**Original instructions** 



QJ241-en-17/10/2011





# QJ241

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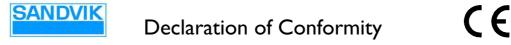
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#### **Machine Information:**

Declaration of Conformity:	
Date of Build	
Engine Serial No	
Serial Number	



#### We hereby declare that the machinery

Serial number -

# Machine Nomination, Type of machine: **QJ241**

Diesel Crusher

is in conformity with the following Directives, Standards and Codes 2006/42/EC Machinery Directive 2004/108/EC Electro-Magnetic Compatibility (EMC) 2006/95/EC Low Voltage Directive (LVD)

EC Type-examination and Certificates ISO21873-2:2009

#### **Technical file**

We assure that documentation have been compiled in accordance with 2006/42/EC Annex VII

#### Phil Coleman, PDC Group Engineering Manager, Swadlincote

is authorized to make the technical file available on request by competent authority of the EC Member States in accordance with 2006/42/EC. The documents will be delivered as electronic files.

#### Paul Colton, Operations Director, Swadlincote

confirms the manufacturing process to ensure compliance of the manufactured machinery with the technical file.

This declaration remains valid as long as no modification is carried out without the manufacturer's written agreement.

Date: 01 / 07 / 2011

Phil Coleman PDC Group Engineering Manager

Paul Colton Operations Director

PGITER

Manufacturer: COMPANY, ADDRESS Sandvik Mining and Construction,

Hearthcote Road, Swadlincote DE11 9DU

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# 1. Safety Section

# 1.1. Safety Essentials

SANDVIK put safety first.

This is to ensure maximum safety measures are taken, *ALWAYS* read this section carefully *BEFORE* carrying out any work on the equipment or making any adjustments.

**Note:** This equipment is manufactured in accordance with the Machinery Directive 2006/ 42/EC of 01.01.2010. The customer should make sure that this equipment is in conformance with local and national legislation if used outside of the EU.

	INHALATION, BREATHING HAZARD!				
	Breathing or inhaling silica dust particles will cause death or serious injury. ALWAYS work with a respirator approved by the respirator				
	manufacturer for the job you are doing. Ensure suitable breathing equipment is used throughout any				
	procedures carried out. ALL necessary precautions MUST be taken to reduce the risk of breathing dust or particles.				

Read this manual and familiarize yourself with any associated documentation. If in ANY doubt ask. Do not take ANY personal risk.

Only trained competent persons should be allowed to install, set, operate, maintain, and de-commission this equipment. Make sure that a copy of this manual is available for any persons installing, using, maintaining or repairing this equipment.



Training should be provided to make sure that safe working practices are followed. Initial commissioning and starting must only be undertaken by a authorised person who has read and fully understands the information provided in the manual pack. ALWAYS follow the procedures outlined in the operating and maintenance instructions.

Training should be provided to make sure that safe working practices are followed. Initial commissioning and starting must only be undertaken by a authorised person who has read and fully understands the information provided in the manual pack. ALWAYS follow the procedures outlined in the operating and maintenance instructions.



To avoid the risk of electric shock, ALWAYS isolate this equipment from the supply source before removing any guards or covers or performing any maintenance or adjustment to the equipment.

**Note:** The equipment manufacturer declines all responsibility for injury or damage if the instructions and precautions in this manual are not followed.

# 1.2. Safety Labels and Signals

This section includes explanations of safety symbols, signs, signals and labels used on the product and information for use.

# 1.2.1. Signal Words

The following signal words and symbols are used to identify safety messages throughout these instructions:

# **DANGER**

The signal word **DANGER** indicates a hazardous situation which, if not avoided, will result in serious injury or death.



The signal word **WARNING** indicates a hazardous situation which, if not avoided, could result in serious injury or death.

# NOTICE

The signal word **NOTICE** indicates a situation which, if not avoided, could result in damage to property or environment.

When you see **ANY** of the signal words in this manual, be alert; your safety is involved. Carefully read and understand the message that follows, and inform other users.

## 1.2.2. General Hazard Symbol



This general HAZARD symbol identifies important safety messages in this manual.

When you see **ANY** of the hazard symbols in this manual, be alert; your safety is involved. Carefully read and understand the message that follows, and inform other users.

# 1.3. Safety Hazards Pertaining to the Equipment



The following safety symbols may be posted on the equipment and contained in the manuals. You MUST observe all safety symbols, labels, and instructions at ALL times.

- **ENSURE** safety instructions and safety labels attached to the equipment are **ALWAYS** complete and legible.
- Keep safety instructions and safety labels clean and visible at all times.
- Replace any illegible or missing safety instructions and safety labels before operating the equipment.

• Ensure replacement parts include safety instructions and labels.

### 1.3.1. Colour Coded Safety Signs

Signs located on the machine and used throughout this manual are colour coded relating to the information they convey, as follows:



#### **1.3.2. Symbols for Prohibited Actions**

Prohibited actions used throughout this manual are indicated by a red circle with a red diagonal line across the circle. The action which is prohibited will always be in black as follows:

No Climbing	No Smoking	Do Not Touch	No Open Flames	Limited or Restricted Access
Do Not Weld	Do Not Remove Safety Guard			

## 1.3.3. Symbols for Mandatory Actions

Mandatory actions used throughout this manual are indicated by white symbols on a blue background as follows:

Wear Safety Gloves	Wear Eye Protection	Wear Safety Helmet	Wear Safety Harness	Wear Ear Protection
Gioves	Protection	пеннет	namess	Frotection
	R			
Wear Safety Boots	Wear Close Fitting Overalls	Wear Respirator	Wear High Visibility Vest	Disconnect Power Source from Supply
<b>O</b>				
Switch Off and Lockout Equipment	Read the Manual			

## 1.3.4. Symbols for Hazards

Hazard symbols used throughout this manual are indicated by a yellow triangle with black symbols and black frames as follows:

Crushing Hazard - Hands	Crushing Hazard - Feet	Chemical Burn Hazard	Electrical Hazard	Electrical Shock/ Electrocution Hazard
Entanglement Hazard	Entanglement Hazard	Falling Hazard	Falling Load Hazard	Ignition Hazard

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Flying Material Hazard	Lifting Hazard	Skin Injection Hazard	Silica or Other Dust Hazard	Tripping Hazard
	Falling Material		Hanging Load	
Magnet Hazard	hazard	Impact Hazard	Hanging Load Hazard	Tipping Hazard
General Hazard	Explosion Hazard	High Pressure Hazard	Drill Entanglement Hazard	Hot Surface Hazard

1.3.5. Machine Serial Number Plate

SANDVIK		С Є <sup>Mfg. year</sup>
Туре		Nominal Power (kW)
Serial No.	Order No.	Engine No.
Manufacturing No.	Mass kg	Sanvik Mobile Crushers & Screens Ltd Hearthcote Road Swadlincote England

# **1.4. Component Safety Features**



DO NOT use this equipment if any safety guards or devices have been removed or NOT installed properly.



DO NOT use this equipment if any safety guards or devices have been removed or NOT installed properly.

## 1.5. Features for Operator Safety

**Note:** Safety features associated with this equipment have been assessed in accordance with ISO21873-2.



Emergency stop buttons have been installed to prevent death or serious injury. Ensure Emergency stop buttons are visible and not obstructed in any way. Ensure all personnel are trained in the operation and location of emergency stops.



Emergency stop circuit is up to 30 V DC series circuit and hard wired to remove power from the Electronic Control Unit (ECU) Engine management system and stop the engine. To avoid electric shock or cutting injury, you MUST wait at least ten full seconds after activating an emergency stop to allow the system to release its residual charge.



You MUST read and fully understand the Hydraulic/Electrical circuit diagrams, Refer to *Electrical and Hydraulics, page 181*.



Safety guards have been installed to prevent death or serious injury. DO NOT remove, modify, or alter any safety guard. Make sure that all safety guards are secured in their correct positions.



Steps, handrails, tread plates, and fixed guards are provided where persons are required to climb on the machine. For maintenance access ONLY.



If for any reason other areas of the machine need to be accessed, DO a full recorded risk assessment and take the appropriate safety measures.

# **1.6. Environmental Safety**

To avoid unnecessary engine emissions, you *MUST* regularly service the machine as specified in the machine maintenance sections contained in this manual.

### 1.6.1. Hazardous Materials

<ul> <li>POSION and CONTAMINATION HAZARD!</li> <li>Drinking from storage containers that have held equipment fluids or other harmful substances could cause serious injury or death. Disposing of fluids or other waste products in an irresponsible manner could cause serious environmental damage.</li> <li>Fuels, fluids and other materials used in the operation of this machine may contain chemicals which could cause serious injury or death and or environmental damage if disposed of in an irresponsible manner.</li> <li>DO NOT store fuels, fluids and other materials used in the operation of this machine in food or beverage containers.</li> <li>Use leak proof containers when draining fluids.</li> <li>DO NOT pour waste onto the ground, down a drain or into any water source.</li> <li>Observe COSSH data information source locally and OEM data information detailed in the appendix of this manual when working with components or substance that may contain chemicals.</li> <li>ALWAYS dispose of fuels, fluids or other materials used in the operation and the operation of this machine in accordance with local and national legal regulations.</li> </ul>



Diesel spillage MUST be cleaned up immediately due to fire hazard. Follow local and national regulations.



ONLY use lubricating oils recommended in the maintenance schedule or OEM manuals.



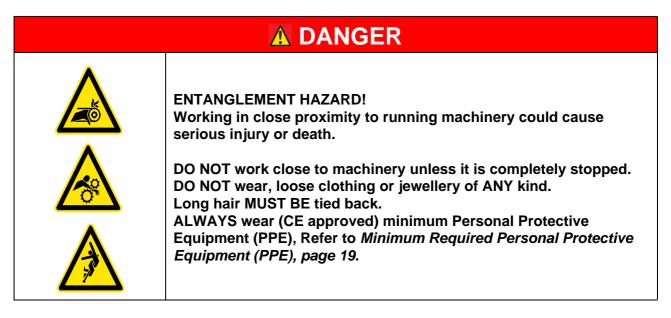
**OBSERVE COSHH / MSDS information contained in the appendix to this manual.** 

### 1.6.2. Machine Disposal

This equipment **MUST ONLY** be disposed of at a specialist machine breaker.

# **1.7. Personal Protective Equipment (PPE)**

#### 1.7.1. Entanglement Hazards



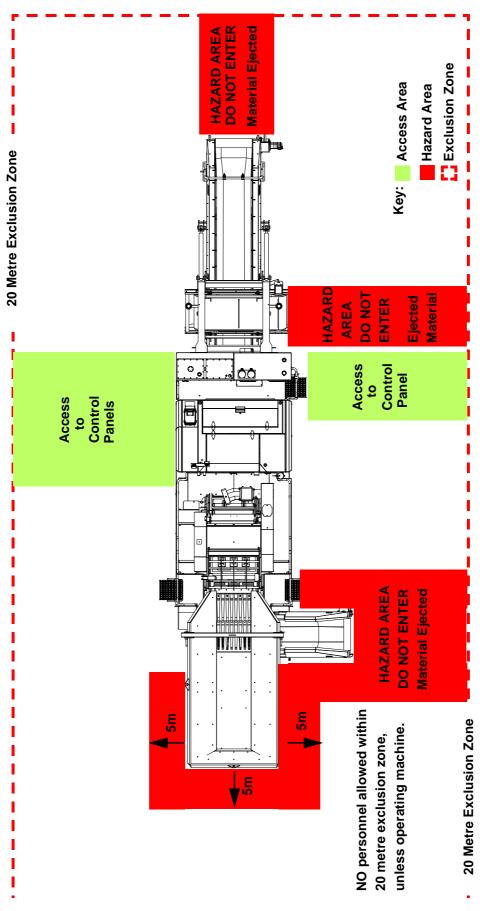
### 1.7.2. Minimum Required Personal Protective Equipment (PPE)

The following (CE approved) PPE **MUST BE WORN** by everyone, as a minimum requirement when working on or around the machinery, within 20 metres (approximately 66 feet): Additional PPE may be required for specific tasks, which will be detailed in the relevant section throughout the manual.

Safety Gloves	Eye Protection	Safety Helmet	Respirator	Ear Protection
	R			
Safety Boots	Close Fitting Overalls	High Visibility Vest		

# 1.8. Hazard Zones

Limit access to equipment and surroundings, erect barriers 20 metres around the perimeter of the machine.



# 1.9. Measured Noise Levels



Ear protection MUST be worn if you are within 20 metres (approximately 66 feet) of the machine when the engine and other parts of the machine are running.

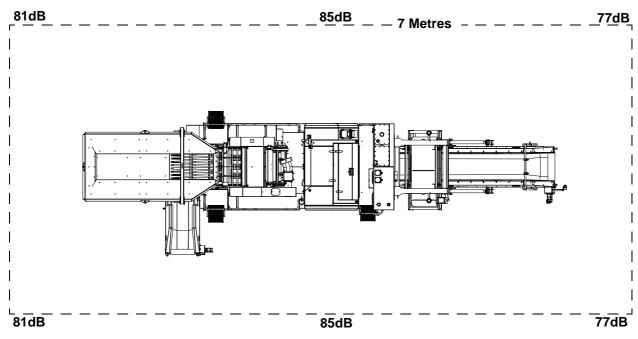


Figure 1-2: Measured Noise Levels

Refer to *Figure 1-2:Measured Noise Levels* the diagram indicates measured noise levels at 7 metres using a Castle GA101/701 meter with an empty machine all systems running situated on the factory assembly line. Product and local conditions will have an affect on the noise levels experienced.

# 1.10. Vibration Levels

There are **NO** circumstances where an operator should need to be on or touching the machine when it is running.

# 1.11. Organizational Safety Measures

The following safety measures **MUST** be observed at all times:



Keep area clean and dry. NEVER lubricate, clean, service, or adjust machinery while it is moving. Allow machinery to cool before performing any maintenance or adjustments. ENSURE all parts are properly installed and are in good condition. Replace worn and broken parts IMMEDIATELY. Remove any build up of grease, oil and debris from equipment. During maintenance, use ONLY the correct tool for the job. NEVER make any modifications, additions, or conversions which may affect safety.

Understand the service procedure before commencing work.

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Disconnect battery ground cable before making adjustments on electrical systems or welding on the equipment.



If clothing, tools, or any body parts become entangled in machinery, IMMEDIATELY disengage all power and operate controls to relieve pressure. Stop engine and implement lockout procedures.



If equipment exhibits any unusual movement or sound, stop equipment, lock out IMMEDIATELY, and report the malfunction to your supervisor.

# 1.12. Personnel Qualifications, Requirements and Responsibilities



ONLY trained, competent, reliable and authorized personnel should operate or maintain this machine. Statutory minimum age limits must be observed.



Work on electrical system and its equipment MUST ONLY be carried out by a skilled electrician or by personnel under the supervision and guidance of a skilled electrician and in accordance with electrical engineering rules and regulations.



Work on the hydraulic system MUST ONLY be carried out by persons with training and authorisation to maintain the hydraulic equipment.

# 1.13. Safety Advice Regarding Specific Operational Phases

### 1.13.1. Standard Operation



Take the necessary steps to ensure the equipment is ONLY used when it is in a safe and reliable state.



Operate the equipment ONLY for its designed purpose, and only if all guarding, protective, and safety devices, emergency shut-off equipment, sound proofing elements and exhausts, are in place and fully functional.



ENSURE local barriers are erected to stop unauthorized entry to the equipment or work area.



Attach a hazard sign(s) to the equipment in appropriate positions to alert all persons of potential hazards. BEFORE starting the engine ensure it is safe to do so.

1.13.2. Blockage or Malfunction



In the event of material blockage, any malfunction or operational difficulty, stop equipment and lockout immediately. Rectify problem immediately, Refer to Operation on page 91 section or contact your nearest dealer.

# 1.14. Unguarded Areas



Limit access to the equipment and its surroundings by erecting barrier guards (min. distance 1.5 meters away) to reduce the risk of other mechanical hazards, falling loads and ejected materials.



Switch off and lockout equipment before removing any safety devices or guarding. Ensure safety devices and guards are all installed correctly before lock out is removed.

	ENTANGLEMENT HAZARD! Working in close proximity to running machinery could cause serious injury or death.	
	DO NOT work close to machinery unless it is completely stopped. DO NOT wear, loose clothing or jewellery of ANY kind. Long hair MUST BE tied back. DO NOT reach in to unguarded machinery. ALWAYS wear (CE approved) minimum Personal Protective Equipment (PPE), Refer to <i>Minimum Required Personal Protective</i> Equipment (PPE), page 19.	

# **1.15. Special Work, Including Equipment Maintenance, Disposal of Parts, and Hazardous Materials**



Observe adjustment, maintenance, and service intervals detailed throughout this manual, except where:

- Failure of warning lights, horns, gauges, or indicators calls for immediate action.
- Adverse conditions require more frequent servicing.
- USE ONLY Original Equipment Manufacturer's (OEM)
- recommended replacement parts and equipment.
- Enure only properly trained personnel undertake these tasks.

### 1.15.1. Securing Equipment Before Performing Maintenance

When undertaking maintenance and repair work, equipment must first be made safe.



Switch off engine using ignition key.

Switch off at isolation point and remove ignition key.

Implement lockout procedures.

Attach hazard sign(s) to equipment in appropriate positions to alert all personnel of potential hazards.

### 1.15.2. Maintenance Site Conditions



Prior to starting any maintenance work, ENSURE equipment is positioned on stable and level ground and has been secured against inadvertent movement and buckling.

#### 1.15.3. Replacement & Removal of Components



ALWAYS observe handling instructions detailed throughout this manual, OEM manuals, or spare parts suppliers' instructions.

Do a full risk assessment and take all necessary safety measures.



NEVER allow untrained staff to attempt to remove or replace any part of the equipment.



The removal of large or heavy components without adequate lifting equipment is PROHIBITED, this could cause serious injury or death.



To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting equipment and secured. ONLY use suitable lifting equipment supplied or approved by OEM.



NEVER work or stand under suspended loads.



KEEP AWAY from the feeder hopper and product conveyor discharge, where there is risk of serious injury or death from contact with ejected debris.



LIMIT ACCESS to the equipment and its surroundings by erecting barrier guards to reduce the risk of residual mechanical hazards, falling lifted loads, and ejected materials.

### 1.15.4. Climbing and Falling



Falling from and/or onto this equipment could result in serious injury or death.



NEVER climb on the equipment while it is in operation or use equipment parts as a climbing aid.



ALWAYS keep the area around the equipment clear of debris and trip hazards.

Beware of moving haulage and loading equipment in the vicinity of the equipment.



When carrying out overhead assembly work, ALWAYS use specially designed or otherwise safety-oriented ladders and maintenance platforms.

ONLY use Maintenance Platforms provided on the equipment. ALWAYS perform work from an approved, safe and secure platform.



When reaching any points 2m (approximately 6 feet) or more above ground level, ALWAYS use CE certified safety harness.



Keep all handles, steps, handrails, platforms, landing areas, and ladders free from dirt, oil, snow and ice.

1.15.5. Safety Considerations During Maintenance



It is essential that you take the following steps to ENSURE you and others are safe. DO full risk assessments and take all necessary safety measures.



During maintenance, RESTRICT ACCESS to essential staff only. Where appropriate, erect barrier guards and post warnings.



The fastening of loads and instructing or guiding of crane operators should be entrusted to qualified persons only.

The observer providing instructions must be within sight or sound of the operator and positioned to have an all around view of the operation.



ALWAYS ensure any safety device such as locking wedges, securing chains, bars, or struts are utilized as indicated in throughout this manual.

Ensure that any part of the equipment raised for any reason is prevented from falling by securing it in a safe reliable manner.

Never work alone.



NEVER work or stand under suspended loads.

### 1.15.6. Safety Considerations During Cleaning



This equipment MUST be isolated prior to cleaning.

After cleaning, examine all fuel, lubricant, and hydraulic fluid lines for leaks, loose connections, chafe marks and damage. Any defects found MUST be repaired immediately.



DO NOT direct power washers near to or into control boxes and electrical devices.

1.15.7. Removal of Safety Devices, Guards and Decals



Prior to operation, all safety devices, control devices, decals and guards, temporarily removed for set-up, maintenance or repair purposes MUST be refitted and checked immediately upon completion of the maintenance or repair work. To avoid serious personal injury or death, NEVER operate the equipment with safety devices, decal or guards removed or unsecured.

ALWAYS report any defects regarding guards, safety devices, decals or control devices.

### 1.15.8. Surrounding Structures



This equipment MUST ONLY be operated in a position away from buildings, permanent structures or high ground to eliminate the risk of persons falling onto the equipment or its surrounds.

All temporary maintenance platforms erected around the equipment MUST be removed prior to operation.

