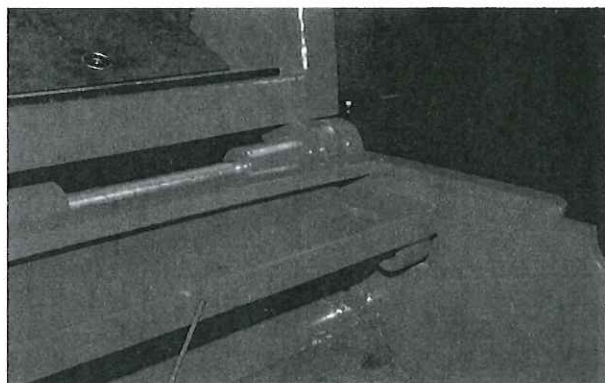


Figure 4

4.7 Dead plate assembly

The GP4 has been installed with a moving dead plate. The purpose of this plate is to allow for items which may accidentally have found their way into the Implosion to pass without damaging the internal mechanism and rotor.



Dead plate in Raised position

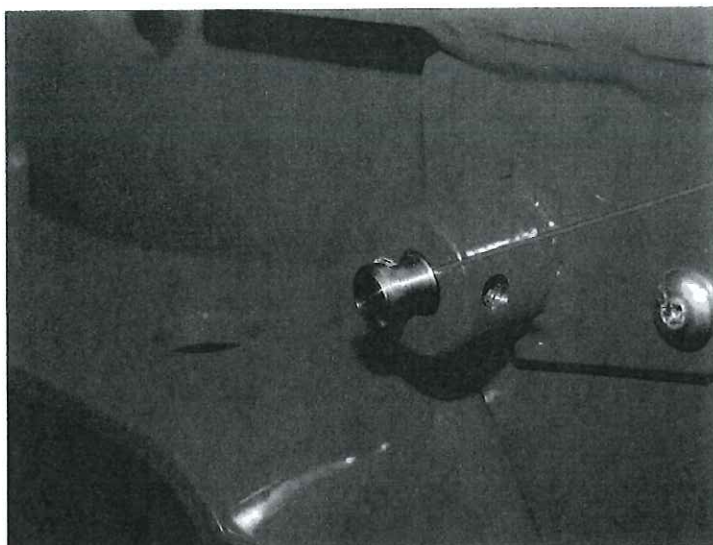


Dead plate in lowered position

The dead plate is hinged along the line of the hopper hinges allowing for a maximum rotation of 20° . The dead plate is supported on both sides by shear pins. These pins are manufactured with shear indentations to assist in the softening of the shear action. Each pin is reversible.

If the shear pin were to activate in operation the operator will notice the discharge glass particle size will be approximately 25mm rather than the more standard 4mm particulate.

To replace the shear pins section 4.2 will be required to be undertaken. The correct location of the shear pins is indicated in the image below.



Shear pin location

Each pin has a machined groove at each end. This groove serves a dual function of a) creating the weak "shear" point between the dead plate and the Imploder chamber b) a location indication to ensure the pin is inserted correctly into the dead plate assembly.

4.8 Measurements / tolerances

The figure below shows the installation measurements of the GP4 Glass Processor. The distance between the floor / deck and the nearest obstruction above the Imploder should be a minimum of 1950 mm. In order to facilitate routine inspection of the imploder and other internal parts, the hopper should be allowed to drop to its stop position without obstruction or external support.