#### 1.15.9. Safety when Refueling

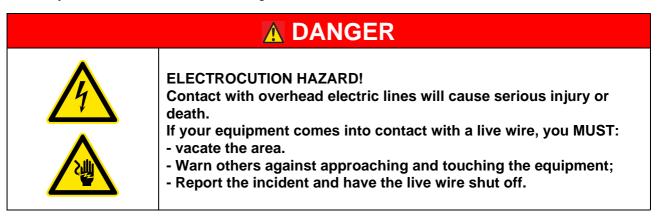
	FIRE HAZARD! Smoking and or using other naked flames in the vicinity of flammable materials and or fuels, could cause serious injury or death. ONLY refuel with diesel from approved storage and supply equipment. NEVER remove the filler cap or refuel with the engine running. NEVER add gasoline or any other fuels mixed to diesel due to increased fire or explosion risks and damage to the engine. Smoking is PROHIBITED when refuelling or handling diesel fuel. DO NOT carry out maintenance on the fuel system near naked lights or sources of sparks, such as welding equipment. IMMEDIATELY clean up spilt fuel and dispose of correctly to minimize any environmental impact. To avoid spillage use drip trays.	

# 1.16. Specific Hazards

#### 1.16.1. Electrical Energy

#### **External Considerations and Hazards**

When working with the equipment, maintain a safe distance from overhead electric lines. If overhead cables are in the vicinity, a risk assessment **MUST** be completed prior to operating the equipment. Ensure you follow local and national regulations.



#### **Machine - Electrical**



Work on electrical system and its equipment MUST ONLY be carried out by a skilled electrician or by personnel under the supervision and guidance of a skilled electrician and in accordance with electrical engineering rules and regulations. Before starting any maintenance or repair work, the power supply to

the equipment MUST be isolated. Check the de-energized parts to ensure they do not have any power. In addition to insulating any adjacent parts or elements, ground or short circuit them to avoid the risk of electrical shock.



The electrical equipment is to be inspected and checked at regular intervals. Defects such as loose connections, scorched or otherwise damaged cables MUST be repaired, or replaced immediately. A trained competent person must do this.

Use ONLY original fuses with the specified current rating. Switch off the equipment IMMEDIATELY if trouble occurs in the electrical system.

This equipment is wired on a negative earth. ALWAYS observe correct polarity.

## 1.16.2. Battery



AVOID contact with the skin, eyes or clothing.

ALWAYS wear appropriate PPE, Refer to *Personal Protective Equipment (PPE), page 19.* 



ALWAYS Isolate and disconnect the battery leads before carrying out any maintenance to the electrical system.

Recharge the battery in a well ventilated area.



The battery contains sulphuric acid, an electrolyte which can cause severe burns and produce explosive gases.



Smoking is PROHIBITED when maintaining the battery.

### 1.16.3. Gas, Dust, Steam, Smoke and Noise

	INHALATION, BREATHING HAZARD! Breathing or inhaling silica dust particles will cause death or serious injury. ALWAYS work with a respirator approved by the respirator manufacturer for the job you are doing.
	Ensure suitable breathing equipment is used throughout any procedures carried out. ALL necessary precautions MUST be taken to reduce the risk of breathing dust or particles.
	Dust found on the equipment or produced during work on the equipment MUST NOT be removed with compressed air.
	Dust waste MUST ONLY be handled by authorized personnel. When disposing of dust waste, the material must be dampened, placed in a sealed container and marked to ensure proper disposal.
٨	ALWAYS operate internal combustion engines outside or in a well ventilated area.
<u> </u>	If, during maintenance, the equipment must be operated in an enclosed area, ENSURE there is sufficient ventilation or provide forced ventilation.
$\wedge$	Observe ALL local and national safety regulations. Contact your local authority for additional information.

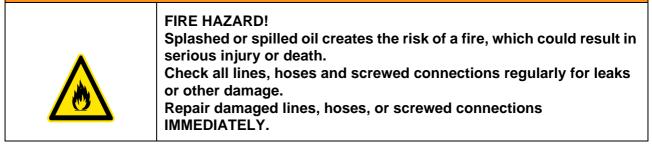
#### 1.16.4. Welding or Naked Flames

FIRE HAZARD! Welding or using other naked flames in the vicinity of the equipment creates the risk of an explosion or fire, which could result in serious injury or death from fire or explosion. AVOID all naked flames in the vicinity of this equipment. Welding, flame cutting and grinding work on the equipment MUST ONLY be carried out if this has been expressly authorized. Before carrying out welding, flame cutting and grinding operations, clean equipment and its surroundings from dust and debris and other flammable substances and ensure the premises are adequately ventilated. The battery MUST BE isolated and disconnected.		

### 1.16.5. Hydraulic Equipment

	SKIN PENETRATION HAZARD! Hydraulic fluid under pressure can penetrate the skin, which will result in serious injury or death. If fluid is injected under the skin, it must be surgically removed or gangrene will result. GET MEDICAL HELP IMMEDIATELY. ALWAYS use a piece of cardboard to check for leaks. DO NOT USE YOUR HAND.	

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Work on hydraulic equipment must be carried out by persons with training and authorisation to maintain the hydraulic equipment. Do a full risk assessment and take all necessary safety measures.



ALWAYS relieve pressure from the hydraulic system before carrying out any kind of maintenance or adjustment.



BEFORE carrying out any repair work, depressurize all system sections and pressure hoses (hydraulic and compressed air system) requiring removal, in accordance with the specific instructions for the unit concerned.

Hydraulic and compressed air lines MUST be laid and fitted properly. Ensure no connections are interchanged. The fittings, lengths and quality of the hoses MUST comply with the technical requirements.



ONLY fit replacement components of a type recommended by the manufacturer.

ALWAYS practice extreme cleanliness when servicing hydraulic components. Ensure all measures are taken to avoid spillage and leaks.

### 1.16.6. Hazardous Substances

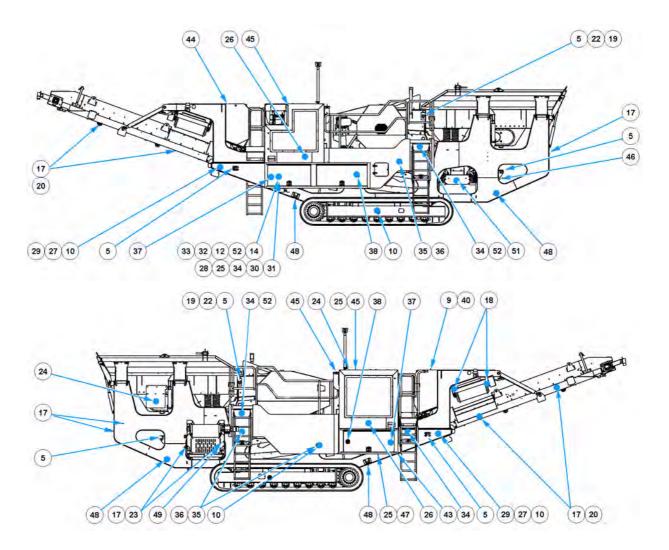


ENSURE that correct procedures are formulated to safely handle hazardous materials in strict accordance with the manufacturer's instructions and all applicable regulations by correctly identifying, labelling, storing, using and disposing of the materials.



A full list of Hazardous Substances associated with this equipment can be found in the appendix of this document.

# 1.17. Safety Decals - Locations



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46 DE1071	47 DE1072	48 DE0061	37 DE7073	49 DE1077
52 885-0267-00				

# 2. Transport and Technical Data

## 2.1. Special Considerations for Transport



ALWAYS observe local and national regulations concerning the transportation of heavy equipment. Ensure all appropriate permits, licenses and endorsements are obtained and maintained before transporting.

NOTICE

DO NOT transport the QJ241 utilizing a vehicle not capable of hauling at least the listed gross weight of the machine. Failure may result in damage to the machine, haulage vehicle, and may result in serious personal injury or death.

#### 2.1.1. Prepare the Machine for Transport

	PERSONNEL HAZARD! Lack of knowledge or understanding could cause serious injury, death or damage to the machine.	
	DO NOT prepare machine for transportation until you have READ and FULLY understood this manual. If necessary seek clarification from your supervisor and or a Sandvik representative, before continuing. Failure to do so may also invalidate the manufacturers warranties.	

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PERSONNEL HAZARD!

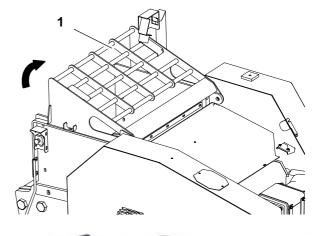
Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Stop the machine, isolate, remove ignition key and tag-out, before continuing. Refer to Lock and Tag-out Procedure on page 89.

	FALLING HAZARD!
	Falling from heights could cause serious injury or death.
	Some of the steps in this procedure requires working at height, ensure the following applies when working off the ground:
	- Maintenance platforms are in place.
<u>s</u>	<ul> <li>All hand rails are fixed in position.</li> <li>All ladders are lowered and fixed in position.</li> <li>A safety harness is worn.</li> </ul>
	•

To prepare the machine for transport, carry out the following:

- 1. Shut down the machine, Refer to Machine Shut Down on page 83.
- 2. Remove two bolts (one each side) and fold back the inlet chute cover (1).



- Loosen safety rails and reposition for transport on both maintenance platforms.
- 4. Fold up all the ladders.

5. Start engine, Refer to Engine - Starting Procedure on page 61.

**0J241** 

6. On the display panel, from the 'Main Menu' screen, press button 4 'Auxiliary Functions'. To activate the auxiliary levers.

#### Note: The main conveyor rises automatically.



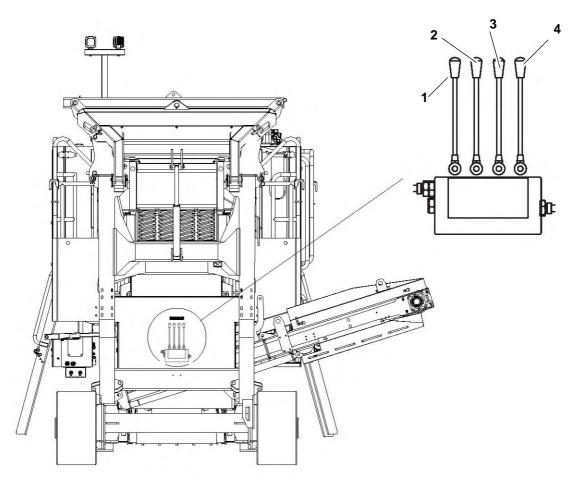


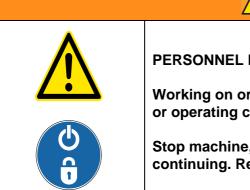
Figure 2-1: Auxiliary Levers - Location

1. Back Door

3. Side Door (Right)

2. Side Door (Left)

- 4. Natural Fines Conveyor
- 7. Refer to Figure *Figure 2-1:Auxiliary Levers Location*, fold the natural fines conveyor by pushing auxiliary lever (4).



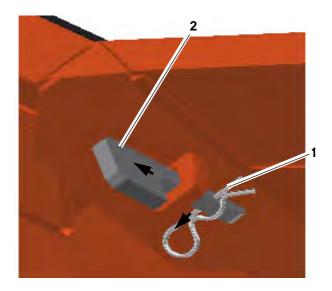
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### **PERSONNEL HAZARD!**

Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Stop machine, isolate, remove ignition key and tag-out, before continuing. Refer to Lock and Tag-out Procedure on page 89.

- 8. Make sure that the lock and tag-out procedure has been carried out on the machine.
- 9. Prepare hopper back door, remove 'R' clips (1) one each side.
- 10. Remove retaining wedge (2) one each side.



- 11. Start engine, Refer to Engine Starting Procedure on page 61.
- 12. From 'Main Menu' press 'Auxiliary Functions' (button 4), which activates the auxiliary levers.
- 13. Refer to Figure *Figure 2-1:Auxiliary* Levers - Location, fold down hopper back door by pushing auxiliary lever (1).



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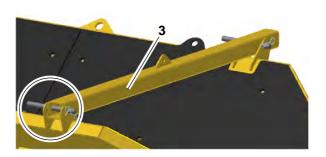


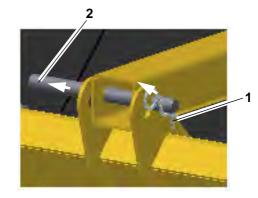
### PERSONNEL HAZARD!

Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Stop machine, isolate, remove ignition key and tag-out, before continuing. Refer to *Lock and Tag-out Procedure, page 89*.

- 14. Make sure that the lock and tag-out procedure has been carried out on the machine.
- 15. Prepare side doors, remove 'R' clips (1) one each side.
- 16. Remove retaining pins (2) one each side.
- 17. Remove cross beam (3).
- 18. Re-insert transport pins to Natural Fines Conveyor (transport position).
- 19. Start engine, Refer to Engine Starting Procedure on page 61.
- 20. From 'Main Menu' press 'Auxiliary Functions' (button 4), which activates the auxiliary levers.
- Refer to Figure *Figure 2-1:Auxiliary Levers - Location*, fold down both hopper sides by pushing auxiliary levers (2, left side) and (3, right side).
- 22. Set the 'Auxiliary lever' switch (4) on the main control panel to the 'OFF' position.
- 23. Place all tools and manuals into tool box and control panels.
- 24. Visually inspect the machine to ensure no component damage.







### 2.1.2. Tracking Machine onto/off Transport Vehicle

	CRUSHING HAZARD! Personnel or objects on machine or in exclusion zones when machine is operational, may cause serious injury or death. DO NOT UNDER ANY CIRCUMSTANCES operate machine when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft). Carry out a thorough site inspection prior to commencing ANY tracking operations.

- 1. Follow start up and tracking procedure, Refer to Tracking Machine on page 62, the machine can be tracked onto or off the transport vehicle at the pre-set tracking speed.
- 2. Before tracking machine off the transport vehicle ensure all temporary sealing and transport straps and chains are removed.
- 3. After tracking machine onto transport vehicle ensure all temporary sealing, transport straps and chains are installed. DO NOT secure by tying down over the tracks.

Note: Tying down is the responsibility of the driver of the transport vehicle.

### 2.2. Transport and Working Dimensions

**Note:** Before transporting this machinery all measurements should be checked to ensure they conform to local and national regulations for transportation of vehicles.

For information on the machine's transport dimensions, refer to Machine Transport Dimensions on page 47.

Note: For information on the machine's working dimensions, refer to Machine Working Dimensions on page 46.

### 2.3. Application and Limitations

This machine has been designed and constructed to reduce minerals such as stone and concrete including steel reinforced concrete to a predetermined size. It must not be used for any other purpose without first contacting Sandvik Mining and Construction technical department. DO NOT operate until the manual and all instructions supplied with the machine are read and fully understood.

### 2.3.1. Common Applications

This list is by no means exhaustive. Please contact Sandvik Mining and Construction for further information on any materials not indicated below.

- Granite.
- Slate.
- Bricks.
- · Limestone.
- Reinforced Concrete.
- · Recycling/ Demolition.
- Asphalt.

### 2.4. Description

This QJ241 is a self contained tracked machine built to withstand the rigours and conditions of operating in quarries and within the construction industry. It utilises a diesel engine to provide the power to the hydraulic power pack and to generate electricity for the electrical systems of the machine. The tracks, feeders, jaws, conveyors and all other working parts of the machine are hydraulically driven. Where possible all of the moving parts of this machine are guarded, where not, warnings are provided. The Safety Section of this manual must be read and fully understood. Any residual organisational, personal and environmental issues must be fully addressed as detailed in the safety section. This equipment has been manufactured and assessed to be in accordance with Machinery Directive 2006/42/EC.

### 2.5. Operation Description

Material is loaded normally by excavator into the hopper where the vibratory feeder transfers the material towards the crushing jaws. The material passes over the grizzly bars where smaller material will fall through the bars and is transferred either to the main conveyor or directed onto the natural fines conveyor. The larger material that has stayed on the grizzly bars is fed to the crusher box and into the jaws where it is crushed between the wear plates and falls onto the main conveyor. The material is transferred up and along the main conveyor passing underneath the magnet. At this point any ferrous material mixed in with the material will be discharged. The material continues along the main conveyor where it is unloaded to a stock pile or to waiting transport.

### 2.6. Key Features

- Diesel hydraulic power via a Caterpillar engine providing hydraulic transmission without clutches.
- Vibratory feeder with automatic control to regulate the feed into the crusher. The hydraulic system automatically coordinates the flow of material from the vibrating feeder over the grizzly bars to the jaw.
- Hydraulic adjustment system to regulate the product size to be crushed.
- Jaw size 1000 x 600 mm encompassing unique high speed and Geo-crush technology to give very high production while reducing wear.
- Operation of jaw can be reversed to clear any blockage.
- High crushing speed.
- Over band magnet removes all of the reinforcing bar when concrete is crushed.
- Spray mounted dust suppression.
- Maintenance platforms.
- Complete machine rises on its hydraulic legs to facilitate cleaning and servicing of tracks and to provides a stable base.
- Machine is self propelled by Remote Control or Umbilical Control Hand Set.

### 2.7. Identification of Main Units

For identification of the main units on the machine, refer to the Product Overview section - Machine Layout Indicating Main Components on page 51.

### 2.8. Identification of Emergency Stop Positions

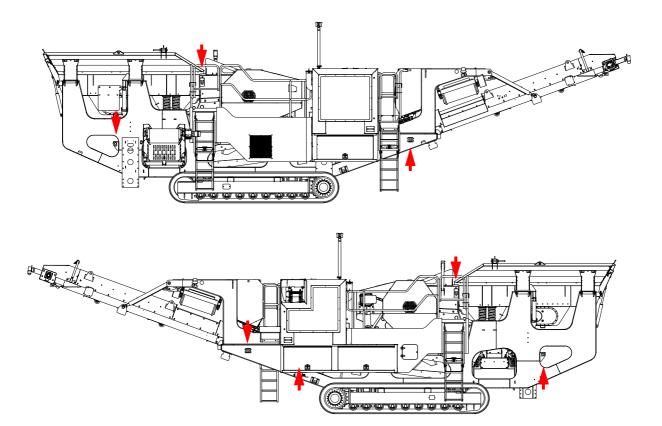


Figure 2-2: Emergency stop positions

### 2.9. Technical Information

- Machine: Single Toggle Mobile Jaw Crushing Unit.
- 1000 x 600 Jaw Crusher.
- Total Weight: XXXXX Tonne.

#### 2.9.1. Machine dimensions

- For working dimensions, refer to Machine Working Dimensions on page 46.
- For transport dimensions, refer to Machine Transport Dimensions on page 47.

### 2.9.2. Standard Features

Primary 1000mm x 600mm Single Toggle Jaw Crusher, designed by Sandvik, utilizing the very latest in finite crushing analysis with rigid one piece welded Crusher Frame, which has been heat-treated after welding for internal stress relief.

### 2.10. Specification of Main Units

### 2.10.1. Feeder

- Hopper Width 1840mm.
- Feeder Width 800mm.
- Feeder Length 3580mm.
- Hopper Capacity 2.8 cubic meters.

### 2.10.2. Crusher

- Feed Opening 1000 x 600 mm.
- Crusher Speed 300 RPM.
- Drive Hydraulic.

### 2.10.3. Conveyors

- Side Conveyor 650mm x 2800mm.
- Main Conveyor 800mm x 8680mm.
- Main Conveyor Speed 123 RPM

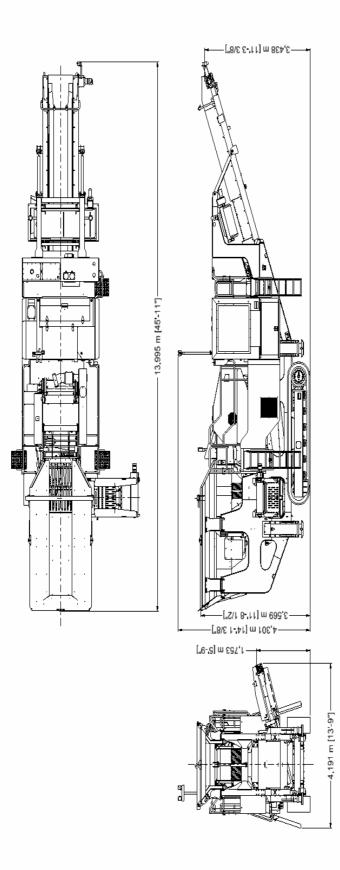
### 2.10.4. Tracks

- Track Type Low Ground Pressure Twin Track Undercarriage.
- Normal Ground Pressure approximately 126.5 kPa (without options).
- Gradient Max 20°.
- Approximate Speed 1.1 km/h.
- Centre 3310mm.
- Width 400mm.
- Drive Hydraulic Integral Motors.
- Control Remote Handset.
- Cable Control Remote Handset Optional Radio remote.

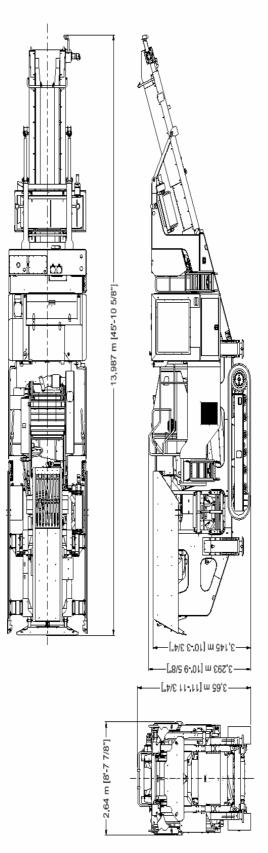
#### 2.10.5. Power Unit

- Caterpillar 6.6.
- Caterpillar 7.1.
- Volvo D7 (Option).
- Fuel Tank Capacity 660 litres.
- Hydraulic Tank Capacity 660 litres.

### 2.11. Machine Working Dimensions



### 2.12. Machine Transport Dimensions



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## 3. Product Overview

### 3.1. Product Overview

### 3.1.1. Main Components:

- Main Conveyor
- Side Conveyor
- Feeder and Vibrator Box
- Magnetic Conveyor
- Jaw Crusher
- Power Pack
- Control Boxes
- Tracks.

### 3.1.2. Optional Extras:

- Extended Hopper Doors
- Engine Heater
- Stock Pile Level Sensor.

QJ241

3.1.3. Machine Layout Indicating Main Components

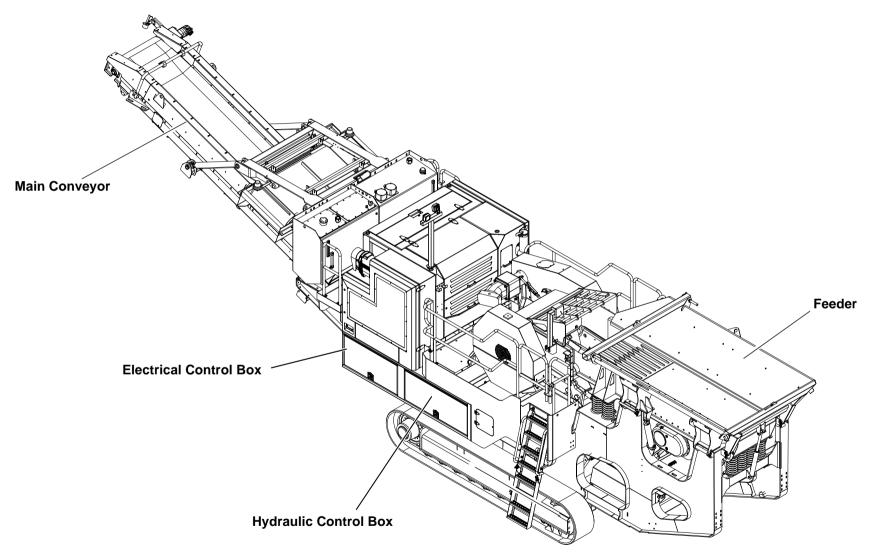


Figure 3-1: Main Components

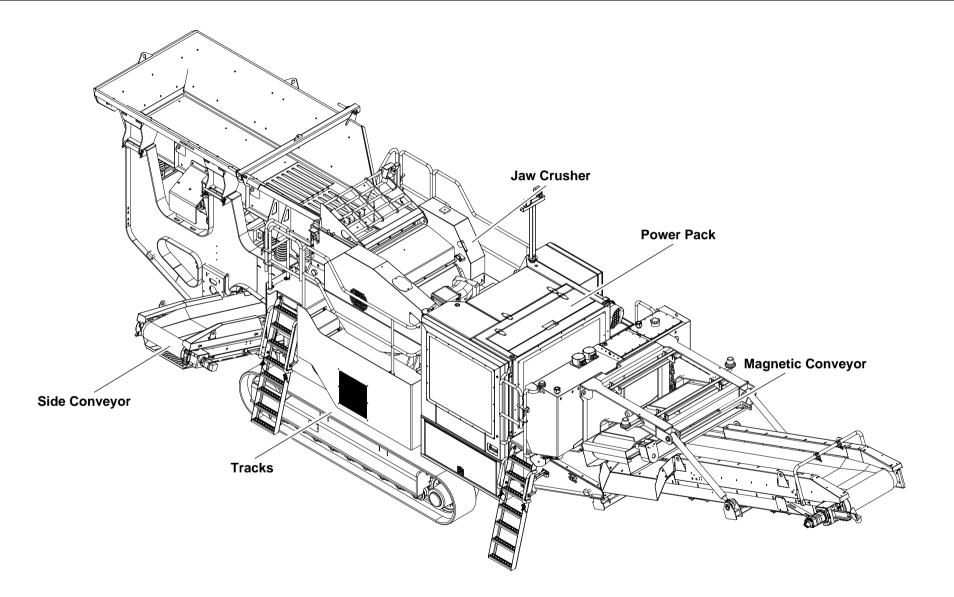


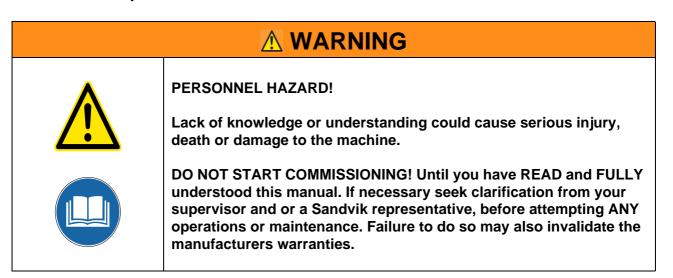
Figure 3-2: Main Components

# 4. Commissioning and Shut Down

### 4.1. Commissioning & Shutdown

### 4.1.1. Commissioning and Shutdown - Safety

The following safety instructions apply throughout the commissioning and shutdown section, additional and or variations in safety measures that are specific to their relevant sub sections will be detailed in the body of the text.



	PERSONNEL HAZARD! Not using the minimum Personal Protective Equipment (PPE) could cause serious injury or death. Ensure the minimum PPE is used when working on or within 20 metres (approximately 66 feet) of the machine, Refer to <i>Minimum</i> <i>Required Personal Protective Equipment (PPE), page 19.</i>

### 4.2. Commissioning

### **Ground Surface Preliminaries**

### NOTICE

This machine is designed to operate on a solid level surface capable of carrying the weight of the machine.

It is important that the machine is placed on level solid ground, capable of carrying the weight of the machine Refer to Identification of Emergency Stop Positions on page 44 or damage could occur. The ground surface should be level. An appropriate site must be identified prior to delivery and unloading of the machine.

#### 4.2.1. Preliminary Operations

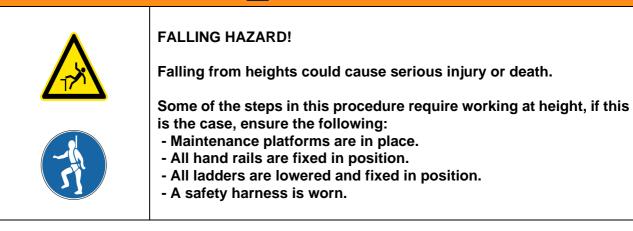
#### **Machine Preliminaries**

NOTICE

Ensure commissioning and shutdown safety, Refer to Commissioning and Shutdown - Safety on page 54 is followed throughout the pre commissioning instructions in addition to the following safety measures.

	PERSONNEL HAZARD! Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.
C C C	Stop machine, isolate, remove ignition key and tag-out, before carrying out these pre-start instructions. Refer to <i>Lock and Tag-out Procedure, page 89</i> .

### 



It is recommended that set up of this machine be carried out by a representative of Sandvik Mobile Screening and Crushing Ltd. or by a qualified representative of the dealer.

### NOTICE

The following instructions assume transportation of this machine using a low loader type vehicle, delivered in close proximity to the job site. If machine Is transported in any other way, contact the manufacturer for additional set up instructions.

Note: A minimum of two persons are required to carry out the following procedures, one to carry out the operations (operator) and one to observe for any potential hazards or dangers (observer).

- 1. Remove all loose items from machine and store safely.
- 2. DO NOT attempt to start this machine until you are aware of all aspects of its operation.
- 3. Remove any temporary sealing and transport straps.
- 4. Visually inspect machine for the following:
  - There are no signs of impact damage.
  - All safety guards / safety devices are in place and secure.
  - All machine components are in place and secure.
  - There are no signs of any fluid or oil leaks including hydraulic hoses.
- 5. Ensure crusher, feeder and conveyor belts are free from any materials, remove if necessary.
- 6. Remove all tools and equipment from the operational area.
- 7. Carry out a full daily maintenance routine, Refer to *Maintenance, page 111*.
- 8. Carry out all engine pre start checks, Refer to Information and Data Sheets, page 207.
- 9. Ensure all visible drums and rollers turn freely.
- 10. Ensure skirting rubbers and scrapers are in place and secure.
- 11. The machine is transported with the inlet chute cover in the open position. Close the inlet chute cover and tighten in position.

### **Position Side Jaw Rubbers**

- 12. Refer to *Figure 4-1: Main Conveyor Jaw Crusher Box Rubbers*, install jaw side rubbers as follows:
  - Remove the nuts, bolts and washers.
  - Position side rubbers, install bolts, washers, nuts and tighten.

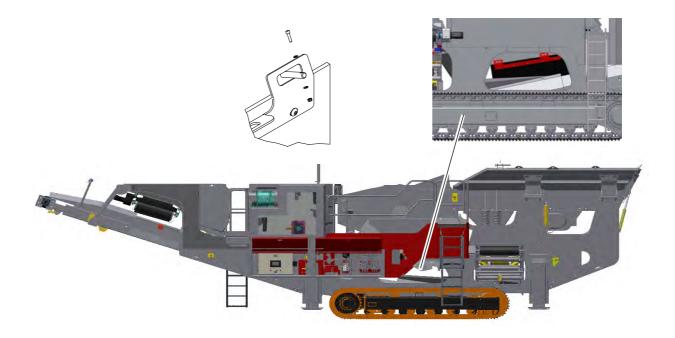
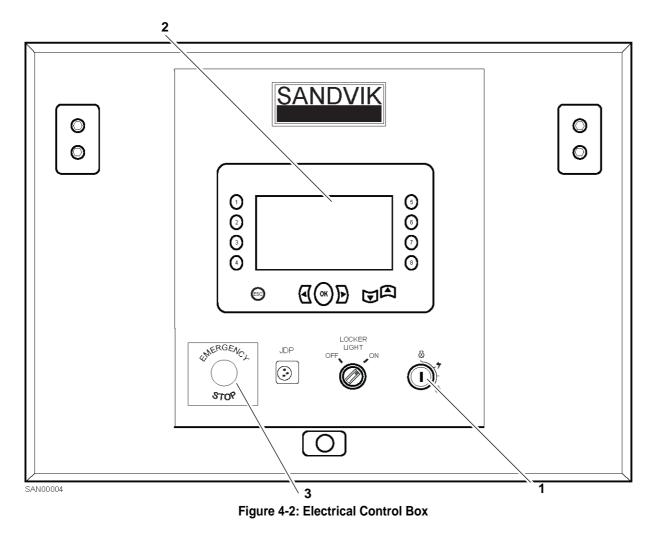


Figure 4-1: Main Conveyor Jaw Crusher Box - Rubbers

### 4.3. Main Control Devices

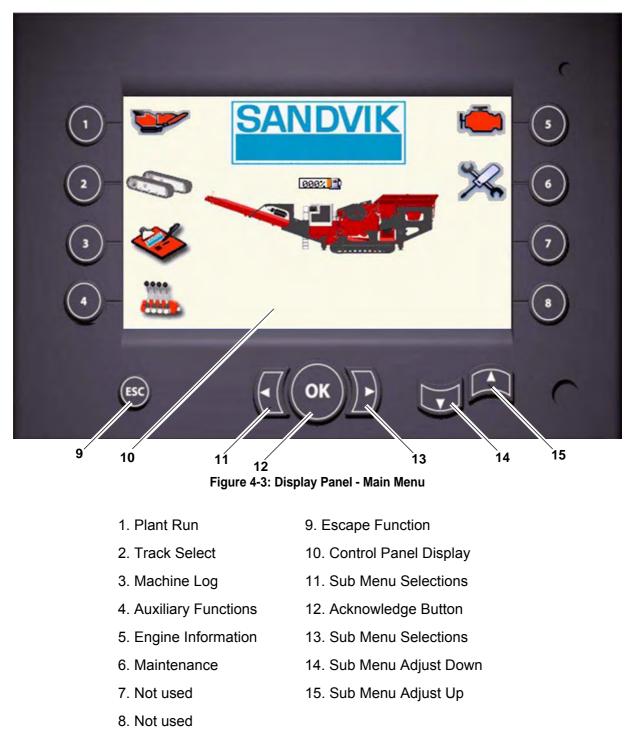
### 4.3.1. Electrical Control Box



Ignition Key
 Display Panel

3. E-Stop Reset

### 4.3.2. Display Panel



**Note:** Screen images throughout may not reflect that portrayed on the machine display, due to software revisions. Images are for illustrative purposes only.

### 4.3.3. Setting the Time and Date

- 1. Refer to *Figure 4-3: Display Panel Main Menu*, to change the time and date press and hold 'ESC' button (9) for 10 to 15 seconds to access the 'Information Menu'.
- 2. Hold in Button 8 until the value that requires to be changed flashes red.
- 3. The "YEARS" field will be highlighted first and begin to flash.
- 4. To increase the years press the Up arrow button (15).
- 5. To decrease the years press the Down arrow button (14).
- 6. Press the arrow right button to move to the next field (13).
- 7. The "MONTHS" field will begin to flash.
- 8. Increase & Decrease the value by using the Up and Down arrow buttons.
- 9. Press the arrow right button to move to the next field.
- 10. The "DAYS" field will begin to flash.
- 11. Increase & Decrease the value by using the Up and Down arrow buttons.
- 12. Press the arrow right button to move to the next field.
- 13. The "HOURS" field will begin to flash.
- 14. Increase & Decrease the value by using the Up and Down arrow buttons.
- 15. Press the arrow right button to move to the next field.
- 16. The "MINUTES" field will begin to flash.
- 17. Increase & Decrease the value by using the Up and Down arrow buttons.
- 18. Press the arrow right button to move to the next field.
- 19. The "SECONDS" field will begin to flash.
- 20. Increase & Decrease the value by using the Up and Down arrow buttons.
- 21. Finally press the arrow right button to store the new date/time the Red highlighted option will disappear from the date/time fields.

### 4.3.4. Setting the Language

- 1. Refer to *Figure 4-3: Display Panel Main Menu*, to change the time and date press and hold 'ESC' button (9) for 10 to 15 seconds to access the 'Information Menu'.
- 2. Button 3 toggles between languages (the country flag or a greeting will appear).

### 4.4. Engine - Starting Procedure

### 4.4.1. Engine Starting Procedure - Safety

	PERSONNEL HAZARD!
	Persons on machine or in exclusion zones when starting machine, may cause serious injury or death.
	DO NOT UNDER ANY CIRCUMSTANCES start the machine when ANY persons are standing on the machine or in the exclusion zones, 20 metres (approximately 66 ft).

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### TIPPING HAZARD!

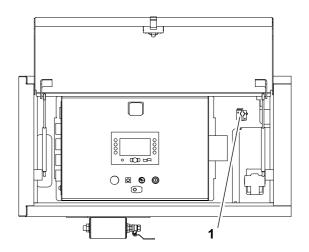
Operating machine on unsuitable ground could cause serious injury or death.

Machine MUST NEVER be tracked on gradients more than: 10° left to right or 20° front to back. Both tracks MUST BE in contact with firm level ground, suitable for carrying the machines weight.



COLD START: When starting machine in temperatures of 0°C (32°F) or below, run all systems at idle for 15 minutes to allow hydraulic oil to reach working temperature (DO NOT feed material into machine during this time). DO NOT change the engine speed while any systems are running. DO NOT operate systems contrary to these instructions.

- 1. Ensure preliminary procedures are carried out prior to starting machine, Refer to *Preliminary Operations on page 55.*
- 2. Turn battery isolation switch (1) 'ON' located inside electrical cabinet.
- 3. Ensure all emergency stops are released.
- Press the E-Stop reset button, refer to *Figure 4-2: Electrical Control Box, page* 58 (item 3).
- Turn ignition key to 'ON' position, display panel 'Main Menu' is displayed, Refer to *Figure 4-3: Display Panel - Main Menu, page 59*.



6. Turn ignition key to 'CRANK' position and hold until engine starts.

Note: Siren will sound & beacon will flash for 7 seconds before engine starts. If engine fails to start wait a few seconds before attempting again.

7. Release ignition key slowly, which returns to the 'ON' position. Engine is now running at idling speed.

Note: To shut-down machine, Refer to Machine Shut Down, page 83.

### 4.4.2. Tracking Machine

	CRUSHING HAZARD!
	Personnel or objects on machine or in exclusion zones when starting and tracking machine, may cause serious injury or death. DO NOT UNDER ANY CIRCUMSTANCES start or track the machine when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft). Carry out a thorough site inspection prior to commencing ANY operations.

Note: A minimum of two persons are required to carry out the following procedures, one to carry out the operations (operator) and one to observe for any potential hazards or dangers (observer).

- 1. Start engine, Refer to *Engine Starting Procedure on page 61*.
- 2. From 'Main Menu' press 'Track Select' button 2.



3. On the remote control handset, turn transmitter to the 'On' position (1).



4. From 'Track Select Menu' press radio receiver 'Remote Track' button 2.

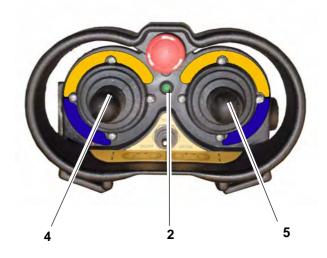
Note: In areas where interference is a particular problem, track by pressing button '1' and use an umbilical cord, hard wired remote control to the machine.

Refer to *Wired umbilical track control on page 65* for further details.

Note: Additional selections available from this menu are 'Auxiliary Functions' (5) and 'Track Diagnostics' (6), Refer to relevant sections for more information.



5. On the remote control handset, wait a few seconds for the green light (2) to start flashing.



6. Activate the radio transmitter, press green button (3).

Note: Siren will sound and beacon will flash and it takes approximately 7 seconds for the radio transmitter to become operational.

 Tracking is now possible using the two joysticks (4) and (5), together to move in a straight line and or individually to turn.
 Refer to *Direction indicators on page 64*.

Note: The tail section of the main conveyor will lift prior to the tracks engaging.



 If necessary engine Revs Per Minute (RPM) can be adjusted up (faster) or down (slower) to aid tracking using buttons as shown.

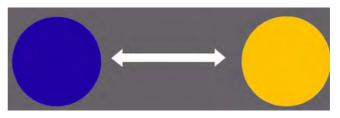
Note: If main conveyor is not raised it will raise automatically.



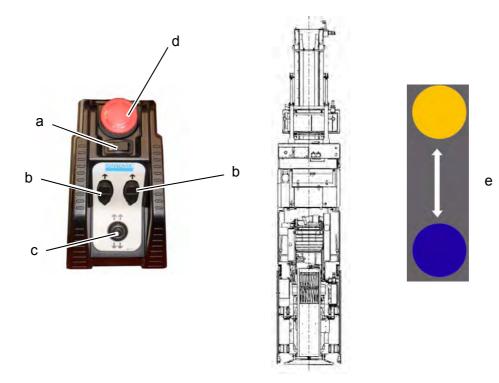
### 4.4.3. Direction indicators

When operating the Remote Handset, the yellow buttons are for forward movement and the blue ones for reverse. (These correspond to direction indicator stickers on the machine and the remote handset.)

When operating the Hard Wire Handset, the yellow buttons are for forward movement and the blue ones for reverse. (These correspond to direction indicator stickers on the machine.)



### 4.4.4. Wired umbilical track control



#### Figure 4-4: Wired umbilical track control

- a. Umbilical control ON/OFF switch.
- b. Individual track control.
- c. Double track control for moving in straight line.
- d. Emergency stop button.
- e. Yellow and blue direction markers.

### 4.4.5. Main Conveyor - Raise

	CRUSHING HAZARD!
	Personnel or objects on machine or in exclusion zones when starting or operating main conveyor, may cause serious injury or death.
	DO NOT UNDER ANY CIRCUMSTANCES start or operate main conveyor when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft). Carry out a thorough site inspection prior to commencing ANY operations.

Note: A minimum of two persons are required to carry out the following procedure, one to carry out the operation (operator) and one to observe for any potential hazards or dangers (observer).

- 9. Start engine, Refer to *Engine Starting Procedure on page 61*.
- 10. From 'Main Menu' press 'Auxiliary Functions' button 4, which activates the auxiliary levers.

Note: Main conveyor rises automatically.

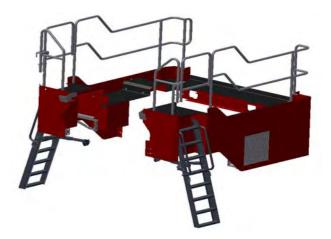


### 4.4.6. Machine Set-up for Operation

It is assumed the pre-commissioning instructions have been completed prior to commencing with machine set-up for operation, Refer to *Preliminary Operations on page 55* if necessary.

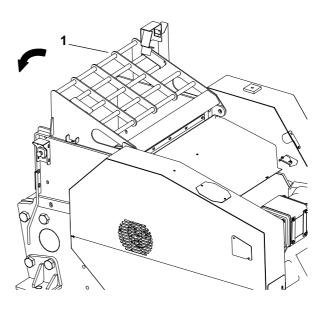
	PERSONNEL HAZARD! Lack of knowledge or understanding could cause serious injury, death or damage to the machine. DO NOT Set-up machine until you have READ and FULLY understood this manual. If necessary seek clarification from your supervisor and or a Sandvik representative, before attempting to set-up machine. Failure to do so may also invalidate the manufacturers warranties.	
	FALLING HAZARD! Falling from heights could cause serious injury or death. Some of the steps in this procedure requires working at height, ensure the following applies when working off the ground: - Maintenance platforms are in place. - All hand rails are fixed in position. - All ladders are lowered and fixed in position.	