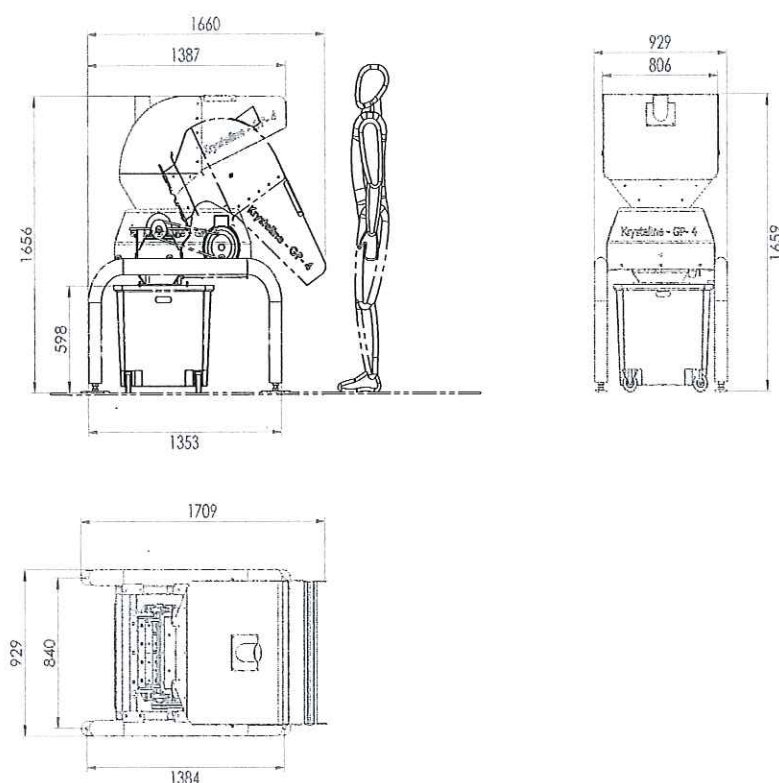


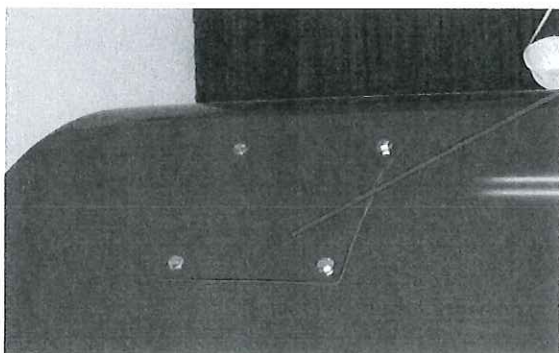
Figure 5



Sufficient tolerance should be maintained to allow for effective removal of components during maintenance

4.9 Air extraction port

Each GP4 is manufactured with an outlet for the installation of dust extraction port. Typically when processing post consumer container glass air extraction is not required, however when drier products such as commercial flat glass and CRT are being processed a negative pressure may be required. A low speed air extraction system is recommended to reduce wear on Impellers and exhaust ductwork.



Removable air extraction cover

A removable cover has been installed to allow for the installation of the air extraction port. If you require this port please contact Krysteline, the corresponding part number is included in the spare parts list

5. Operation

Pre start check

- Is the power supply connected?
- Do you have the correct safety equipment?
- Has the machine been damaged?
- Is the danger zone free from obstruction?
- Do you have adequate storage bins available?

Pre feeding

- Is the processed glass collection bin empty?
- Ensure the machine is running prior to feeding
- Place one bottle in the chute to test the rotor is processing

Whilst operating

- Always feed the machine within its recommended feed rate
- Never feed anything other than glass
- If glass stops exiting the machine there may be something jammed across the rotor. Wait a while to see if it clears. Try two more bottles to see if it clears, if not strip down to remove obstruction.

Stopping

- Always ensure the machine runs for at least two minutes after the last glass has been fed



6. Maintenance

The GP4 glass Processor has been manufactured to a high quality and as a result is very reliable and robust. It provides you with maximum performance with a minimum of care and maintenance. However it is important to follow the maintenance procedures below to ensure the glass Processor's continuing efficient performance.

SAFETY FIRST: *Isolate power supply before carrying out any repair and/or maintenance. Also ensure that the proper precautions are taken against lacerations by un-imploded glass, which may still be in the chamber, wear gloves where appropriate.*

6.1 Maintenance of machine parts

Carry out the maintenance and inspection listed below at the intervals specified in Table 1 on page 19.

Bearings: In accordance with the specification on pages 24 to 27.

Wear Plates: These are wearing items and should be replaced when they are visibly worn to 20% of their original dimensions.

Rotating blades: These are wearing items and should be replaced immediately when they are visibly worn to within 2mm of the rotor or the gap between the stationary blade and the rotating blade reaches 10mm or the glass becomes sharp when exiting the machine. When rotating blades are replaced all securing bolts and spring washers must also be replaced. These are supplied FOC with all genuine parts. If you don't have the bolts don't install the blades. Contact Krysteline immediately to have the genuine parts shipped.

Rotating blades have two wear surfaces. Simply rotate the blades inside for outside to achieve a new surface.

Stationary blades: These are wearing items and should be replaced immediately when they are visibly worn to the tolerances indicated in figure 4 below. When rotating blades are replaced all securing bolts and spring washers should also be replaced. These are supplied FOC with all genuine parts. If you don't have the bolts don't install the blades. Contact Krysteline immediately to have the genuine parts shipped.

Stationary blades have two wear surfaces. Simply rotate the blades inside for outside to achieve a new surface.