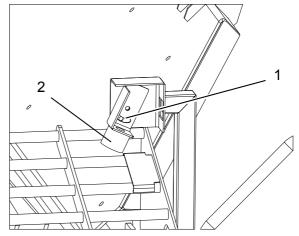
- A safety harness is worn.
- 1. Make sure that the lock and tag-out procedure has been carried out on the machine.
- 2. Fold down the ladders.
- 3. Install safety rail to maintenance platforms and tighten securely.



4. Fold the inlet chute cover (1) into position and install two bolts (one each side).

- 5. At the top of the inlet chute cover, set the sonar to its working position:
  - Loosen the lower bolt (1).
  - Pivot the sonar (2) in position.
  - Tighten the lower bolt.





- 6. Un-tag the machine, refer to *Tag Removal Procedure on page 90*.
- 7. Start engine, Refer to *Engine Starting Procedure, page 61*.
- From 'Main Menu' press 'Auxiliary Functions' (button 4), which activates the auxiliary levers.
- Refer to Figure *Figure 2-1: Auxiliary Levers - Location*, fold up both hopper sides by pulling auxiliary levers (2, Left side) and (3, Right side).



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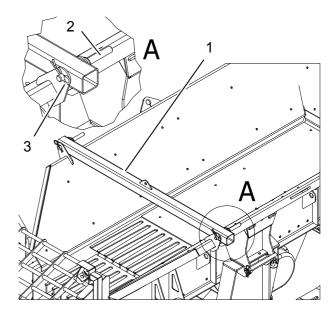


### PERSONNEL HAZARD!

Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Stop machine, isolate, remove ignition key and tag-out, before continuing with these instructions. Refer to *Lock and Tag-out Procedure, page 89*.

- 10. Make sure that the lock and tag-out procedure has been carried out on the machine.
- 11. Install the hopper cross beam (1).
- 12. Install the retaining pins (2) one each side.
- 13. Install the 'R' clips (3) to secure the retaining pins.



- 14. Un-tag the machine, refer to *Tag Removal Procedure on page 90*.
- 15. Start engine, Refer to *Engine Starting Procedure on page 61*.
- From 'Main Menu' press 'Auxiliary Functions' (button 4), which activates the auxiliary levers.
- Refer to Figure *Figure 2-1: Auxiliary Levers - Location*, fold up hopper back door by pulling auxiliary lever (1).



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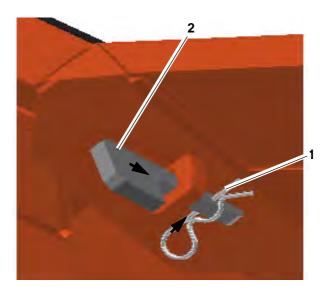


### PERSONNEL HAZARD!

Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Stop machine, isolate, remove ignition key and tag-out, before continuing with these instructions. Refer to *Lock and Tag-out Procedure, page 89*.

- Make sure that the lock and tag-out procedure has been carried out on the machine.
- 19. Secure the rear hopper door, install retaining wedge (1) one each side.
- 20. Install 'R' clips (1) one each side.

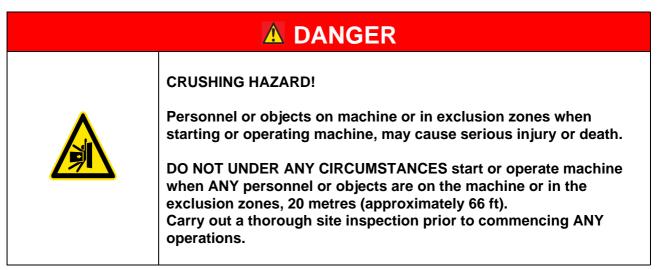


- 21. Start engine, Refer to *Engine Starting Procedure on page 61*.
- 22. From 'Main Menu' press 'Auxiliary Functions' (button 4), which activates the auxiliary levers.
- 23. Refer to Figure *Figure 2-1: Auxiliary Levers - Location*, unfold natural fines conveyor by pulling auxiliary lever (4).



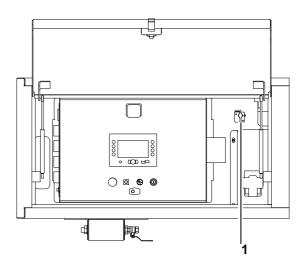
### 4.5. Operating the Machine

Before commencing general operation ensure all preliminary operations are carried out, this applies during the commissioning process and or general usage, Refer to *Preliminary Operations, page* **55**.



#### 4.5.1. Start-up Sequence - Running the Crusher

- Ensure preliminary procedures are carried out prior to starting machine, Refer to *Preliminary Operations, page 55*.
- 2. Turn battery isolation switch (1) 'ON' located inside electrical cabinet.
- 3. Ensure all emergency stops are released, and the switch on remote control handset is turned off.
- Turn ignition key to 'ON' position, display panel 'Main Menu' is displayed, Refer to *Figure 4-3: Display Panel - Main Menu, page 59*.



- 5. Access crusher control sub menu by pressing button 1.
- Select relevant run mode, 'Manual' or 'Automatic' Refer to *Manual Run Mode,* page 72 or *Auto Run Mode, page* 77.



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### 4.5.2. Manual Run Mode

Note: Selecting this option allows the operator to select particular functions and start each operation in turn.

- Access crusher control menu, Refer to Start-up Sequence - Running the Crusher, page 71.
- 2. Select 'Manual Run' mode, press button 1 to access 'Manual Run' mode options.



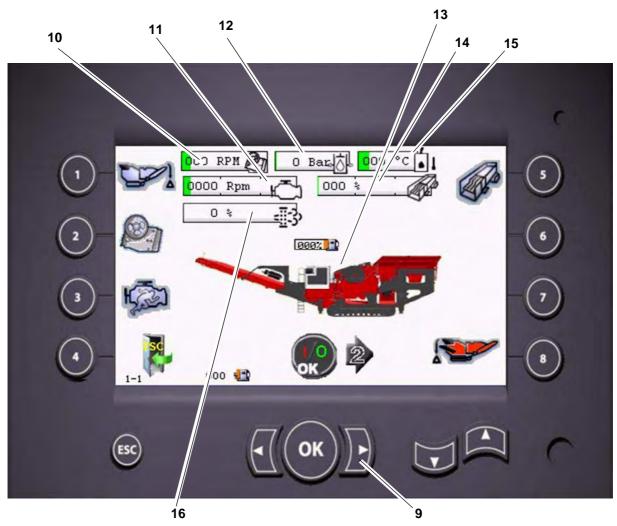


Figure 4-5: Manual Run Mode - Page 1 Options

- 1. Main Conveyor Start / Stop
- 2. Crusher Start / Stop
- 3. Engine speed adjust mode
- 4. Return to Main Menu

- 9. Next Page
- 10. Crusher Speed (RPM)
- 11. Engine Speed (RPM)
- 12. Crusher Drive Pressure

- 5. Feed Conveyor Start / Stop
- 6. Not Used
- 7. Not Used
- 8. Natural Fines Conveyor Start / Stop
- 13. Display Screen Options
- 14. Feeder Speed % Value
- 15. Hydraulic Oil Temperature (°C)
- 16. Engine Soot Level % Value (3b engine only)

When 'Manual Run' mode has been selected each of the operations can be started up individually, however they can only be started up in following sequence, 'Main Conveyor', 'Crusher' and 'Feeder'.

#### Note: The Natural Fines Conveyor can be turned on at any point during the sequence.

## 4.5.3. Manual Run Page 1 Options - Functionality

### Refer to Figure 4-5: Manual Run Mode - Page 1 Options, page 72.

#### Button 1 - Main Conveyor Start / Stop

Operates main conveyor, which will automatically lower, a siren sounds and beacon flashes for 10 seconds before conveyor starts.

#### Note: Main conveyor cannot be stopped until the crusher as been switched off.

#### Button 2 - Crusher Start / Stop

Operates the crusher which, can only be started after the main conveyor has been started, a siren sounds and beacon flashes for 10 seconds before crusher starts.

#### Note: Crusher can only be stopped if the feed conveyor is stopped first.

#### **Button 3 - Engine Adjust Speed**

Allows the operator to control engine speed. When this function is selected the option to start and stop the Natural Fines Conveyor will disappear and engine ramp up/down buttons will appear enabling the operator to increase or decrease engine speed.

#### Button 4 - Return to Main Menu

Returns the user to the main menu.

#### Button 5 - Feeder Start / Stop

Operates feeder which, can only be started after the crusher has reached a preset operating speed, a siren sounds and beacon flashes for 10 seconds before the crusher starts.

#### Button 6 - Not Used

Button 7 - Not Used

#### Button 8 - Natural Fines Conveyor Start / Stop

Operates Natural Fines Conveyor which, can be started any time after the crusher is started, a siren sounds and beacon flashes for 10 seconds before Natural Fines Conveyor starts.

#### Item 9 - Next Page

Takes the user to the next menu page.

#### Item 10 - Crusher Speed (RPM)

Indicates the current crusher speed displayed in Revolutions Per Minute (RPM).

#### Item 11 - Engine Speed (RPM)

Indicates the current engine speed displayed in RPM.

#### Item 12 - Crusher Drive Pressure

Indicates the current crusher drive pressure displayed in bar.

#### Item 13 - Display Screen Options

Available display screen options are shown.

#### Item 14 - Feeder Speed % Value

Indicates the current feeder speed as a percentage value.

#### Item 15 - Hydraulic Oil Temperature

Indicates the current hydraulic oil temperature displayed in degrees centigrade.

#### Item 16 - Engine Soot Level % Value (3b engine only)

Indicates the current engine soot levels displayed as a percentage value.

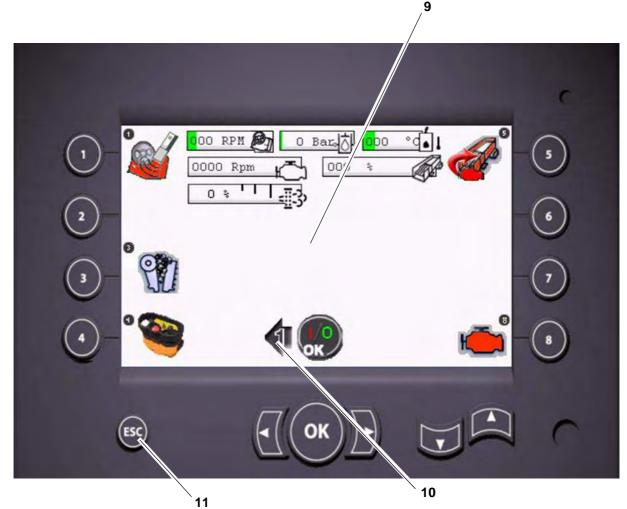


Figure 4-6: Manual Run Mode - Page 2 Options

- 1. Hopper Level Control Enable
- 2. Not Used
- 3. Crusher Jog
- 4. Radio Select
- 5. Crusher Level Control Enable
- 6. Not Used

- 7. Not Used
- 8. Engine Information
- 9. Display Screen Options
- 10. Previous Page
- 11. Escape Function

## 4.5.4. Manual Run Page 2 Options - Functionality

### Refer to Figure 4-6: Manual Run Mode - Page 2 Options, page 75.

#### **Button 1 - Hopper Level Control Enable**

Enables hopper level control, the level sensor in the crushing chamber controls the feeder speed in relation to the level of material in the chamber. Desired control levels can be adjusted.

#### Hopper Level Control - Sub Menu

# Refer to Figure 4-7: Hopper Level Control - Sub Menu.

- Button 2 / 3 increase / decrease level.

- Button 6 / 7 increase / decrease sensor sensitivity.

# Refer to Figure 4-6: Manual Run Mode - Page 2 Options, page 75.

#### Button 2 - Not Used

#### **Button 3 - Crusher Jog**

Allows the operator to jog crusher in forward and reverse.

#### **Button 4 - Radio Select**

Allows the operator to control functions of the machine via the remote control handset - Jog forward/reverse, feeder speed and feeder on/ off.

#### **Button 5 - Crusher Level Control Enable**

Enables crusher load control. Desired control levels can be adjusted.

#### **Crusher Level Control - Sub Menu**

#### Refer to Figure 4-8: Crusher Level Control -Sub Menu.

- Buttons 2/3 adjusts feeder start up pressure.
- Buttons 6/7 adjusts feeder stop pressure.
- Press back button to return to previous menu.

Refer to *Figure 4-6: Manual Run Mode - Page 2 Options, page 75*.

Button 6 - Not Used

Button 7 - Not Used



Figure 4-7: Hopper Level Control - Sub Menu



Figure 4-8: Crusher Level Control - Sub Menu

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#### **Button 8 - Engine Information**

Displays engine information.

#### **Item 9 - Display Screen Options**

Displays all the current available options.

#### Item 10 - Previous Page

Displays previous page options, Refer to Figure 4-5: Manual Run Mode - Page 1 Options.

#### **Item 11 - Escape Function**

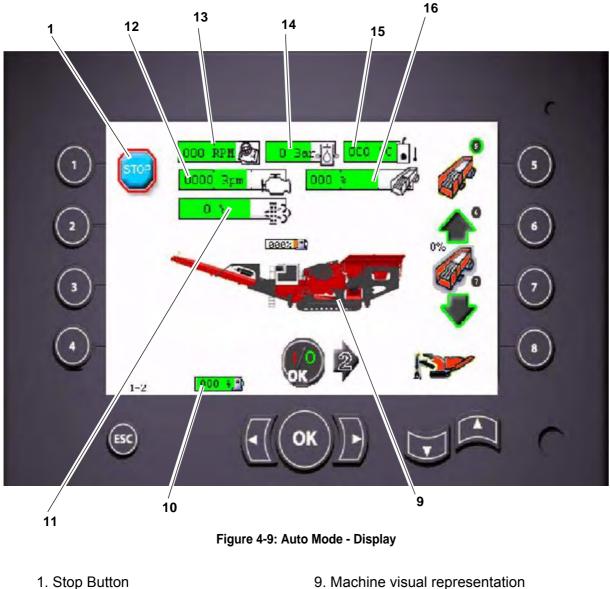
Returns the user to the main menu.

#### 4.5.5. Auto Run Mode

# Note: Selecting this option operates the crusher in automatic mode.

- Access crusher control menu, Refer to *Start-up Sequence - Running the Crusher, page 71*.
- 2. Select 'Auto Run' mode, press button 2 to access 'Auto Run' mode options.





- 2. Not Used
- 3. Not Used
- 4. Not Used
- 5. Feeder on/off
- 6. Increase feeder speed
- 7. Decrease feeder speed
- 8. Natural Fines Conveyor Start / Stop

- 10. Fuel Gauge
- 11. Engine Soot Level % Value (3b engine only)
- 12. Engine Speed (RPM)
  - 13. Crusher Speed (RPM)
  - 14. Engine Load (Bar)
- 15. Hydraulic Oil Temperature (°C)
- - 16. Feeder Speed % Value

Operating machine in auto mode will start each function automatically, sounding the siren and flashing the beacon for 10 seconds prior to each function commencing. As follows:

- Α. Main conveyor lowers.
- Β. Main conveyor starts.
- C. Crusher and engine increase to pre-set speed.

**Note:** When crusher reaches its preset speed and no feeder inhibit faults are active the feeder can be started manually by pressing button 5.

#### 4.5.6. Auto Mode Display - Functionality

Refer to Figure 4-9: Auto Mode - Display, page 78.

#### Button 1 - Stop Button

Stops the 'Auto Mode' process.

#### Button 2 - Not Used

Button 3 - Not Used

Button 4 - Not Used

#### **Button 5 - Crusher Level Control Enable**

Enables crusher load control. Desired control levels can be adjusted.

#### Buttons 6 and 7

Adjusts the feeder speed.

#### Button 8 - Natural Fines Conveyor Start / Stop

Operates Natural Fines Conveyor which, can be started any time after the crusher is started, a siren sounds and beacon flashes for 10 seconds before Natural Fines Conveyor starts.

#### Item 9 - Visual representation

A visual representation of the machine is displayed on the screen.

#### Item 10 - Fuel Gauge

Indicates the current amount of fuel in the tank.

#### Item 11 - Engine Soot Level % Value (3b engine only)

Indicates the current engine soot levels displayed as a percentage value.

#### Item 12 - Engine Speed

Indicates the current engine speed displayed in RPM.

#### Item 13 - Crusher Speed

Indicates the current crusher speed displayed in RPM.

#### Item 14 - Engine Load

Indicates the current engine load displayed in bar.

#### Item 15 - Hydraulic Oil Temperature

Indicates the current hydraulic oil temperature displayed in degrees centigrade.

#### Item 16 - Feeder Speed % Value

Indicates the current feeder speed as a % value.

### 4.5.7. Feeder - Remote Adjustment

Machine must be operational and in 'Manual Mode' or 'Auto Mode' to adjust feeder, Refer to *Engine* - *Starting Procedure, page 61*.

1. Turn transmitter to the 'On' position (1).



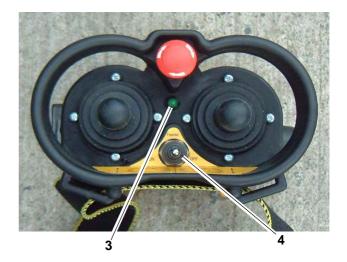
2. Activate radio transmitter, press green button (2).

Note: Siren will sound and beacon will flash and it takes approximately 7 seconds for the radio transmitter to become operational.





- 3. Wait a few seconds for the green light (3) to start flashing.
- 4. Toggle switch (4) to switch the feeder on and off as required.



### 4.5.8. Feeder Transfer Chute

	PERSONNEL HAZARD Working on or in close proximity to the machine whilst it is on and	
<u> </u>	or operating could cause serious injury or death.	
<b>O</b>	Stop machine, isolate, remove ignition key and tag-out, before changing the position of the diverter chute. Refer to <i>Lock and Tag-out Procedure, page 89</i> .	
	Ensure locking pin on diverter chute handle is securely attached.	

The feeder section separates smaller sized material away from the material to be crushed. The operator has a choice as to how to stockpile this graded material with the use of the 'Diverter Chute' and 'Natural Fines Conveyor'.

- 1. Make sure that the lock and tag-out procedure has been carried out on the machine.
- 2. Locate diverter chute handle (1).



#### **Option 1**

Graded material mixed with crushed material - Stock piled together.

3. Move diverter chute handle to the left, ensure locking pin is securely attached.



## **Option 2**

Graded material is directed onto the Natural Fines Conveyor to be stock piled separately away from main conveyor stock pile.

4. Move diverter chute handle to the right.



# 4.6. Fault Events

The system stores the last 27 recorded historical fault events, which can be accessed via the display screen.

For a full list of fault codes, refer to *Machine Fault Codes and Maintenance Screens on page 172*.

1. To access 'Fault Events' log, select 'Fault Events' button 3 from 'Main Menu'.

Note: To navigate to 'Main Menu' press 'ESC' button from any other menu screen.



Note: Historical fault events are shown in order of their time stamps, up to a maximum of 27 events. Any subsequent events over-write the oldest event.

- 2. Use 'Scroll Buttons' to highlight next or previous 'Fault Event'
- When 'Fault Event' has been removed or cleared from the machine Press 'OK' to acknowledge removal.
- 4. A pop-up 'WARNING' window identifying the fault opens.
- 5. If you want to permanently remove it from memory press 'OK'.
- 6. If you made a mistake or don't want to remove it from memory press 'ESC' to return to previous menus.





# 4.7. Machine Shut Down

### 4.7.1. Machine Shut Down Safety

Ensure commissioning and shutdown is done safely, refer to *Commissioning and Shutdown - Safety, page 54* is followed throughout machine shut down in addition to the following safety measures.

	CRUSHING HAZARD! Personnel or objects on machine or in exclusion zones when shutting down machine, may cause serious injury or death. DO NOT UNDER ANY CIRCUMSTANCES shutdown machine when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft). Carry out a thorough site inspection prior to commencing ANY operations.	

	FLYING MATERIAL HAZARD!	
	Personnel or objects on machine or in exclusion zones when shutting down machine, may cause serious injury or death.	
	DO NOT UNDER ANY CIRCUMSTANCES start or operate machine when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft).	
	Carry out a thorough site inspection prior to commencing ANY operations.	
	Ensure all material has been removed from the feeder and crusher chamber and that the conveyors are not producing a stock pile, prior to shutdown.	

### 4.7.2. Manual Stop Sequence

Ensure commissioning and shutdown is done safely, refer to **Commissioning and Shutdown -Safety, page 54** and **Machine Shut Down Safety, page 83** is followed throughout machine shut down.

**Note:** When stopping machine manually, you MUST follow the correct shut down operational sequence!



Figure 4-10: Manual Run Mode

- 1. Allow machine to continue to run until there is no more material on or in the machine.
- 2. Refer to *Figure 4-10: Manual Run Mode*, from 'Manual Run' mode shut down feeder, press button 5.
- 3. Allow the feeder to completely stop.
- 4. Shut down crusher, press button 2.
- 5. Allow the crusher to completely stop (when crusher drive pressure falls below a set value).
- 6. Ramp engine RPM down, press button 3 followed by the down button.
- 7. Shut down main conveyor, press button 1.
- 8. Shut down Natural Fines Conveyor at any point during this procedure, press button 8.
- 9. Lock and tag-out the machine, Refer to Lock and Tag-out Procedure, page 89.

## 4.7.3. Auto Stop Sequence

Ensure commissioning and shutdown is done safely, refer to **Commissioning and Shutdown** - **Safety, page 54** and **Machine Shut Down Safety, page 83** is followed throughout machine shut down.



Figure 4-11: Auto Mode

- 1. Allow machine to continue to run until there is no more material on or in the machine.
- 1. Refer to *Figure 4-11: Auto Mode*, from 'Auto Run' mode press the 'STOP' button.
- 1. 'STOP' button will flash red and the 'Auto Stop Sequence' will commence.
- 2. During shut down a visual representation will be displayed.
- 3. Feeder will shutdown.
- 4. After a short delay the crusher will shut down.
- 5. When crusher drive pressure falls below a set value it will completely stop and the engine will commence ramp down.
- 6. Main conveyor will then shut down.
- 7. Lock and tag-out the machine, Refer to *Lock and Tag-out Procedure, page 89*.

## 4.7.4. Emergency Stop - Operation

Use emergency stop buttons in an emergency situation not normal stopping - frequent use causes damage to hydraulic components.

Emergency stop buttons must be reset before machine re-start.



Make sure that ANY emergency has been cleared before the emergency stop is reset.

In the event of a malfunction, operational difficulty or other emergency, firmly press the nearest emergency stop button and lockout immediately, Refer to *Lock and Tag-out Procedure on page 89*.

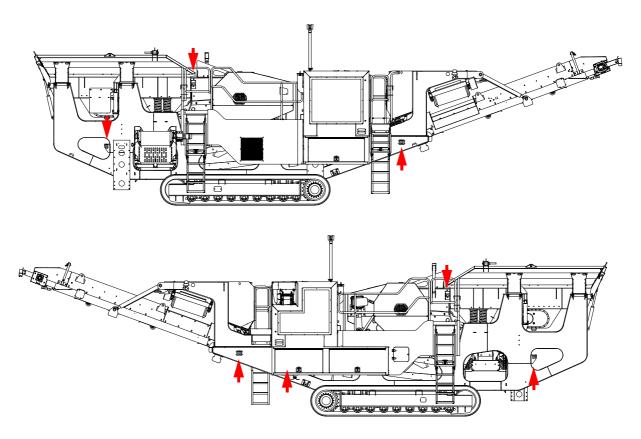
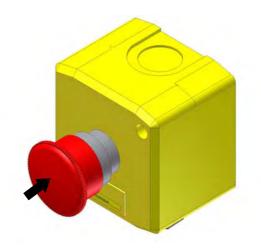


Figure 4-12: Emergency Stop Buttons - Location

1. Push emergency stop button to stop the machine.



## 4.7.5. Emergency Stop - Reset

- 1. Ensure malfunction, operational difficulty or other emergency has been rectified.
- 2. Ensure preliminary operations are carried out prior to reset, Refer to *Preliminary Operations, page 55*.
- Reset all emergency stops. Turn emergency stop clockwise and release.
- Restart as necessary, Refer to *Start-up* Sequence - Running the Crusher, page 71.



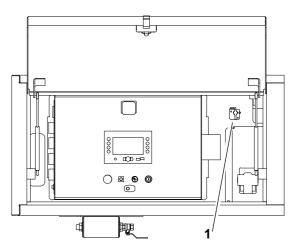
## 4.8. Lock and Tag-out Procedure



When carrying out any maintenance or working on or around the machine it must be switched off, the isolator moved to the off position and a lock attached to prevent any accidental attempts to start the machine.

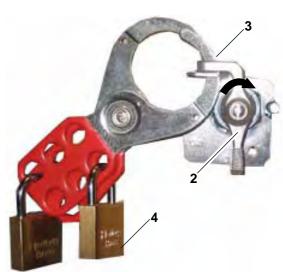
Lock and tag-out the machine whenever it is operated under alternate power, or under ANY condition which shutting off the engine and removing the ignition key does not completely cut the power, to ensure proper immobilization. Failure to follow this procedure could result in damage to the machine, serious injury or death.

- 1. Position all hydraulic controls in the neutral position.
- 2. Ensure all supports and slide stops are securely fixed in position.
- Shut down machine and remove ignition key, Refer to *Machine Shut Down on page 83*.
- 4. Locate isolator, inside electrical cabinet area (1).



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- 5. Move isolator (2) to the off position to align lock holes (as shown).
- 6. Install isolator device (3) through lock holes.
- 7. Attach individual lock/s (4) and keep individual keys on your person.
- If necessary, when safe to do so start machine, Refer to *Start-up Sequence -Running the Crusher, page 71*.

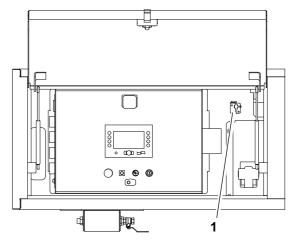


## 4.8.1. Tag Removal Procedure

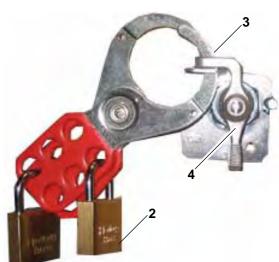


Ensure there are NO persons on the machine or in the danger zone before tag removal as this may result in serious injury or death.

- 1. Ensure all maintenance has been completed and no persons are on or near the machine.
- 2. Locate isolator, inside electrical cabinet area (1).



- 3. Remove ONLY your lock (2).
- 4. If yours is the last lock, remove isolator device (3).
- 5. Move isolator (2) to the on position, rotate clockwise.
- If necessary when safe to do so start machine, Refer to Start-up Sequence -Running the Crusher on page 71.



# 5. Operation



Do not start operating this machine until you have read and fully understood this manual.

# 5.1. Before Starting Up the Machine (for Operation)

Before commencing general operation ensure all preliminary operations are carried out, this applies during the commissioning process and or general usage, Refer to *"Preliminary Operations" on page 55*.

	CRUSHING HAZARD!	
	Personnel or objects on machine or in exclusion zones when starting or operating machine, may cause serious injury or death.	
	DO NOT UNDER ANY CIRCUMSTANCES start or operate machine when ANY personnel or objects are on the machine or in the exclusion zones, 20 metres (approximately 66 ft).	
	Carry out a thorough site inspection prior to commencing ANY operations.	

Make sure the machine is set for operation refer to *"Machine Set-up for Operation" on page 67* and the scheduled maintenance checks are done refer to *"Maintenance" on page 111*.

- 1. Make sure the material size is set as necessary. Refer to "Using Radio Remote to Adjust the Jaw CSS" on page 106.
- 2. Set the feeder transfer chute output (main conveyor or side conveyor) refer to *"Feeder Transfer Chute Setup" on page 110*.
- 3. Set up the exclusion zones with safety barriers and appropriate signs from the following conveyors:

	Material will exit from a height from all conveyors and ferrous metal will exit from the magnet chute, which may cause injury or death
	STRONG magnet field on the magnet conveyor, do not go near it if you have a pacemaker, as this may cause death
The main product output convoyor	

- The main product output conveyor
- The side conveyor
- The magnet conveyor chute

# 5.2. Machine Crushing Mode

1. Start engine, Refer to *"Engine - Starting Procedure" on page 61*. The initial control screen P1000 will be displayed.



Figure 5-1: Initial Control Screen

2. At the initial control screen, select machine, button 1.



# 5.3. Methods of Operation

The crusher start up has an automatic mode which should normally be used.

The manual crusher start up mode may be used if desired but components of the machine must be started and stopped in the correct sequence. The machine controls will only allow the correct sequence by highlighting the next step when available.



DO not start the machine if it is full of material. Clear any material away before starting.

Select the automatic or manual method of operation as follows:

## 5.4. Automatic Mode

1. At the crushing screen, select the automatic start up of the crusher, press button 2.



- 2. Each sequence of the operation will be highlighted as it starts. A warning is activated prior to each function starting in the following sequence:
  - Main conveyor lowers.

- Main conveyor starts.
- Crusher starts, increasing to preset speed.
- 3. The automatic screen 1 will be displayed.

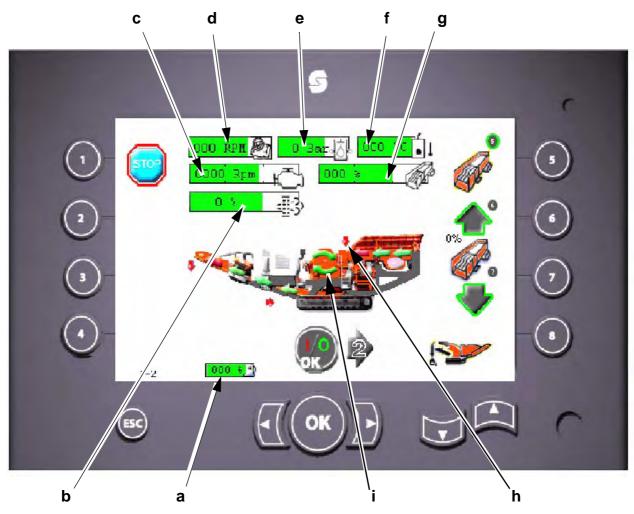


Figure 5-2: Automatic Operation Information Screen 1

- a. Fuel tank level gauge.
- b. Engine soot level as a % value (3b engine only).
- c. Engine speed rpm.
- d. Crusher speed rpm.
- e. Engine load as a % value.
- f. Hydraulic oil temperature.
- g. Current feeder speed as a % value.
- h. Red arrow indicates position of sensor that has stopped the feeder.
- i. Green arrow indicates material flow through crusher.

### 5.4.1.Feeder Start and Stop

- When the crusher is at operating speed, the feeder icon will flash, press start button 5. A warning is activated prior to starting.
- 2. Press button 5 again to stop.

## 5.4.2. Feeder Speed Adjustment

- 1. To increase the feed rate speed, press button 6.
- 2. To decrease the speed, press button 7.

Speed is shown as a % of maximum.

### 5.4.3. Natural Fines Conveyor Start and Stop

- When the crusher is at operating speed, the fines conveyor icon will flash, press start button 8. A warning is activated prior to starting.
- 2. Press button 8 again to stop.

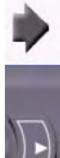
### 5.4.4. Automatic Operation - Additional Control Screen

- 1. Press right arrow to view next screen.
- 2. Press left arrow to return to previous screen.









### 5.4.5.To Stop the Crusher in Auto Mode

- 1. Allow all material to clear from the feeder.
- 2. Return to auto screen 1 If necessary, press left arrow.

- 3. On screen 1 of the auto mode screen, press button 1.
- 4. The machine will stop components in sequence with a delay between each section, to ensure all material has been cleared.

#### 5.4.6. Return to Initial Control Display

- 1. When escape icon is visible, press button 4 to return to previous control display.
- or
- 2. Press ESC to return to previous control display.









## 5.5. Manual Mode

1. At the crushing screen, select the manual start up of the crusher, press button 1.

1 - Manual

The manual screen 1 will be displayed.

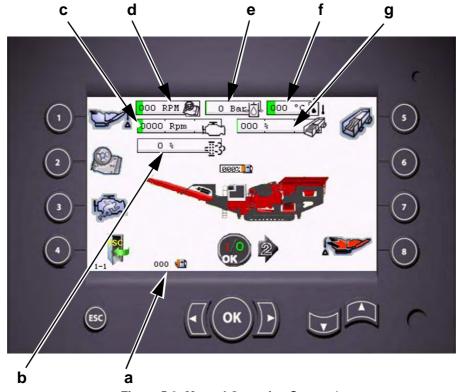


Figure 5-3: Manual Operation Screen 1

- a. Fuel tank level gauge.
- b. Engine soot level as a % value (3b engine only).
- c. Engine speed rpm.
- d. Crusher speed rpm.
- e. Engine load as a % value.
- f. Hydraulic oil temperature.
- g. Current feeder speed as a % value.

## 5.5.1.Starting the machine

There is a delay before each component starts and a warning is activated prior to each function starting.

The machine components can only be started in the following sequence:

- 1. Start the main product output conveyor, press button 1.
- 2. Start the crusher, press button 2.
- 3. When the crusher is running at a pre-set speed, other components can be started

### 5.5.2. Engine Speed Adjustment

- When the crusher is running the engine speed can be adjusted, press button 3 and the engine icon is highlighted for speed adjustment.
- 2. To increase the engine speed, press the up button.
- 3. To decrease the engine speed, press the down button.
- 4. When the required engine and crusher speed are shown, set the speed by pressing button 3 again.

### 5.5.3. Feeder Start and Speed Control

A warning is activated prior to the feeder starting.

- 1. Start the feeder, press button 5. The feeder icon will become lit.
- 2. To adjust the speed of the feeder, press button 6 to increase and button 7 to decrease.















#### 5.5.4.Natural Fines Conveyor Start and Stop

A warning is activated prior to the conveyor starting.

- When the crusher is running the fines conveyor can be started, press button 8. The icon will become lit.
- 2. To stop the natural fines conveyor, press button 8.

#### 5.5.5. Manual Operation Screen Display 2

Control functions available from this display screen:

- Crusher chamber level monitor.
- Joggle the crusher.
- Use radio remote for machine adjustments.
- Control feeder by engine and crusher load.
- View engine parameters.

#### 5.5.6. Crusher Chamber Level Monitor

- 1. To switch on the crusher chamber monitor, press button 1
- 2. The icon will be highlighted when on.
- 3. Once active, the height of the sensor can be adjusted by pressing button 2.







4. On the crusher chamber level adjustment screen, the following adjustments can be made and viewed:



- The desired height level setting can be adjusted by pressing buttons 2 and 3.
- The current level detected by the sensor is displayed in mm (1).
- The feeder indicator bar (2) will turn orange when the feeder is being controlled by the level sensor.
- The time taken for the feeder to increase to full speed can be adjusted by buttons 5 & 6.
- The time taken for the feeder to reach minimum speed can be adjusted by buttons 7 & 8.

### 5.5.7. Joggle the Crusher

- If the crusher has stalled, the Closed Size Setting (CSS) is to be opened to the maximum setting before attempting to clear the blockage. Refer to "Adjust the Jaw Closed Size Setting (CSS)" on page 106.
- 2. If the machine is not running, select manual mode by pressing button 1. Start the main conveyor and increase the engine speed to 1800 rpm.



3. Select the options screen by pressing the right arrow.



4. Select crusher joggle, button 3.

Note:

If the feeder is running it will stop.

If the crusher is running it will stop.

Once complete the icon will highlight green.

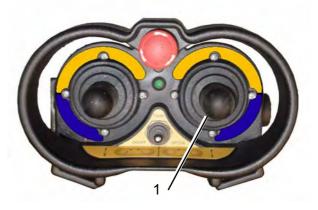
- 5. Press left or right arrow buttons to joggle the jaw in each direction as required.
- 6. If the radio remote control is to be used with the jogging function. Set up the radio remote control. Refer to *"Using Radio Remote for Machine Adjustments" on page 101.*
- 7. The jaw can now be jogged using the right hand remote lever (1).
- Once complete de-select 'jog' mode by pressing button 3, the crusher will return to normal operating speed.

### 5.5.8. Using Radio Remote for Machine Adjustments

- 1. Select radio remote, press button 4.
- 2. The icon is highlighted when on and shows the signal strength.
- 3. Set radio remote switch option to plant.















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4. Switch the radio remote control to 1 and wait until the green light flashes consistently.

5. Synchronise the radio control to the machine, press green button.

# 5.5.9. Control Feeder by Engine and Crusher Load

Feeder load control settings:

- 1. The feeder load control is activated by pressing button 5 (1).
- 2. Once activated, the feeder load control can be adjusted using button 6 (2).

Feeder load control adjustment:

- 3. The maximum load can be set by pressing buttons 6 and 7.
- 4. The minimum engine load can be set by pressing buttons 2 and 3.
- If the engine load is controlling the feeder, the engine power indicator will turn orange (1).





G

1

0 °C

Max

(5)

6







#### 5.5.10. View Engine parameters

- 1. To view engine parameters during operation, press the right arrow to access the options screen (shown).
- 2. Press button 8.

1. When the machine is idle press button 5.

There are two engine parameter screens

• Screen 1 as shown:







To access screen 2 of the engine parameters, press the right arrow button.

Screen 2 shown:



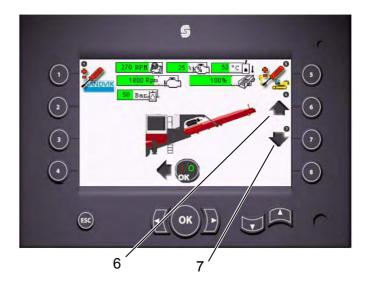
#### 5.5.11.Manual Operation Screen Display 3

Control functions available from this display screen:

• Main conveyor raise and lower.

#### 5.5.12. Main conveyor raise and lower

- 1. From the main screen, press the right arrow to access the options screen (screen 2)
- Select the right arrow again (screen 3). The main conveyor can be raised or lowered by pressing buttons 6 and 7



# 5.6. Stalled or Blocked Crusher

# ▲ DANGER

Make sure NO persons are on the machine when it is ON, as this may cause injury or death.

When the material is removed from the jaw, the jaws may move together because of the stored pressure. Make sure that you are NOT between the jaw plates as this may cause injury or death.

If the jaw stalls or is blocked with material:,

- Make sure the feeder is OFF and has stopped.
- Make sure the crusher is OFF and has stopped.
- Make sure the main conveyor is OFF and has no material on it.
- If necessary reverse or joggle the jaw crusher, refer to "Joggle the Crusher" on page 100, or
- Make sure that the machine is locked and tagged-out. Remove the material with a suitable tool or tools.



• Start machine again only when the material is removed and it is safe to do so.

# 5.7. Adjust the Jaw Closed Size Setting (CSS)



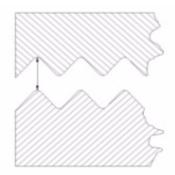
**0J241** 

The crusher must not be operated at Closed Size Settings (CSS) of less than 75mm (3") without prior approval in writing from Sandvik Mining and Construction

The Jaw CSS is the distance (1) between the jaw plates at the minimum jaw opening.

- On the display screen, from the manual/auto run select screen. Select the right arrow (1) to close the jaw (reduce the CSS).
- To increase the CSS select the left arrow (2).

Note: A visual check of the material output size is to be made to determine if further adjustment is required.





## 5.7.1 Using Radio Remote to Adjust the Jaw CSS

- If the radio remote control is to be used to set the CSS. Set up the radio remote control. Refer to "Using Radio Remote for Machine Adjustments" on page 101.
- 2. The jaw can now be adjusted using the right hand remote lever (1).



To cancel the radio remote, press button 6 (2).



# 5.8. Operating The Machine (Crushing)



Do not start crushing until you have read and fully understood this manual.

To operate machine, start the systems in the sequence that follows:

- 1. If fitted, start the water pump.
- 2. Before loading material into the machine, Make sure that the machine is not vibrating excessively. Shut down the machine refer to *"Machine Shut Down" on page 83*.

#### 5.8.1. Loading Material Into Machine:



NO persons are allowed ON the machine or in the hazard zones when the machine is ON, also while the machine is loaded as this may cause serious injury or death.

Make sure ALL necessary precaution are taken to reduce the risk of breathing in dust or particles, as this may cause serious injury or death

# NOTICE

**RISK OF EQUIPMENT DAMAGE.** Do not start these systems if they are full of material. Clear any material away before starting.

- 1. The feeder *MUST* be on and running *BEFORE* material is put on it. *DO NOT* start the feeder if it is full of material.
- 2. Material which is larger than 80% of the crusher box input should not be presented to the feeder. *STOP, ISOLATE AND TAG THE MACHINE* and remove any large pieces of material with the appropriate equipment. *DO NOT* use excavators to force any material into feeder as any damage occurred from this action will invalidate any Sandvik Mining and Construction warranty.
- Material should be fed carefully, (not dropped onto feeder) from about 300mm above feeder. Make sure that feeder is evenly loaded over its entire length - excluding grizzly. This is to help with screening fines material and to maximise production.
- 4. It is recommended that an excavator is used to load material into hopper. DO NOT OVER FILL HOPPER.
- For maximum output and minimum wear, it is recommended that the crusher chamber is fed consistently with the supply of material being steady and constant. STOP/ START OPERATION OF THE FEEDER SHOULD BE AVOIDED.
- 6. Sensors are fitted to the crusher box side plate and should the crusher chamber become overfilled the feeder will STOP until the material is reduced to an acceptable level. For setting the crusher chamber level monitor, refer to *"Crusher Chamber Level Monitor" on page 99*.
- 7. See "Feeder Speed Adjustment" on page 95 for adjusting feeder control speed.

When the machine is set up as described in the previous pages, it is now ready to be used to crush the desired material.