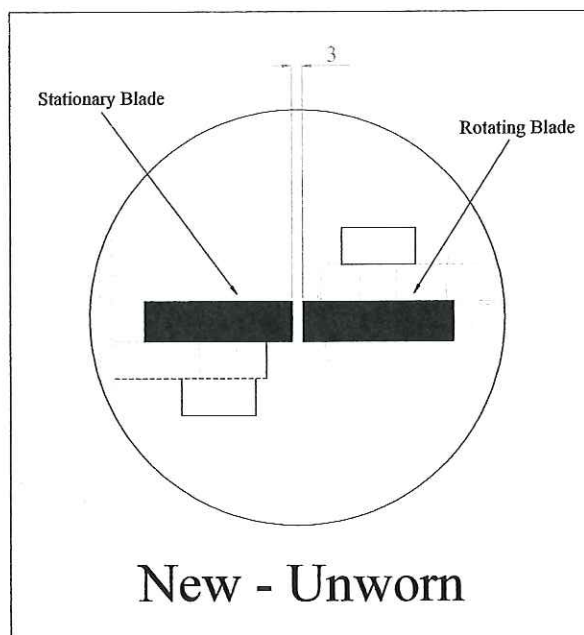


Figure 6A

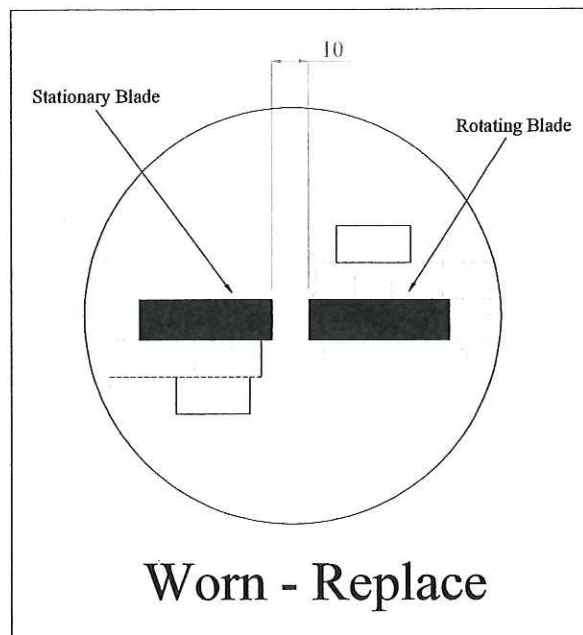


Figure 6B

Guards: Check that they are not removed or loose, replace or repair.

6.2 Greasing Instructions

A precision bearing can be damaged as much by over greasing-as by under greasing. Two strokes with the enclosed pressure gun once a month will guarantee the correct amount for each bearing

Lubricant: Use Mikrolube GL 261 for the bearings.

6.2 Maintenance Schedule

Table 1

ITEM	ACTION	INTERVAL
Rotating & Stationary Blade	Check for wear	Monthly
Rubber curtains / Brushes	Check for damage / effectiveness	Weekly
Guards and safety devices	Inspection	Daily
Belt tension	Check for correct tension	Monthly
Bearings	Greasing	Monthly
Motor	Dust down electrical motors, check for damage or excess heat	Monthly
Rotor Shaft seals	Check for wear	Monthly
Wear plates	Check wear does not exceed spec.	Monthly
Imploder to Hopper seal	Check for tears or damage	Monthly



6.3 Belt tensioning

The drive belt tension should allow for a maximum float of 15mm (See figure 7 below). Lack of attention to belt tension and condition will result in premature failure.

Belt tensioning should be undertaken by using the two tensioning bolts located on the motor support rails. Care should be taken to ensure the pulleys are aligned once tensioning has been completed.

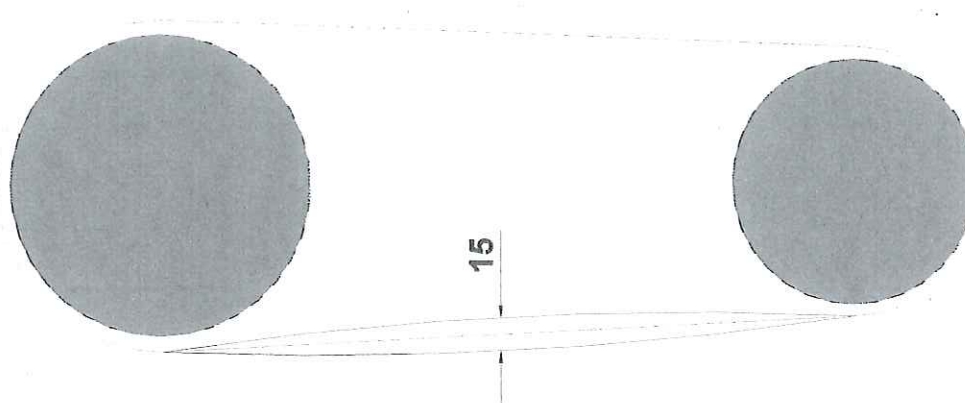


Figure 7

7 Repair

7.1 Opening the Imploder housing

- Isolate the machine from its power source.
- Release the three flange retaining bolts on rear of Processor / hopper as per detail in Fig 2 on Page 12.
- Tilt the infeed Hopper as per instructions in Fig.1 on Page 13.
- Remove unprocessed glass with a suitable dry brush prior to proceeding further, ensuring adequate hand and eye protection is taken.