### 5.9. Reverse Jaw Operation

When crushing, the jaw of the machine may become jammed with material. If this happens, the direction of crushing can be reversed in order to free the material. To do this, proceed as follows:

- 1. Make sure that the crusher has stopped.
- 2. On the display screen, press button 5 for crusher reverse.
- 3. Select button 1 for manual start up of the crusher or button 2 for automatic start up.

The crusher will run in reverse.

 The crusher can be stopped by either, crusher reverse, press button 5 to set to off. Or cycle the ignition.



The procedure may be repeated as often as necessary to try to release any blockages in the crusher box. If the machine is unable to crush material that has become stuck in the jaw after the crusher reverse function has been activated, the crusher may need to be cleared manually refer to *"Stalled or Blocked Crusher" on page 105*.

## 5.10. Feeder Transfer Chute Setup

<b>A</b>	PERSONNEL HAZARD!
Û	Stop the machine, isolate, remove ignition key and tag-out before setting up the feeder transfer chute. Refer to <i>"Lock and Tag-out Procedure" on page 89</i> .
	The feeder transfer chute lever may move suddenly due to the momentum of the deflector plate. Care is to be taken when moving the lever into position.

The feeder transfer chute separates smaller sized material away from the material to be crushed. The deflector plate (1) is adjusted using the handle (3). All the material put into the hopper can be directed onto the main conveyor through the chute (4). If the smaller sized material is required to be separated, the material is directed through the chute (2) to the side conveyor. The operator has a choice as to how to stockpile this graded material with the use of the feeder transfer chute and side conveyor'.

For further information on the feeder transfer chute, refer to "Feeder Transfer Chute" on page 81.

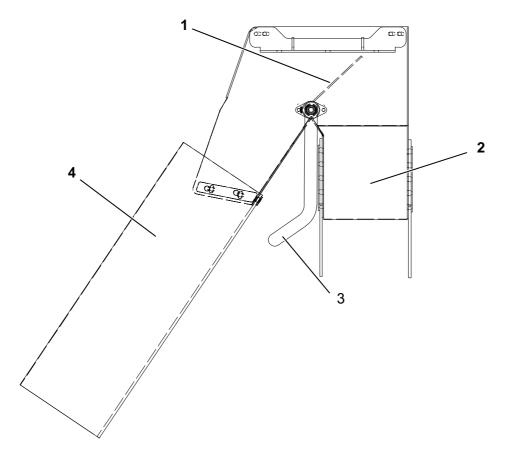


Figure 5-4: Feeder transfer chute

# 6. Maintenance

### 6.1. Maintenance - Safety Requirements

The safety instructions that follow apply throughout the maintenance section. Additional and or variations in safety measures that are specific to the relevant maintenance procedure will be detailed in the body of the text.

Maintenance is essential for safety and to ensure the best possible performance from the machine by reducing the chances of breakdowns.

For maintenance schedules and procedures relating to Original Equipment Manufacturers, refer to *Information and Data Sheets on page 207*.

	PERSONNEL HAZARD!
	Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.
	Do not stand on the machine whilst it is operation.
Ô	Stop the machine, isolate, remove ignition key and tag-out before carrying out any maintenance procedures. Refer to <i>Lock and Tag-out Procedure on page 89</i> .

	FALLING HAZARD!
	Some maintenance requires working from height. Falling from heights could cause serious injury or death.
	When working at height, obey the precautions that follow: • Maintenance platforms are in place
	<ul> <li>All hand rails are fixed in position</li> </ul>
	<ul> <li>All ladders are lowered and fixed in position</li> </ul>
	• A safety harness is worn.

WARNING	
$\mathbf{A}$	HOT SURFACE HAZARD! The engine could still be hot after operation and cause severe burns if touched.
	Make sure that the engine is cool before maintenance is started.

# NOTICE

**RISK OF EQUIPMENT DAMAGE.** Do all maintenance procedures as a minimum requirement.

Machines that operate in severe site or environmental conditions may require more frequent maintenance routines.

Only use lubricants, fluids, filters and parts recommended by the Original Equipment Manufacturer (OEM) or accelerated wear or damage could result. Never use grease containing Molybdenum.



Do not start any maintenance until you have read and fully understood this manual. Particular attention must be paid to the *Safety Section on page 11*. If there is a maintenance procedure that is not fully understood contact Sandvik before commencing with the maintenance.



Any adjustments must only be carried out by trained personnel. Any adjustments to the hydraulic system must only be carried out by trained Sandvik service engineers.



Make sure that oils and fluids are cleaned and disposed of correctly in a way that meets the local and national environmental regulations.

# 6.2. Daily Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out before the machine is started each day.

Daily Maintenance Schedule (minimum requirements)	
1.	Do the daily engine maintenance schedule. Refer to C9 Operation & Maintenance Manual.
2.	Air cleaner rubber seals - inspect for wear.
3.	Air pre-cleaner - inspect and clean as necessary.
4.	Diesel tank - check top up level. Refer to <i>Diesel Fuel - Check Level and Top Up on page</i> <b>123</b> .
5.	Engine Oil - check top up level. Refer to <i>Engine Oil - Check Level and Top Up on page 122</i> .
6.	Engine Coolant - check top up level. Refer to <i>Engine Coolant - Check Level and Top Up on page 125</i> .
7.	Water tank (if fitted) - check level.
8.	Hydraulic oil tank - check top up level. Refer to <i>Hydraulic Fluid - Check Level and Top Up on page 124</i> .
9.	Hydraulic, water and diesel hoses - check for signs of damage or leaks.
10.	Diesel water trap feeder - check and drain as necessary. Refer to <b>Diesel Water Trap - Drain</b> on page 124.
11.	Track gearbox - check oil level. Refer to Track Gearbox Oil - Change on page 137.
12.	Feeder Gearbox - check level. Refer to <i>Feeder Gearbox - Check Oil Level and Top Up on page 129</i> .
13.	Rollers and Drums - inspect condition and make sure that they move freely.
14.	All Safety guards - make sure they are present and attached.
15.	Grizzly bars - make sure they are free from obstructions.
16.	Crusher chamber - make sure it is free from obstructions.
17.	Crusher lubrication system - Inspect hoses for signs of damage or leaks.
18.	Emergency stops - operate and reset all. Refer to <i>Emergency Stop - Operation on page 87</i> .
19.	Walk around inspection.
20.	Track machine 10 meters in both directions to prevent chain seizure. Refer to <i>Tracking Machine on page 62</i> .

# 6.3. Weekly Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out on a weekly basis

Weekly Maintenance Schedule (minimum requirements)	
Preliminaries.	
1.	Do the daily maintenance schedule. Refer to <b>Daily Maintenance Schedule on page 114</b> .
2.	Do the weekly engine maintenance schedule. Refer to C9 Operation & Maintenance Manual.
3.	Panels and bolts - check that all are in place and secure.
4.	Oil cooler and radiator - clear any build up of dust.
5.	Jaw plates - check for wear. Turn around or replace as necessary. Refer to <i>Jaw Plates -</i> <i>Turning and changing on page 142</i> .
6.	Toggle plate - inspect to make sure that it is free from cracks or other defects. Replace as necessary.
7.	Toggle assembly - inspect for damage. Clear all debris to make sure that there is free movement of the hydraulic cylinders.
8.	Toggle clamping ram - inspect for damage or wear, replace as necessary.
9.	Link arm ram bearings - inspect for damage or wear, replace as necessary.
10.	Crusher chamber liner plates - inspect for wear, replace as necessary.
11.	Crusher box front and rear beam fixing bolts - check and tighten as necessary.
12.	Jaw brake pressure - check and adjust as necessary.
13.	Bearings - Grease. Refer to <b>Bearings - Grease on page 130</b> .
14.	Belt scraper - check and adjust as necessary.
15.	Belt sealing rubbers - check and check and adjust as necessary.
16.	Main/side conveyor bearings - check and apply grease as necessary.
17.	Jaw plates - perform full movement of the plates, make sure that the adjustment wedge and clamping system are free moving and clear from any obstruction.

# 6.4. 50-80 Hours Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that the following is carried out after 50-80 hours running of the machine.

50-	50-80 Hours Maintenance Schedule	
1.	Replace the following filter elements. Refer to <i>Hydraulic Filters - Replace on page 135</i> for filter locations:	
	Series 45 (130cc) filter element	
	Series 90 (130cc) filter element	
	Jaw circuit high pressure filter element	
	Return filter elements (2 off).	

# 6.5. 250 Hours Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out every 250 hours.

250	250 Hours Maintenance Schedule (minimum requirements)	
Pre	liminaries.	
1.	Do the weekly maintenance schedule. Refer to <i>Weekly Maintenance Schedule on page 115</i> .	
2.	Do the engine 250 hour maintenance schedule. Refer to C9 Operation and Maintenance manual.	
3.	Hydraulic hoses - check for signs of damage or leaks.	
4.	Conveyor belts and tracking - Inspect condition, align head drums as necessary.	
5.	Toggle clamping ram bearings - inspect (note! these bearings must be thoroughly inspected with a view to change at the next 250 hours service.	
6.	Link arm ram bearings - inspect (note! these bearings must be thoroughly inspected with a view to change at the next 250 hours service.	
7.	Drive belts - check for wear, swelling, softening and tension, replace as necessary.	
	Note! Tautness should remain constant during the belts working life.	

# 6.6. 500 Hours Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out every 500 hours.

500 Hours Maintenance Schedule (minimum requirements)	
Preliminaries.	
Do the 250 hours maintenance schedule. Refer to <b>250 Hours Maintenance Schedule on page 117</b> .	
Do the engine 500 hour maintenance schedule. Refer to C9 Operation and Maintenance manual.	
Fuel filters - replace. Refer to C9 Operation and Maintenance manual.	
Engine oil filter - replace. Refer to C9 Operation and Maintenance manual.	

### 6.7. 750 Hours Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out every 750 hours.

750 Hours Maintenance Schedule (minimum requirements)		
Pre	Preliminaries.	
1.	Do the 250 hours maintenance schedule. Refer to <b>250 Hours Maintenance Schedule on</b> <i>page 117</i> .	

# 6.8. 1000 Hours Maintenance Schedule



Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out every 1000 hours.

100	<b>1000 Hours Maintenance Schedule (minimum requirements)</b> Preliminaries.	
Pre		
1.	Do the 500 hours maintenance schedule. Refer to <b>500 Hours Maintenance Schedule on</b> page 118.	
2.	Vibrating feeder - change oil. Refer to <i>Oils and Fluids on page 170</i> for the recommended oil.	
3.	Toggle clamping ram bearings - replace.	
4.	Link arm ram bearings - replace.	
5.	Hydraulic system - change oil. Refer to <i>Oils and Fluids on page 170</i> for the recommended hydraulic fluid.	
6.	Track gearboxes - change oil. Refer to Track Gearbox Oil - Change on page 137.	

# 6.9. 2000 Hours Maintenance Schedule



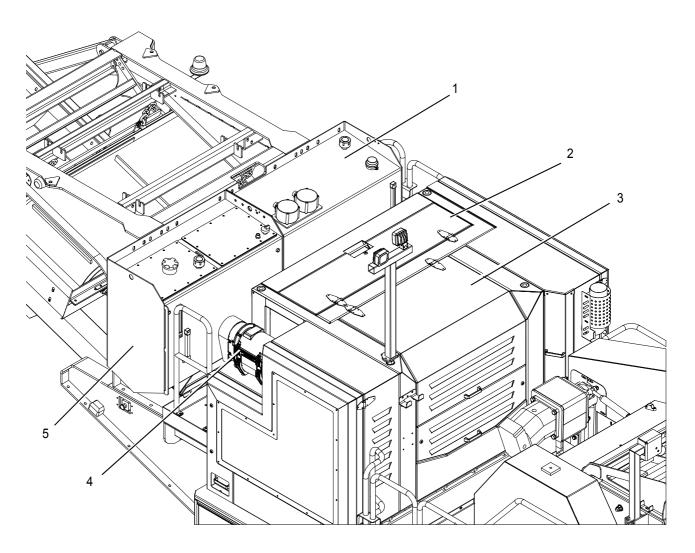
Maintenance - Safety Requirements on page 112 must be followed before this maintenance is started.

Make sure that these checks are carried out every 2000 hours.

200	2000 Hours Maintenance Schedule (minimum requirements)	
Pre	Preliminaries.	
1.	Do the 1000 hours maintenance schedule. Refer to <i>1000 Hours Maintenance Schedule on page 119</i> .	
2.	Replace the following strainers. Refer to <i>Hydraulic Filters - Replace on page 135</i> for strainer locations:	
	2 1/2" suction filters/strainers	
	Filter suction strainer.	
3.	Replace the following filter elements. Refer to <i>Hydraulic Filters - Replace on page 135</i> for filter locations:	
	Series 45 (130cc) filter element	
	Series 90 (130cc) filter element	
	Jaw circuit high pressure filter element	
	Return filter elements (2 off).	
4.	Flush the hydraulic system.	
5.	Hydraulic system - change oil. Refer to <b>Oils and Fluids on page 170</b> for the recommended hydraulic fluid.	

# 6.10. Maintenance Procedures

The engine and hydraulic compartment locations are shown at *Figure 6-1:* to aid maintenance procedures.





4 5

Key to Figure 6-1:

1	Hydraulic tank
2	Radiator compartment

- 2 Radiator compartment3 Engine compartment
- Air cleaner Fuel tank

### 6.10.1. Fluid Drain Points

3 4 1 2 Figure 6-2: Fluid drain points

The fluid drain points are located below the hydraulic cabinet.

Key to Figure 6-2:.

- Radiator drain 1
- 2 3 Sump drain
- Hydraulic drain 4
- Diesel drain

### 6.10.2. Engine Oil - Check Level and Top Up



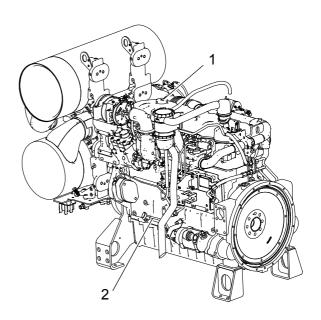
The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

WARNING
HOT SURFACE HAZARD!
The engine could still be hot after operation and cause severe burns if touched.
Make sure that the engine is cool before maintenance is started.



**RISK OF EQUIPMENT DAMAGE.** Incorrect filling procedures can cause contamination and can damage the equipment. Make sure that the oil is filled correctly.

- Open the engine compartment cover. For location refer to *Figure 6-1: Engine/ hydraulic compartment locations, page 121* (item 3).
- 2. At the engine compartment, check the engine oil level through the dipstick (2).
- 3. If necessary, refill the oil. Clean the area around the filler cap (2) before opening to prevent contamination.
- Refer to *Oils and Fluids on page 170* for the recommended oil or refer to Caterpillar C9 Operation and Maintenance manual.



### 6.10.3. Diesel Fuel - Check Level and Top Up



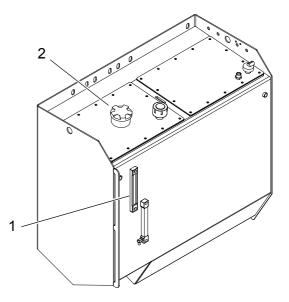
The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

# NOTICE

**RISK OF EQUIPMENT DAMAGE.** Incorrect filling procedures can cause contamination and can damage the equipment. Make sure that the oil is filled correctly.

All fault will show on the display screen when the fuel level is low. A visual check can also be made.

- At the fuel tank, visually check the fuel level (1).
- 2. If necessary refill fuel tank. Clean the area around the filler cap (2) before opening to prevent contamination.
- 3. Refer to *Oils and Fluids on page 170* for the recommended fuel.



### 6.10.4. Diesel Water Trap - Drain



The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

- Open the engine compartment cover. For location refer to *Figure 6-1: Engine/ hydraulic compartment locations, page 121* (item 3).
- 2. Visually check the diesel water trap, drain if necessary.



6.10.5. Hydraulic Fluid - Check Level and Top Up



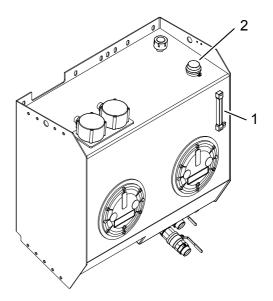
The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



**RISK OF EQUIPMENT DAMAGE.** Incorrect filling procedures can cause contamination and can damage the equipment. Make sure that the oil is filled correctly.

All fault will show on the display screen when the hydraulic fluid level is low. A visual check can also be made.

- 1. Visually check the hydraulic fluid level (1). If necessary fill the hydraulic tank. Clean the area around the filler cap (2) before opening to prevent contamination.
- 2. Refer to *Oils and Fluids on page 170* for the recommended hydraulic fluid.



### 6.10.6. Engine Coolant - Check Level and Top Up



The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

# NOTICE

**RISK OF EQUIPMENT DAMAGE.** Incorrect filling procedures can cause contamination and can damage the equipment. Make sure that the oil is filled correctly.

- Open the radiator compartment cover. For location refer to *Figure 6-1: Engine/ hydraulic compartment locations, page 121* (item 2).
- Check radiator water level & refill if necessary (1).
- 3. Refer to *Oils and Fluids on page 170* for the recommended anti-freeze fluid.
- 4. Use a 50/50 mixture of anti-freeze and water.

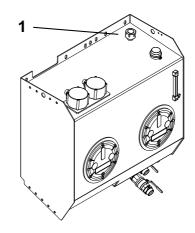


6.10.7. Checking/ Changing Hydraulic Tank Air Breather



The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

- 1. At the top of the hydraulic tank, clean the area around the air breather (1).
- 2. Replace the tank air breather.



### 6.10.8. Air Cleaner - Servicing



The safety requirements in Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

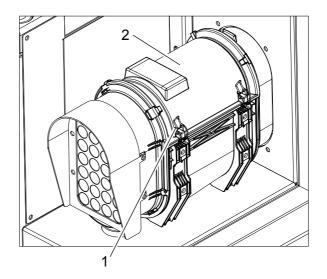
# Make sure all necessary precautions are taken to reduce the risk of breathing in dust particles.

Note: When the engine has operated in environments that are dusty or dirty, the air cleaner elements may require more frequent service, than what is stated in the maintenance schedules.

Note: A fault will display on screen if there is an air filter blockage.

Replace the air cleaner filters as follows:

- 1. Locate the air cleaner, refer to *Figure 6-1:* (item 4).
- 1. Release the four clips (1) that attach the air cleaner cover (2).
- 2. Remove the air cleaner cover.



- 3. Replace the primary air filter (1).
- To gain access to the secondary air filter (2) (not shown) the primary air filter must be removed.
- 5. Replace the secondary air filter (2) (not shown).
- 6. Install the air cleaner cover.
- If an air filter blockage has occurred, the air filter blockage switch is to be reset. Refer to *Figure 6-4:* for switch location.



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# 6.10.9. Magnet Conveyor - Maintenance

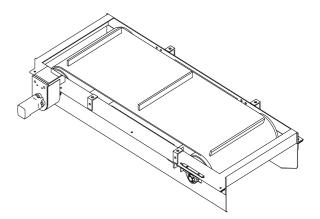
MAGNET HAZARD! The magnet conveyor has a strong magnetic field. Do not approach the magnetic conveyor if fitted with a pacemaker as this can cause injury or death.



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

Refer to the manufacturers handbook for maintenance information. *Information and Data Sheets on page 207*.

1. Remove pieces of metal from the magnet conveyor to prevent jamming of rotating parts.



### 6.10.10. To Adjust the Magnet Conveyor Belt Tension

•	MAGNET HAZARD!
	The magnet conveyor has a strong magnetic field. Do not approach the magnetic conveyor if fitted with a pacemaker as this can cause injury or death.

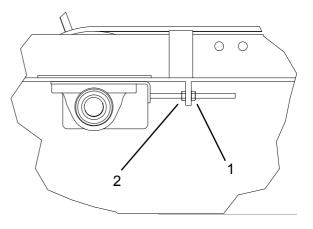


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

- To adjust the magnet conveyor belt tension, the tail drum is to be moved in/out as necessary:
- 2. Loosen the bolt (1) and tighten the bolt (2) as necessary.

Note! The belt has to operate loose so ferrous metal does not get trapped.

- 3. Make sure that both sides are adjusted equally and the tail conveyor is aligned correctly.
- 4. Make sure that the conveyor belt is in the centre
- Tighten bolt (1) when the belt is tightened to the correct level. Adjust the magnet conveyor belt tension



# 6.10.11. Feeder Gearbox - Check Oil Level and Top Up

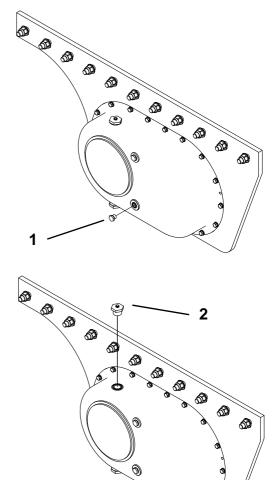


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



**RISK OF EQUIPMENT DAMAGE.** Incorrect filling procedures can cause contamination and can damage the equipment. Make sure that the oil is filled correctly.

- 1. Clean the area around the plug (1) before removal to prevent contamination.
- 2. To check the oil level in the feeder, remove the level plug (1). If oil comes out the level is acceptable.



To top up the oil level:

- 3. Clean the area around the filler plug before removal to prevent contamination.
- 4. Remove the filler plug.
- Fill until oil comes out of the level hole.
   Refer to *Oils and Fluids on page 170*, for recommended oil for the feeder gearbox.
- Install the level plug (1) and the filler plug (2).
- 7. Repeat for the feeder gearbox on the opposite side.

### 6.10.12. Bearings - Grease



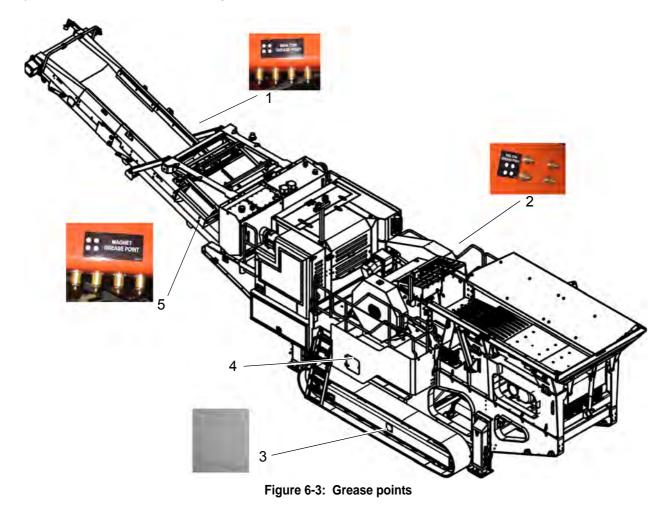
Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



**RISK OF EQUIPMENT DAMAGE.** Do not use grease containing molybdenum. Doing so could cause damage to parts and invalidate any warranty. Only use grease specified in Oils and Fluids on page 170.

Only apply grease where indicated, refer to *Figure 6-3*: for the grease point locations.

For information on filling the auto-lubrication system, refer to Grease Pump Unit (Auto-lubrication system)- Fill with Grease on page 131.



Key to Figure 6-3:

- 1 Main conveyor grease points
- 23 Side conveyor grease points
  - Track grease panel

4 5 Auto-lubrication filling point magnetic conveyor grease points

# 6.10.13. Grease Pump Unit (Auto-lubrication system)- Fill with Grease



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

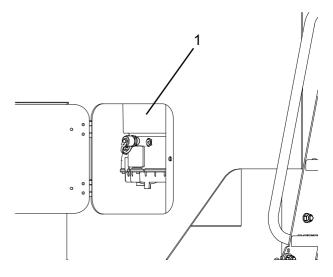


**RISK OF EQUIPMENT DAMAGE.** The greasing system MUST only be filled with the recommended grease listed within Oils and Fluids on page 170.

The greasing system automatically applies grease to the frame, jaw stock and frame bearings. The grease pump unit (1) that feeds the system is to be re-filled when required.

- 1. The grease pump warning light on the display panel will become lit when the unit is empty of grease. Refer to
- Follow the maintenance and filling instructions in the manufacturer's handbook. Refer to *Information and Data Sheets on* page 207.

Note! The Grease Pump Unit is factory preset and should not need adjustment. The recommended setting is 6 min./ hour.



### 6.10.14. Inspecting/ Adjusting Belt Sealing Rubbers

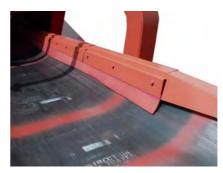


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

1. Sealing rubber in correct position & condition.

2. Adjust as required.

3. Refit clamp fixing screws.







# 6.10.15. Belt Scraper - Adjust



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

1. If necessary, adjust the head drum scraper by loosening bolts in the springs, adjusting scraper and re-tightening bolts.

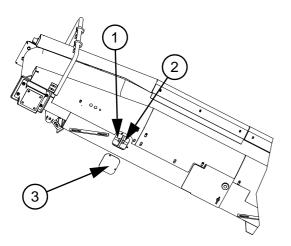


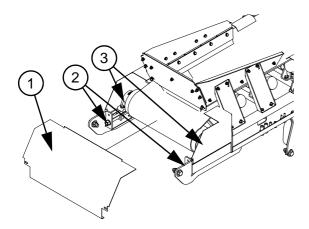
### 6.10.16. Conveyor Belts - Adjust



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

A belt will need adjustment when it has become slack and starts to slip on the rollers.





Main Conveyor:

Adjust the drive drum out as necessary:

- 1. Remove the cover plate (3).
- 2. Loosen the bolt (2) and tighten the bolt (1) as necessary.
- 3. Make sure that both sides are adjusted equally and the tail conveyor is aligned correctly.
- 4. Make sure that the conveyor belt is in the centre.
- 5. Tighten bolt (2) when the belt is tightened to the correct level.

### Side Conveyor:

Adjust the Tail drum out as necessary.

- 1. Remove the cover (1) and loosen the bearing bolts (3). Tighten the bolts (2) as necessary.
- 2. Make sure that both sides are adjusted equally and the tail drum is aligned correctly.
- 3. Make sure that the conveyor belt is in the central to the drum.
- 4. Install the cover (1) when the belt is tightened to the correct level.

# 6.10.17. Hydraulic Filters - Replace

IFigure 6-4: and Figure 6-5: indicate filter locations on the machine.



Make sure that filters are disposed of correctly in a way that meets the local and national environmental regulations.

Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



**CLEAN UP ANY OIL SPILLS AFTER PERFORMING THESE** OPERATIONS, WITH A SPILL KIT THAT MEETS YOUR LOCAL AND NATIONAL REGULATIONS.





Key to Figure 6-4:

- Series 45 (130cc) filter element Jaw circuit high pressure filter element Series 90 (130cc) filter element Air filter blockage reset switch 1 2 3
- 4

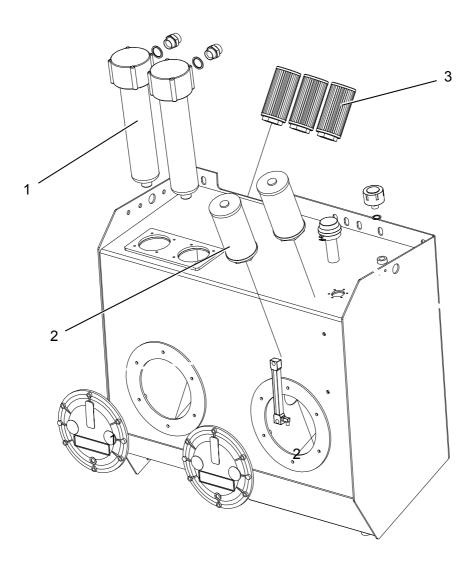


Figure 6-5: Hydraulic tank - filter element locations (for replacement)

Key to Figure 6-5:

- Return filter element (2 off) 2 1/2" Suction filters/strainers (90 micron) (3 off) Filter suction strainer
- 1 2 3

### 6.10.18. Track Gearbox Oil - Change

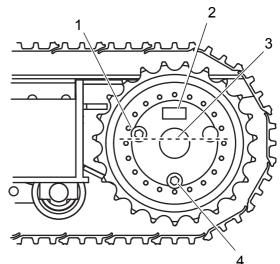


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



Make sure that oils and fluids are cleaned and disposed of correctly in a way that meets local and national environmental regulations.

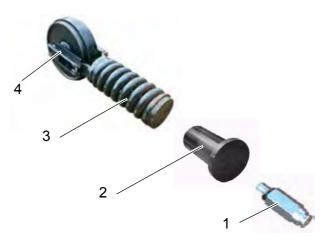
- Track the machine, refer to *Tracking Machine on page 62* until the gearbox (2) is in the upright position. The top up plug (1) should be positioned to the left. The drain plug (4) is to be positioned at the bottom of the gearbox.
- 2. Clean the area around the drain plug before removal to prevent contamination.
- Place a suitable container under the drain plug. Using an M10 socket wrench, remove the drain plug to drain the oil.
- 4. Clean the area around the drain plug and reinstall the drain plug.
- 5. Clean the area around the top up plug before removal to prevent contamination.
- 6. Using an M10 socket wrench, remove the top up plug.
- Fill the oil to the correct level (3), the oil level should be level with the bottom of the top up plug threaded hole. Refer to *Oils and Fluids on page 170* for recommended oil.
- 8. Allow any surplus oil to drain before installing top up plug.
- 9. Clean any residue from the gearbox.



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### 6.10.19. Track Tension

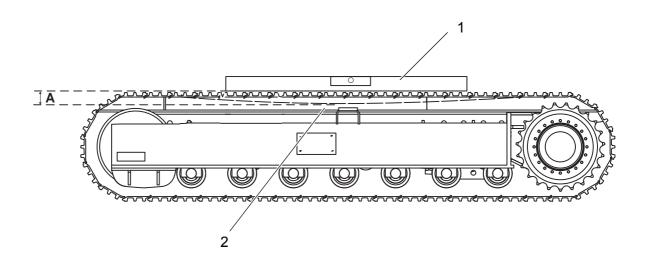
Note: Track adjustment operates through a tensioning system. When the tensioning cylinder (2) is filled with grease it pushes the spring tension unit (3) and the idler (4) forward. Grease is filled through the track adjuster grease valve (1).



# 6.10.20. Track Tension - Check



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



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#### Figure 6-6: Side view on track

- 1. Track the machine, refer to *Tracking Machine on page 62* a few metres forwards and backwards on level ground to allow the tracks to adopt their natural degree of tension. Do not slew the machine.
- 2. Stop the machine, refer to *Machine Shut Down on page 83*.
- 3. Using a straight edge (1) and a measuring tape, measure the droop of the track (2) the droop (dimension A) should not exceed 30 mm.

### 6.10.21. Track Tension - Increase

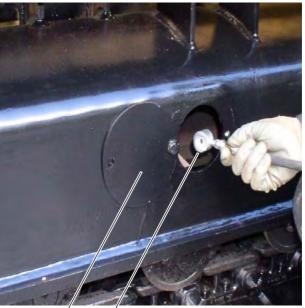


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.



RISK OF EQUIPMENT DAMAGE. Do not over-tension the track as this places excessive loads on the gearbox and idler bearings. This will lead to accelerated wear and premature failures.

- 1. Remove the inspection cover (1) on the side of track frame.
- 2. Make sure that the track adjuster grease valve is secure.
- 3. Attach a grease gun connector (2), to a grease gun and install on to the track adjuster grease valve.
- 4. Pump grease into the tensioning system through the grease nipple until track droop is correct.
- 5. Recheck the track tension, refer to *Track Tension Check on page 139*.
- 6. Add additional grease if required and repeat check.
- 7. Clean off any escaped grease and install the inspection cover.



/ 2

1

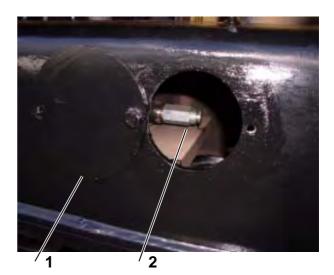
# 6.10.22. Track Tension - Reduce

	SKIN INJECTION HAZARD!	
	Fluid under high pressure could penetrate the skin causing serious injury or death.	
	Never loosen a grease nipple by more than $\frac{1}{2}$ turn when the track is under tension.	



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

- 1. Remove the inspection cover (1) on the side of the track frame.
- 2. Loosen the track adjuster grease valve (2), by turning it 1/2 turn anti-clockwise. As the grease escapes from the tensioning system the track will become slack.
- 3. Recheck the track tension, refer to *Track Tension Check on page 139*.
- 4. When correct tension has been achieved, tighten the track adjuster valve 1/2 turn clockwise.
- 5. Clean off any excess grease and install the inspection cover.



# 6.11. Jaw Plates - Turning and changing

When examining the jaw plates it is found that they are excessively worn they must be either turned or replaced. Jaw plates will wear more at the bottom of the crusher chamber, as this is where most of the crushing action takes place. The jaw plates can be turned around to maximise their useful life.



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

Do not start any jaw plate maintenance until you have read and fully understood the Safety Section on page 11.

•	FALLING OBJECT HAZARD!
<b>A</b>	Do not allow personnel to work on or walk under loads supported by a crane or hoist.
	Only use certified and approved lifting equipment. Make sure that the lifting equipment used meets the applicable regulations i.e. that lifting equipment is strong and stable enough for the intended use, is marked with a Safe Working Load (SWL), is suitably positioned and is operated in a planned manner by competent persons.
	Make sure that all the loads are attached with their related supports / lift equipment before the installation or the removal.
	RISK OF CRUSHING AND DEATH! Be Careful of the component weights. NEVER get into the jaw box's crushing chamber while the jaw plates or the jaw bolts are loose and/or the machine is NOT locked and tagged out. If you are not sure do NOT enter the crushing chamber.
6	Make sure that there are minimum of two persons to do the task.
	Make sure that the lockout procedure is completed before the start of the maintenance procedures. NEVER work on the machine while it is in operation.



Only use Sandvik approved lifting devices to secure the load to the crane. Refer to the following paragraphs for additional information.

- Inspect Sandvik supplied lifting equipment (as shown in image). Make sure that the lifting tools are undamaged.
- If any damage is found do not continue with the procedure and replace the damaged equipment immediately.





RISK OF EQUIPMENT DAMAGE. Do not allow the jaw plate to become excessively worn so that the seats for the crusher box jaw plate or jaw stock become worn.

This can result in the need for more extensive and costly repairs or even replacement.

6.11.1. Prepare to Remove the Jaw Plates



Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

To prepare the machine to change or turn jaw plates, proceed as follows:

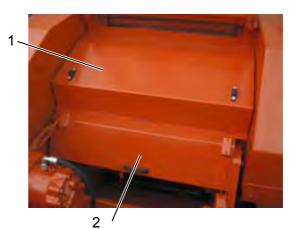
- 1. Open the jaw plates gap to the full position. Refer to setting material output size *Adjust the Jaw Closed Size Setting (CSS) on page 106*.
- 2. Shut down the machine. Refer to the Machine Shut Down on page 83.
- 3. Lock and tag-out the machine. Refer to the Lock and Tag-out Procedure on page 89.

### 6.11.2. Jaw Guards - Remove

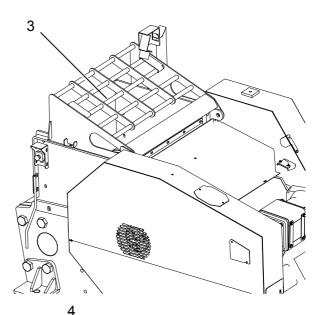


Maintenance - Safety Requirements on page 112 must be followed before this procedure is started.

 Remove the guard and toggle cover plate (1) and (2) above the jaw stock.



2. Remove the inlet chute cover (3).



 Make sure that the jaw plate and the wedges (4) are clean, include all lift holes and clearances between the plates and the wedges.



4. If necessary remove the dirt from the main conveyor as follows:



Make sure that personnel are clear of the hazard exclusion zone before the machine is started. Refer to *Hazard Zones on page 20*.

- 5. Make sure the all personnel are off and away from the machine.
- 6. Un-tag the machine. Refer to the Tag Removal Procedure on page 90.
- 7. Start the machine. Refer to *Engine Starting Procedure on page 61*.
- 8. Start the main conveyor to remove all dirt. Refer to *Operating The Machine (Crushing)* on page 108.
- 9. When the material is removed from the main conveyor, shut down the machine. Refer to *Machine Shut Down on page 83*.
- 10. Lock and tag-out the machine. Refer to the Lock and Tag-out Procedure on page 89.

#### 6.11.3. Swing Jaw Plate - Remove

	FALLING OBJECT HAZARD!		
	The jaw plate becomes loose when the nuts are removed, it could fall and cause serious injury or death.		
	Make sure that personnel are NEVER in the jaw box or between the jaw plates.		

### 



#### FALLING OBJECT HAZARD! The wedges will become loose when the nuts are removed, they

could fall and cause injury or damage the equipment. Make sure that the wedges are held in position and carefully removed from the back of the jaw plate.



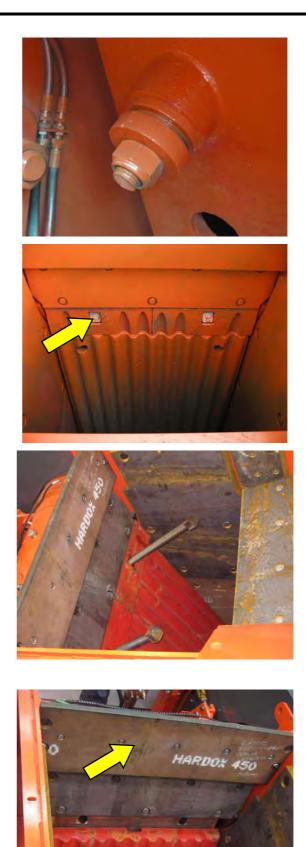
*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.

11. Loosen and remove the wedge nuts.

12. Remove the wedge bolts and the wedges from swing jaw stock only.

13. NOTE: Remove the wedge bolts as shown; pull out the wedge up the bolt. Remove the wedges and the bolt.

14. Attach a crane to the wear plate and support the weight with the chain/strap. Remove the nuts and the bolts. Remove the wear plate with a crane.



15. Attach the lifting hooks to a minimum of a 5 tonne (metric) or 6 ton (US) crane.

16. Put the lifting hooks in the correct position, in the lifting holes. Make sure they are central to the jaw plate and they are vertical to the point of lift. Make sure they are installed correctly into the lifting holes.





FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

17. Lift the jaw plate up and out with the crane.When the jaw plate is clear of the machine move it out and away from the machine.



18. When the jaw plate is away from the machine move it down.



#### 6.11.4. Fixed Jaw Plate - Remove



*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.

## A DANGER

FALLING OBJECT HAZARD!



The fixed jaw plate is loose when the nuts are not installed and tightened and the jaw plate could fall and cause serious injury, death or damage the equipment. Make sure it is held in position when the lifting tools are removed.

Make sure persons are NEVER in the jaw box or between the jaw plates.



RISK OF EQUIPMENT DAMAGE. Install and tighten the control valve lever into the position as shown below. Remove again after use. Improper use could result in damage to the jaw plates.

1. Loosen and remove locking nuts from the bolts.

2. Carefully remove the bolts. DO NOT enter the crusher box. NOTE: Push the bolt from back of the fixed jaw plate.



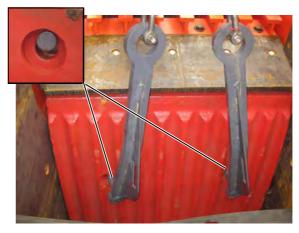


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3. Attach the lifting hooks to a minimum of a 5 tonne (Metric) or 6 ton (US) crane.



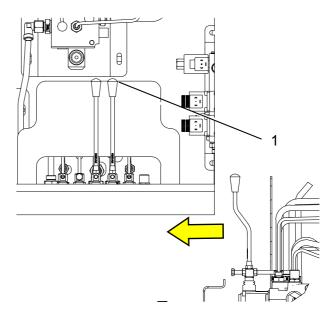
4. Install the Lifting hooks into the lifting eyes correctly. Tighten the chain/ropes with the crane.





Make sure that personnel are clear of the hazard exclusion zone before the machine is started. Refer to *Hazard Zones on page 20*.

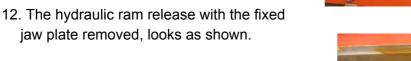
- 5. Make sure the all personnel are off and away from the machine.
- 6. Un-tag the machine. Refer to the *Tag Removal Procedure on page 90*.
- 7. Start the machine. Refer to *Engine Starting Procedure Safety on page 61*.
- 8. Pull back the jaw plate release lever (1). to bring the fixed jaw plate forward.
- 9. Refer to Machine Shut Down on page 83.
- 10. Refer to *Lock and Tag-out Procedure on page 89*.



#### MAINTENANCE

11. Use the crane and remove jaw plate, Remove the wedge.

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Make sure that personnel are clear of the hazard exclusion zone before the machine is started. Refer to Hazard Zones on page 20.

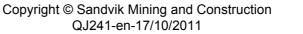
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- 13. Make sure the all personnel are off and away from the machine.
- 14. Un-tag the machine. Refer to the Tag Removal Procedure on page 90.
- 15. Start the machine. Refer to Engine -Starting Procedure on page 61.
- 16. Push forward the jaw plate release lever (1) to bring the fixed jaw plate forward.
- 17. Refer to Machine Shut Down on page 83.
- 18. Refer to Lock and Tag-out Procedure on page 89.







#### 6.11.5. Crusher Box Liner Plates - Replace



*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.



Do not attempt to remove liner plate by hand



FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

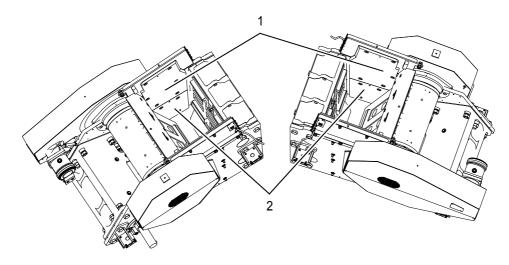


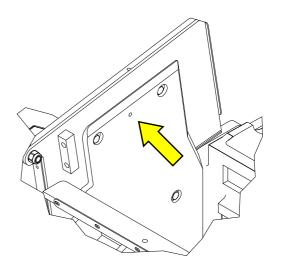
Figure 6-7: Location of crusher box liner plates

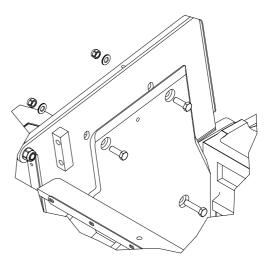
Note! The removal procedure for the all crusher box liner plates is identical. The top plates (1) are to be removed first followed by the bottom plates (2). To install the crusher box liner plates, the bottom plates are to be install first followed by the top plates.