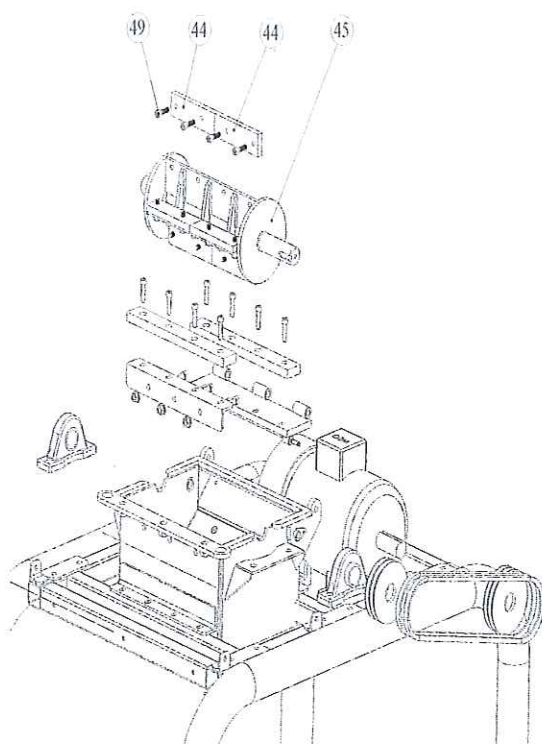
7.2 Replacing rotating blades

For detail see Fig. 8

- Ensure the Processor is isolated from its power supply.
- Open the Processor assembly to reveal the internal parts. See Fig. 8 for detail.
- Each of the eight blades on the rotor has been attached with a socket head bolt and spring washer. In turn remove each rotating blade. The blades are designed to be rotated, so check that both front and rear edges have been used before disposing of the blades.



- d) All socket head bolts must be discarded when the blade is disposed of. Under no circumstance should any of the bolts or spring washers be reused on new blades.
- e) With all of the blades removed the rotor should be thoroughly cleaned to ensure new blades would mate to the rotor without impairment by foreign objects. Ignoring this process could result in the blade working loose and damaging the equipment.
- f) Replace the worn rotating blades ensuring that all bolts are tightened to 135Lb/ft or 180Nm. Do not over tighten the bolts or they may shear during operation.
- g) Check the tolerance between the rotating and stationary blades; if it is outside of that shown in Fig.4B then adjust or replace the stationary blades as per figures 4a & 4b on page 16.
- h) Close the Processor assembly by reversing procedure 2 indicated in this section.



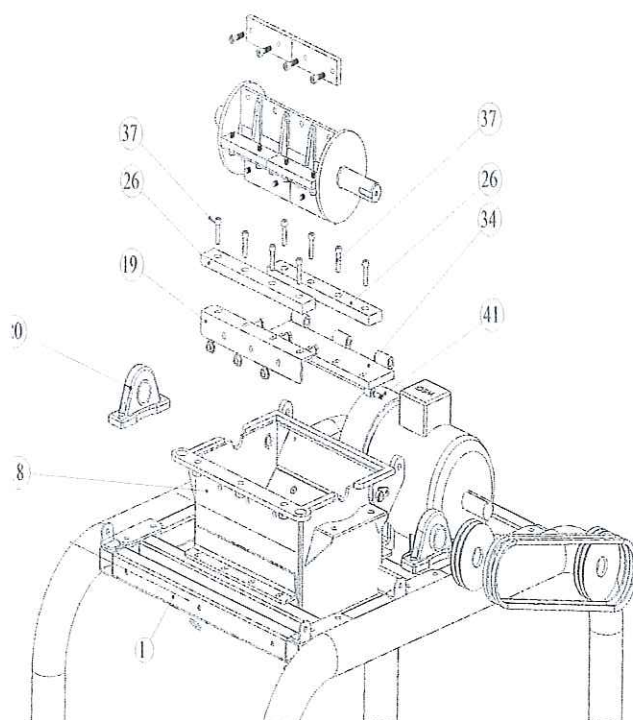
ITEM	Description	Qty
49	Retaining socket head bolt	16
44	Rotating blade	8
45	Rotor	1

Figure 8



7.3 Replacing Front Stationary Blades

- Ensure the Processor is isolated from its power supply.
- Open the Processor assembly to reveal the internal parts. See Fig. 9 for detail.



ITEM	Description	Qty
37	Retaining socket head bolt	8
26	Stationary blade	2
34	Dead plate	1
41	Shear pin	2
19	Dead plate support (Rear)	1
20	Bearing	2
18	Imploder chamber	1
1	Chassis	1

Figure 9

- Check the tolerance between the rotating and stationary blades; if it is outside of that shown in Fig. 6a & 6b then replace the stationary blades as follows.
- Each of the 2 stationary blades on the support plate has been attached with a socket head bolt and spring washer from the underside. In turn remove each rotating blade. The blades are designed to be rotated, so check that both front and rear edges have used before disposal of the blades.



- e) All socket head bolts must be discarded when the blade is disposed of. Under no circumstance should any of the bolts or spring washers be reused on new blades.
- f) With the two stationary blades removed the support plate should be thoroughly cleaned to ensure new blades are mated to the support plate without impairment by foreign objects. Ignoring this process could result in the blade working loose.
- g) Replace the worn stationary blades ensuring that all bolts are tightened to 135Lb/ft or 180Nm. Do not over tighten the bolts or they may shear during operation.
- h) Close the Processor assembly by reversing procedure 2 indicated in this section as illustrated in Figure 2 on page 12.

7.4 Replacing Rear Stationary Blades

- a) Ensure the Processor is isolated from its power supply.
- b) Open the Processor assembly to reveal the internal parts. See Fig. 9 for detail.
- c) Check the tolerance between the rotating and stationary blades, if it is outside of that shown in Fig. 9 then replace the stationary blades as follows in section
- d) Remove the Stationary blade support plate by unbolting the three M10 bolts located across the front of the Imploder chamber. The support plate should be supported whilst the bolts are removed to prevent it dropping into the Imploder chamber.
- e) The Stationary Blade support plate should be removed to a vice and firmly secured to allow for the blades to be replaced.
- f) Each of the 2 stationary blades on the support plate has been attached with a socket head bolt and spring washer from the underside. In turn remove each rotating blade. The blades are designed to be rotated, so check that both front and rear edges have used before disposal of the blades.
- g) All socket head bolts must be discarded when the blade is disposed of. Under no circumstance should any of the bolts or spring washers be reused on new blades.
- h) With all of the blades removed the rotor should be thoroughly cleaned to ensure new blades might be mated to the rotor without impairment by foreign objects. Ignoring this process could result in the blade working loose.
- i) Replace the worn rotating blades ensuring that all bolts are tightened to 135Lb/ft or 180Nm. Do not over tighten the bolts or they may shear during operation.
- J) Close the Processor assembly by reversing procedure 2 indicated in this section.



8 Parts List

The following sections contain all parts of the GP4 that may be needed to be replaced. In order to obtain these parts from Krysteline spares@krysteline.net the Serial Number of the machine and the relevant code, description, quantity required should be quoted in the order documentation.

8.1 Rotor & Blades

CODE	DESCRIPTION	QUANTITY
GP4775	Rotor	1
GP4672	Rotating Blades	8
GP4703	Rotor Blade attachment bolt & washer	16
GP4673	Stationary Blade	2
GP4704	Stationary Blade attachment bolt & washer	8

8.2 Imploder housing

CODE	DESCRIPTION	QUANTITY
GP4201	Lower discharge wear plate	2
GP4202	Upper discharge wear plate	2
GP4705	Pedestal bearing	2
GP4704-2	Pedestal bearing bolt, nut and washer	4
GP4661	Front hopper sealing gasket	1
GP4658	Rear hopper sealing gasket	1
GP4203	Rubber dead plate seal	1
GP4204	Rubber dead plate seal lock down plates	2
GP4210	Front stationary plate rotating plate	1
GP4211	Shear pin	2
GP4212	Shear pin retaining boss	
GP4213	Rear flange lock down bolts, washers & nuts	3
GP4214	Wear plate countersink bolts, washers and nuts	8
GP4215	Hinge rod and pins	1
GP4216	Rear stationary blade removable support bracket	1
GP4217	Bolts, washers and nuts for	

8.3 Feed hopper

CODE	DESCRIPTION	QUANTITY
GP4645	Rubber Curtain (Outer)	2
GP4647	Rubber Curtain (Middle)	2
GP4649	Rubber Curtain (Inner)	1
GP4218	Rear vertical wear plate	2



GP4219	Front vertical wear plate	1
GP4712	Front upper wear plate	1
GP4713	Rear upper wear plate	1
GP4220	Imploder radiused wear plate (Right)	1
GP4221	Imploder radiused wear plate (Left)	1
GP4222	Front flange gasket	1
GP4223	Rear flange gasket	1
GP4224	Shaft seal plate and gasket	2
GP4225	Inner curtain retaining plate and clamp plate	1
GP4226	Exhaust outlet port and gasket	1
GP4227	Exhaust outlet cover plate and gasket	1

8.4 Drive train

CODE	DESCRIPTION	QUANTITY
GP4707	5.5kw 3Phz Motor	1
GP4228	V belt SPA 1285	2
GP4229	Rotor Pulley 132-2 SPA	2
GP4230	Rotor Pulley Taper Bush 1610-40	1
GP4231	Motor Pulley 125-2 SPA	1
GP4232	Motor Taper Bush 2112-38	1
GP4233	Motor Slide plate and bolts	1

8.5 Electrical

CODE	DESCRIPTION	QUANTITY
GP4234	Power inlet plug 4 Pin	1
GP4235	Free socket 4 Pin	1
GP4236	Appliance inlet plug	1
GP4237	Plastic SY Gland	6
GP4238	SY Flex Gland	2
GP4239	20/16mm bush	1
GP4240	Socket to controller	1
GP4241	Plug to controller	1
GP4242	Motor circuit breaker	1
GP4243	SY Flex cable 1.5m x 10m	1
GP4244	Controller enclosure	1
GP4245	Emergency stop mushroom	1
GP4246	NC Contactor	1
GP4247	Green button	1
GP4248	Red button	1
GP4249	Interlock	1
GP4250	NO contactor	1



GP4251	25A Contactor	1
GP4252	Overload relay	1

8.6 Guards

CODE	DESCRIPTION	QUANTITY
GP4253	Front	1
GP4254	Rear	1
GP4255	Left	1
GP4256	Right	1

9. Bearing Maintenance

Bearing maintenance

(The following is an extract from SKF General Catalogue pages 89 to 93)

Lubrication and Maintenance

Rolling bearings must be lubricated to prevent inter-metallic & glass particulate contact between the rolling elements, raceways and cage and also to protect the bearing against corrosion and wear.

The most favourable operating temperature for a rolling bearing is obtained when the minimum of lubricant necessary to ensure reliable lubrication is used. However, the quantity used also depends on the additional functions required of the lubricant, e.g. sealing or cooling.

Lubricating properties deteriorate with time as a result of mechanical working and ageing. Additionally, all lubricants become contaminated in service and must therefore be replenished or changed from time to time; see under "Relubrication interval" and "Oil change", respectively.

Rolling bearings may be lubricated with grease or oil and in special cases with a solid lubricant. The design of spherical roller thrust bearings is such that they should be lubricated with oil, although at slow speeds and in certain special cases it is possible to use grease.

The choice of lubricant depends primarily on the operating conditions i.e. on the operating conditions i.e. on the operating temperature range and speed, as well as on environmental conditions.

Grease Lubrication

Under normal operating conditions rolling bearings can generally be grease lubricated. Grease has certain advantages compared to oil; it is more easily retained in the bearing arrangement, particularly where the bearing axis is inclined or vertical, and it also assists in sealing against impurities, damp and water.

In general, the free space in the bearing and housing should only be partly filled with grease (30 - 50%). Overfilling causes a rapid rise in temperature, particularly at high speeds. The quantities of grease required for the initial fill of SKF bearing housings are given in the housing tables.

Where bearings are to operate at very slow speeds and must be well protected against corrosion, it is advisable to completely fill the housing with grease.



The limiting speeds for grease-lubricated bearings are listed in the bearing tables (see also section "Limiting speeds").

Greases

Lubricating greases are thickened mineral oils or synthetic fluids. The consistency of a grease depends largely on the type and quantity of the thickening agent used. When selecting a grease, consistency, temperature range and rust inhibiting properties are the most important factors to be considered.

Consistency

Consistency is usually quoted in terms of the National Lubricating Grease Institute (NLGI) Scale, metallic soap thickened greases of consistency 1, 2 or 3 are those normally used for rolling bearings. The consistency should not change unduly with temperature or mechanical working. Greases, which soften at elevated temperatures, may leak from the bearing or housing, those, which stiffen at low temperatures, may restrict rotation of the bearing. In applications subjected to vibration, the grease is heavily worked as it is continuously thrown back into the bearing by the vibration. Mechanically stable greases should be used for such applications.

Temperature Range

Most calcium base greases are stabilised with 1 to 3% water. With rising temperature the water evaporates and the grease separates into mineral oil and soap. The upper temperature limit for these greases is therefore approximately +60°C. Some heat-stable calcium base greases (calcium complex) are available however. These permit operating temperatures up to +120°C.

Sodium base greases may be used at temperatures between -30 and +80°C, although some special grease may be used up to +120°C.

Lithium base greases are generally suitable for use at temperatures between -30 and +110°C although a few are available which can be used up to +150°C.

Greases containing inorganic thickeners, e.g. clay or silica, instead of metal soaps, may be used for short periods at higher temperatures than lithium base greases.

Synthetic greases (e.g. those made from diester or silicone fluids) may be used at both higher and lower temperatures than greases made from mineral oils.

Where it is desired to use grease for bearings operating at higher or lower temperatures than those mentioned above, SKF should be consulted.

Rust Inhibiting Properties

Sodium base greases are water soluble, i.e. they absorb water to a certain extent to form a rust inhibiting emulsion without their lubricating properties being impaired. These greases will protect the bearings sufficiently against rust providing that free water cannot enter the bearing arrangement. Should water enter, these greases can easily be washed out of the arrangement.

Lithium and calcium based greases are virtually insoluble in water and do not, therefore, afford protection against corrosion unless they contain rust inhibiting additives. The rust inhibiting properties of both types of grease are good when they contain EP additives (principally lead compounds). These greases adhere well to the bearing surfaces as well as being insoluble in water. These EP greases are therefore particularly suitable for applications where water can penetrate the bearing arrangement, e.g. papermaking machines or rolling mills.



Load Carrying Ability

For heavily loaded bearings, e.g. rolling mill bearings, greases containing EP additives are used since these increase the load carrying ability of the lubricant film. Such greases are also generally recommended for the lubrication of medium and large-sized bearings.

Miscibility

Particular attention must be paid to the miscibility of greases when, for some reason, a different grease has to be used for relubrication purposes. The mixing of incompatible greases generally leads to a reduction in consistency and maximum permissible operating temperature as compared to the individual greases in the mixture, and can be the cause of damage.

Greases having the same thickener and a similar base oil are compatible e.g. a sodium base grease can be mixed with another sodium base grease. Calcium and lithium base greases can sometimes be mixed with each other but are not compatible with sodium base greases. However, the mixture of compatible greases may have a softer consistency than either of the component greases although lubricating properties will not necessarily be impaired. In applications where a softer consistency is likely to give rise to leakage problems, relubrication should be carried out at short intervals until the new grease has completely replaced the old.

SKF Greases for Rolling Bearings

The range of SKF lubricating greases is designed to cover most bearing applications and operating conditions where grease lubrication can be used. Information will be supplied on request.

Relubrication Interval

The period during which a grease lubricated bearing will function satisfactorily without relubrication is dependent on the bearing type, size, speed, operating temperature and the grease used. The relubrication intervals (hours of operation) obtained from Diagram 1 are valid for bearings in stationary machines where loading conditions are normal. The diagram is based on the use of an age-resistant, average quality grease and is valid for bearing temperatures of +70°C measured on the outer ring. The intervals should be halved for every 15°C increase above +70°C, but the maximum permissible operating temperature for the grease should obviously not be exceeded. Conversely, if operating temperatures are lower than +70°C, the intervals can be lengthened to about twice the values for operating temperatures of 50°C and below. It should be noted, however, that relubrication intervals may vary significantly even where apparently similar greases are used.

For small bearings, particularly deep groove ball bearings, the relubrication interval is often longer than the life of the bearing application. Relubrication is not, therefore, normally required. In such cases, ball bearings fitted with shields or seals and which are "lubricated-for-life" may be used.

Where there is a risk of the grease becoming contaminated the relubrication intervals should be reduced. This reduction also applies to applications where the grease is required to seal against moisture, e.g. bearings in paper-making machines, where water runs over the bearing housings, should be relubricated once a week.

Relubrication

The amount of grease needed for relubrication can be obtained from

$$G = 0.005 D B$$

Where

G	= grease quantity, g
D	= bearing outside diameter, mm
B	= total bearing width, mm (= H for thrust bearings)



When operating conditions are such that relubrication can be carried out at infrequent intervals, it is sufficient if the bearing housing is accessible and can be opened easily. The cap of split housings and the cover of one-piece housings can usually be taken off to expose the bearing. After removing the used grease, fresh grease should first be packed between the rolling elements.

Where more frequent lubrication is required provision should be made for regreasing; preferably a grease nipple should be fitted to the housing. A grease gun (lubricator) can then be used. To ensure that fresh grease actually reaches the bearing and replaces the old grease, the lubrication duct in the housing should either feed the grease adjacent to the outer ring side face, or better still, into the bearing, e.g. spherical roller bearings with lubrication groove and holes in the outer ring, figs 1 and 2. After a number of such relubrication the housing should be opened and the used grease removed before fresh grease is added.

Krysteline Group Ltd Environmental Policy

Krysteline Group Ltd (KGL) is a company that was originally founded out of the need to provide a solution to help eliminate the dumping of waste glass at sea. The glass Imploder was discovered as a result of testing aimed at providing a waste handling system that would comply with marine industry legislation introduced in 1990's. The entire KGL business philosophy therefore is based upon recycling waste glass via the most environmentally efficient methods possible, to create higher value new market products.

The Krysteline board is therefore committed to the protection and conservation of the environment wherever it operates. It recognises that any of its businesses may have some impact on the environment and is committed to giving due consideration to adverse impacts on the environment and local communities. KGL is also committed to the conservation of natural resources and raw materials.

To achieve these objectives the KGL board, through implementation of this policy will target to do the following:

1. Meet or exceed current environmental legal requirements in all countries of operation and use this as a basis for further development of environmental programmes.
2. For all products, focus on product stewardship and identify ways of improving efficiency throughout the supply chain and manufacturing process to reduce consumption of materials, energy and other resources and to minimise waste and harmful emissions. Sensitivity to environmental issues should be incorporated in the planning, design and operation of facilities and services, including the recycling and re-use of materials and reduction in the use, or replacement where possible, of substances which may be harmful to the environment.
3. Continually improve environmental performance of Krysteline's processing systems and products through the use of environmentally responsible suppliers, sub-contractors and specialist agencies. Work with other bodies to improve the sustainability of our business, including the reduction in use of virgin raw materials and fuels.
4. Consider the use of alternatives to scarce and non-renewable resources and give them preference wherever economically viable. Continually examine the re-use of waste or by products from the manufacturing process.
5. Advise key suppliers of our environmental expectations and work with them to improve their environmental performance and the energy efficiency of equipment supplied to us.
6. Develop and market products and services to meet current environmental legal requirements. Promote the environmental credentials of KGL and its products to customers and the public at large. Each successive product should be targeted to be produced more efficiently than its predecessors and, where appropriate, should be capable of being re-used, recycled or safely disposed of.
7. Maintain control on discharges and emissions to comply with legal limits and endeavour to reduce the impact of discharges and emissions by using less hazardous material.
8. Raise the level of employee awareness of environmental issues and promote a responsible, accountable and environmentally aware culture throughout the Group. Provide training and instruction to help employees perform their work efficiently and to reduce detrimental impacts on the business or the environment. Train employees to manage the environmental impacts of their work. Encourage employee reporting of non-compliant practices to senior management wherever they believe it is appropriate.
9. Communicate environmental ideas from each company in the Group to all other companies.
10. Review and revise environmental policies annually incorporating continuous improvement.
11. Ensure all KGL companies comply with the corporate environmental policy and, in addition, operations in other countries comply with stringent local requirements on disposal and treatment of waste. An environmental responsible culture is achieved through employee encouragement and participation. This has been established through training, team discussions, and annual audits.

Krysteline Group Limited Warranty Statement

Guarantee

1. In respect of goods manufactured by the Seller (excluding expendable items such as, but not limited to, conveyor bands, transmission connections, wear parts, processing tips, electrical accessories) the Seller shall within a period of 12 months from the date of delivery repair or, at the Seller's option, replace any goods which are proved to the Seller's satisfaction to be defective in design material or workmanship provided always that this obligation will not apply where:
 - a. The goods have been altered in any way whatsoever or have been subjected to misuse or unauthorised repair: or
 - b. The goods have been installed or connected by someone other than the Seller or a person approved by the Seller: or
 - c. The Buyer has failed to observe or perform the requirements or any maintenance procedures relating to the goods: or
 - d. The Buyer has failed to notify the Seller of any defect or suspected defect immediately the same comes to the Buyer's knowledge: or
 - e. The Buyer is in breach of this or any other contract made with the Seller
 - f. Where the defect arises from a defect in the Buyer's own design drawings or specification or where the goods have not been properly stored
2. Where the Seller is not the manufacturer of the goods the Seller shall use reasonable endeavours to make over to the Buyer the benefit of any warranty or guarantee given by the manufacture of those goods
3. Save as provided in Clause 1&2 the Seller shall be under no liability under the contract for any personal injury, death, loss or damage of any kind whatsoever whether consequential or otherwise including, but not limited to, loss of profits and to the full extent permitted by Law the Seller hereby excludes all conditions, warranties and stipulations expressed or implied, statutory, customary or otherwise which but for such exclusion would or might subsist in the Buyer's favour except that such exclusion will not apply to any implied condition that the Seller has or will have the right to sell the goods when the property is to pass. Under no circumstances will the Seller or his servants, agents, or sub-contractors be liable for any loss or damage of any kind whatsoever (except arising from death or personal injury) whether consequential or otherwise caused directly or indirectly by and negligence on the Seller's part or on the part of any of the Seller's servants, agents or sub-contractors in connection with or arising out of the manufacture or supply of goods or in connection with any advice or statement given or made by or on the Seller's behalf.
4. The Buyer shall afford to the Seller reasonable access to the goods to examine the same where the Buyer alleges damage to or fault in the goods and the Buyer shall not process, use or otherwise deal with such goods until the Seller has inspected the same.