- 1. Make sure that the swing jaw plate is removed. Refer to *Swing Jaw Plate Remove on page* **145**.
- 2. Make sure that the fixed jaw plate is removed. Refer to *Fixed Jaw Plate Remove on page 149*.

 install and tighten a lifting eye. Attach a minimum of a 2 tonne (Metric) 3 ton (US) crane with a chain to the lifting eye. Make sure the chain is tight to support the weight of the wear plate.

- Loosen and remove the bolts with the washers. Lift up the wear plate with the crane. To install lift the wear plate into position and hold it there with the crane. Install and tighten the bolts with the washers and nuts (TORQUE 711 Nm).
- 5. Remember the remove and install sequence given in step 1. And the remove and install procedure is the same for all the wear plates.





#### 6.11.6. Fixed Jaw Plate - Install



*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.



FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

1. Place the lifting tools in the jaw plate. Before lifting the plate make sure the back face and pockets are clean of debris.



 Make sure the lifting tool is installed correctly in the hole. Lift the fixed jaw plate with a minimum of a 5 tonne (Metric) or 6 ton (US) crane.



3. Make sure the back of the plate is clean and smooth. Clean out any build up dirt or dust in the holes.

4. Install wedge in position as shown. The wedge should not rest on the lifting tool. See photos for approximate position. NOTE: Use grease to hold the wedge into position.





FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

5. Make sure the ram pin is in the full back position. Clean mounting plate.



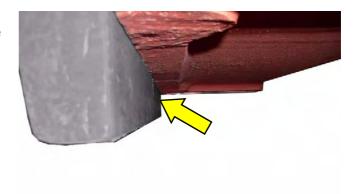
 Use the crane and lower the plate into position, SLOWLY into the crusher box. Make sure the a clearance of 10mm to 15mm is between both sides.

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	FALLING OBJECT HAZARD!		
<b>A</b>	The fixed jaw plate is loose when the nuts are not installed and tightened and the jaw plate could fall and cause serious injury, death or damage the equipment. Make sure it is held in position when the lifting tools are removed.		
	Make sure persons are NEVER in the jaw box or between the jaw plates.		

7. Make sure the fixed jaw plate is installed correctly and that there is no clearance between the bottom of the jaw box and the fixed jaw plate.



 Carefully remove the lifting tools, and hold the plate into position, DO NOT ENTER THE JAW BOX.

9. Install the bolts and push them all the way through the hole.

10. Install the nuts and lock nuts, but do not tighten.









11. Adjust the fixed jaw plate as necessary and make sure it is centred.



12. Tighten the nut (1) and lock nut (2).



1

2

#### 6.11.7. Swing Jaw Plate - Install

	PERSONNEL HAZARD! Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death. Stop machine, isolate, remove ignition key and tag-out, before carrying out these maintenance instructions.		

- 1. Make sure that the lock and tag-out procedure has been carried out on the machine.
- Make sure the plate is free of dirt and dust.
   Use a minimum of a 5 ton (Metric) or 6 ton (US) crane and lift the swing jaw plate.

3. Make sure the lifting tools are in the correct position.





FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

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 Lift the swing jaw plate slowly into position. Slowly lower jaw plate into position. DO NOT ENTER THE JAW BOX

5. The jaw plate recesses will audibly drop onto the location point.





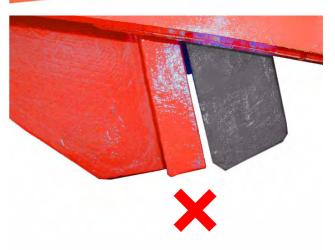


6. Make sure a even clearance is on both sides. The swing jaw plate must have no clearance with the jaw face.

7. This is WRONG. The swing jaw must have no clearance with the jaw face. Adjust the swing jaw plate with the crane.

8. This is correct. The swing jaw plate has no clearance with the jaw face.



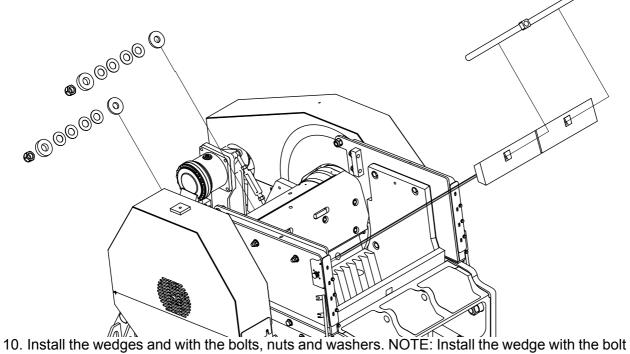




9. Remove the lifting tools and from the swing jaw plate



	FALLING OBJECT HAZARD!		
	The swing jaw plate is loose when the nuts are not installed and tightened and the jaw plate could fall and cause serious injury, death or damage the equipment. Make sure it is held in position when the lifting tools are removed.		
	Make sure persons are NEVER in the jaw box or between the jaw plates.		



10. Install the wedges and with the bolts, nuts and washers. NOTE: Install the wedge with the bolt at the same time, position the bolt into the hole and install the wedge into position, use a hammer to make sure it is installed correctly. DO NOT ENTER THE JAW BOX.

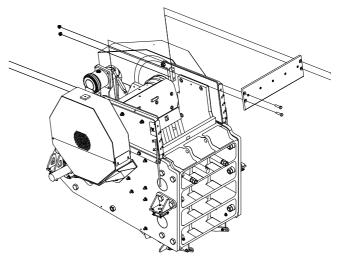


FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.

11. Make sure that the nuts are tightened correctly (TORQUE 5375Nm)



 Use a crane with a strap/chain (lifting eye) to lift and hold the wear plate into position. Install and tighten the bolts with the nuts and washers.



#### 6.11.8. Jaw Guards - Install

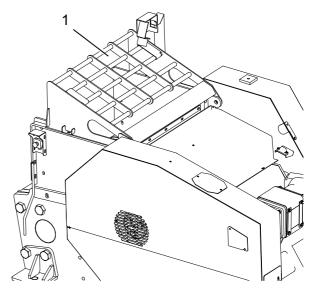


*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.

1. Install the toggle cover plate and the guard with the nuts and bolts



2. Install the inlet chute cover (1).



#### 6.11.9. Toggle Plate - Remove/ Replace

To protect the crusher from the excessive loads generated by un-crushable objects, the jaw stock is fitted with an overload protection device - "Toggle Plate". When the permissible loads are exceeded, the Toggle Plate will collapse from elastic buckling. The crusher will then automatically shut down, providing a degree of protection to valuable machine components. When this happens, clear any blockages from the machine and fit the replacement toggle in the following way.

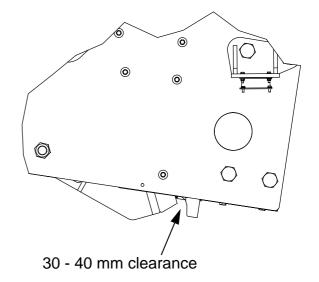
Make sure the jaw guards are removed refer to Jaw Guards - Remove on page 144.



*Maintenance - Safety Requirements on page 112* must be followed before this procedure is started.

- Reduce the Closed Size Setting (CSS) to 30

   40 mm.
- 2. Stop the machine, refer to *Machine Shut Down on page 83*.





FALLING OBJECT HAZARD. Do not allow personnel to work or stand below a suspended load. If necessary put safety barriers in position.



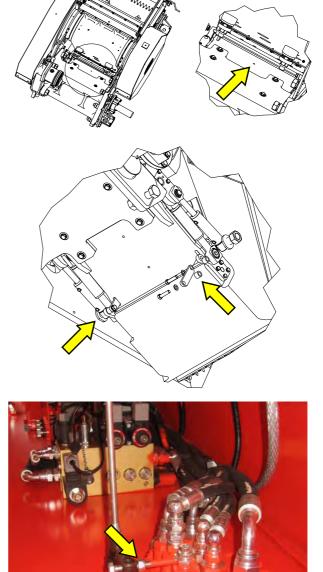
Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.

Do not stand on the machine whilst it is operation.

Stop the machine, isolate, remove ignition key and tag-out before carrying out any maintenance procedures. Refer to *Lock and Tag-out Procedure on page 89*.

- 3. Make sure that the machine is locked and tagged-out.
- 4. Install and tighten a lifting eye. Attach a minimum of a 2 tonne crane with a chain to the lifting. Lift the crane to tighten the chain and support the weight of the Toggle plate.
- Loosen and remove the bolts with the washers and bushes. Remove the tie bar. Do both tie bars.

- 6. Loosen and remove the nut with the bolt. and install and tighten the spare lever.
- 7. Start the machine. Make sure the Engine speed is set to position 1. DO NOT press clamp ON.





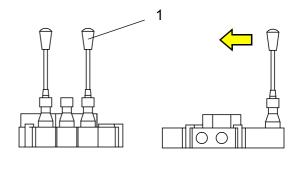
Make sure that all personnel are clear of the machine before the jaw stock is released.



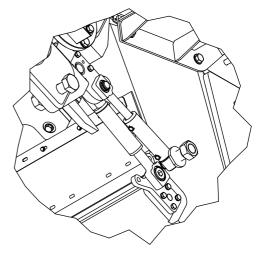
#### MAINTENANCE

- 8. Push the toggle valve (1) to release the toggle plate.
- 9. Stop the machine refer to *Machine Shut Down on page 83*.
- 10. Lower the Toggle plate with the crane and remove through the clearance above the main conveyor.

11. Check and Inspect the Toggle clamp and toggle ram bearings for cracks. Replace if necessary.



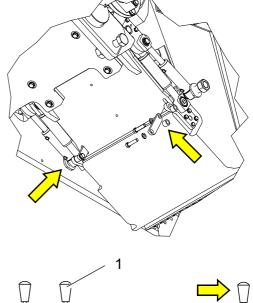




12. Use a minimum of a 2 tonne crane to lift and hold the Toggle plate into the correct position.

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- 13. Install the tie bar. Install and tighten the bolts with the washers and bushes. Do both tie bars.
- 14. Start the machine refer to "4.3 Starting Procedure" on page 52. Make sure the Engine speed is set to position 1. DO NOT press clamp ON.
- 15. Pull the Toggle valve (1) to engage the Toggle plate.
- 16. Turn OFF the machine refer to "4.8 Shut Down the Machine" on page 68





#### MAINTENANCE

17. Loosen and remove the spare lever. Install and tighten the bolt with the nut.

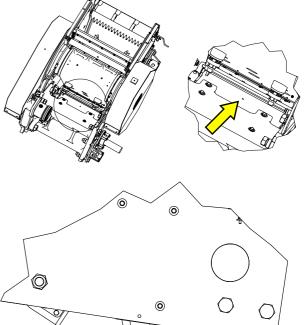
18. Remove the chain and loosen and remove the lifting eye.

- 19. Install the jaw guards refer to Jaw Guards -Install on page 114.
- 20. Adjust the closed size setting (CSS) as necessary. Refer to Adjust the Jaw Closed Size Setting (CSS) on page 106.

Make sure that all guards are fitted and that the feeder, crusher and conveyor belts are empty before the machine is started.

21. Make sure the machine is un-tagged refer to Tag Removal Procedure on page 90.







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#### 6.12. Oils and Fluids

NOTICE

RISK OF EQUIPMENT DAMAGE. Only use lubricants, fluids, filters and parts recommended by the Original Equipment Manufacturer (OEM) or accelerated wear or damage could result.

Never use grease containing Molybdenum. This may cause damage to the machine components and will invalidate the warranty.



Make sure that oils and fluids are cleaned and disposed of correctly in a way that meets the local and national environmental regulations.

Oils and fluids related to servicing:

Lub/ Oil and Points	Max. Vol.	Temperature	Viscosity	Manufacturers Equivalent Specifications	Sandvik Part Number
Anti-freeze				Shell Safe Anti Freeze Concentrate	CN6071
Diesel	420 Lt			Shell Agricultural Gas Oil	CN6004
Engine oil	30 Lt			Shell Rimula Signia 10W-40	CN6125
	30 Lt	Cold Weather		Shell Diesel Engine Oil Rimula 5W-30	CN5704
Engine oil - alternative	30 Lt			See Manufacturer's Handbook	
Feeder gearbox	6 Lt			Shell Omala 220 Gear Oil	CN6055
pump unit (Auto- lubrication	?Lt	-20°C to +150°C		SKF LGHB 2 (NLGI Grade 2)	CN6110 (400g tube)
system)					CN6109
pump unit (Auto- lubrication system)		Arctic		Shell Aeroshell 33	CN5702
Torque arm bearings	1 Lt	-20°C to +150°C		SKF LGHB 2 (NLGI Grade 2)	CN6110 (400g tube)
					CN6109
Hydraulic system	1400 Lt		ISO VG 32	Shell Tellus Arctic 32 (<0 <sup>3</sup> C)	CN5700

Lub/ Oil and Points	Max. Vol.	Temperature	Viscosity	Manufacturers Equivalent Specifications	Sandvik Part Number
	1400 Lt		ISO VG 46	Shell Tellus 46 (5 <sup>3</sup> C - 35 <sup>3</sup> C)	CN6070
	1400 Lt		ISO VG 68	Shell Tellus Oil 68 (>35 <sup>3</sup> C)	CN7739
	1400 Lt	Environmentally friendly		Shell Naturelle HF-E 46 (5 <sup>3</sup> C - 35 <sup>3</sup> C)	CN6106
Manual lubrication points and track tension	As req.			Shell Albida EP2	CN6073
Track gearbox	5Lt			Exol Ethena EP90 Gear Oil	
Tracks - alternative	5Lt			Shell SPIRAX GSX75W-80	CN6100

A full list of Substances Hazardous to Health associated with this equipment can be found in the appendix of this document.

#### 6.13. Machine Fault Codes and Maintenance Screens

#### 6.13.1. Maintenance screens

Maintenance screens are accessed by pressing Button-6 in the main menu screen and from the Services Menu page in Manual Operating Mode.

When in the maintenance mode the user can operate each function independent of other functions.

Upon entering the Parameter adjust pages for both Sandvik and Customer access; a security page will appear.

To gain access to the maintenance mode the operator must contact Sandvik and quote the reference code (1) displayed on the screen. The operator will be given a 4 digit number which should be entered using the screen Buttons 1-8.

Once entered press the OK-button to accept the code - if the correct code is entered then access will be granted. However if the incorrect code is entered the operator will have to wait sixty seconds before attempting to enter a new pin code.

#### 6.13.2. Machine Fault Codes

All faults are reported on the display screen. Each fault is identified by a fault number (1) and a fault description (2).

There are three categories of faults:

- · Red faults
- Blue faults
- · Engine faults.



The tables that follow describe the faults in each category:

#### 6.13.3. Red Faults

Fault Number	Red Faults Description
1	Machine Stops





Fault Number	Red Faults Description
2	Radio Stop Pressed
3	Low Hydraulic Oil Level
4	High Hydraulic Oil Temperature
9	Engine Speed Low Feeder Unavailable
11	Fuel Low Level Warning
13	Main Conveyor Speed Critical
19	Controller Unit2 Unavailable
26	Hydraulic Oil Temperature Sensor Unavailable
32	Manual Handset Stop Pressed

#### 6.13.4. Blue Faults

Fault Number	Blue Faults Description
	Radio Track Joy stick Fault
	Radio Unavailable
	Hydraulic Oil Temperature Warning
	Manual Track Handset Fault
	Main Conveyor Pull Stop
	Left Track Valve Fault
	Right Track Valve Fault
	Feed Conveyor Valve Fault
	Hydraulic Temperature sensor Unviable
	Hydraulic Oil Cooler Output Unavailable
	Main Conveyor Output Unavailable
	Hydraulic Oil Temperature sensor Unavailable
	High Engine Load

#### 6.13.5. Engine Faults

Fault Number	Engine Faults
	Fuel Temperature
	Fuel Rate
	Retarder Solenoid current

Fault Number	Engine Faults
	Ether Injection Control Solenoid
	8 Volt DC Supply
	5 Volt Sensor DC Power Supply
	Engine Oil Pressure
	Boost Pressure Sensor
	Atmospheric Pressure
	Engine Coolant Temperature
	Throttle Position
	Engine Speed
	Secondary Engine Speed
	Fuel Pressure
	Intake Manifold Air Temp
	Injector Actuation Pressure
	Engine Timing
	Air Inlet Heater Relay
	System Voltage
	Check Programmable Parameters
	J1939 Data Link communications
	Engine Coolant Level
	Inlet Air Temperature
	Fuel Temperature
	Auxiliary Temperature
	Auxiliary Temperature Sensor
	High Auxiliary Pressure
	Auxiliary Pressure Sensor
	Cylinder #1 Injector
	Cylinder #2 Injector
	Cylinder #3 Injector
	Cylinder #4 Injector
	Cylinder #5 Injector
	Cylinder #6 Injector

# 7. Trouble Shooting

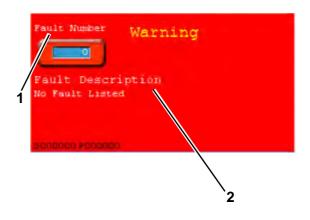
#### 7.1. Trouble Shooting

The section that follows lists some of the common problems that can occur with the machine. If any of these occur, carry out the checks listed:

#### 7.1.1. Machine faults displayed on screen

All faults are reported on the display screen. Each fault is identified by a fault number (1) and a fault description (2).

For a list of the faults refer to *Machine Fault Codes and Maintenance Screens on page* 172.



Fault	Cause	Actions	State Sequence
Main conveyor speed wheel. Critical conveyor speed fault.	If the speed wheel on the main conveyor speed drops below 10 M/M default setting for a 2 seconds period.	Stop the feed conveyor and Main conveyor immediately. Intermittent bleeper will sound. Display Main conveyor low speed and fault Numberlog fault.	Shutting down go to state 501. Set desired shut down time intervals.
Main Hydraulic Failure	If the Hydraulic temperature sensor becomes unavailable when in plant run mode, hydraulic oil coolers will run continuous.	Stop the feeder immediately. Intermittent siren will sound. Display temperature sensor fault Number Log fault.	Shutting down go to state 501. Set desired shut down time intervals. Delay 5sec - stop re circulating / transfer conveyors Delay 15sec: State return to 200
			Engine stop.

Fault	Cause	Actions	State Sequence
Main Hydraulic Failure	If the Hydraulic temperature sensor fails the hydraulic oil coolers will run continually for tracking mode this is only permitted for?	Display temperature sensor fault Number 0log fault.	State return to 200 Engine stop.
Main hydraulic oil level low	seconds. A fault indicated by the main hydraulic oil level sensor. Signal goes low on fault. C1p14	Stop the feeder conveyor immediately. Intermittent bleeper will sound	Go to state 500. Set desired time periods for sequence shut down. State return to 200
		Display warning (Red screen Fault) Main hydraulic oil level low, fault Numberlog fault.	Engine shut down
Hydraulic Oil Temperature warning	If the oil temperature reaches hydraulic oil temperature warning setpoint? degrees C.	Stop the feeder conveyor immediately. Intermittent bleeper will sound	Restart If the temperature drops below its set warning value, reset by pressing the Ok button, and continue with the start sequence.
		Display warning (Blue screen Fault) Main hydraulic oil temperature warning, fault Number 010log fault.	Manually start the feeder from the screen (Auto page number 4001 Manual Page number 9001), press button - audible warning for 10secs.
			Option to shut down plant.

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Fault	Cause	Actions	State Sequence
Hydraulic Oil	If the oil temperature	Stop the feeder	Shutting down, go to
Temperature High	reaches hydraulic oil	conveyor	state 501. Set desired
i emperatare i ngri	temperature High set	immediately.	shut down time
	point? degrees C	, , , , , , , , , , , , , , , , , , , ,	intervals?
		Intermittent bleeper	
		will sound	State return to 200
			Wait for next choice.
			Wait for field choice.
		Display warning (Red	
		screen Fault)	
		Main hydraulia ail	
		Main hydraulic oil temperature warning,	
		fault Numberlog	
		fault.	
Engine speed	If engine speed drops	Stop the feeder	If speed recovers
Engine speed	below a Setpoint for a	conveyor	manually start the
	time period.	immediately.	feeder from the
			screen (Auto page
			number Manual Page
		Display alarm for	number.
		shutting down feeder.	
			Press button audible
			warning for 10
			second.
			1 second pause feed
			conveyor re-starts.

#### 7.1.2. Original Equipment Manufacturer (OEM) Trouble shooting

For information regarding OEM trouble shooting, refer to the relevant documentation listed in *Information and Data Sheets on page 207*.

**Original Instructions** 

## **Parts Manual**

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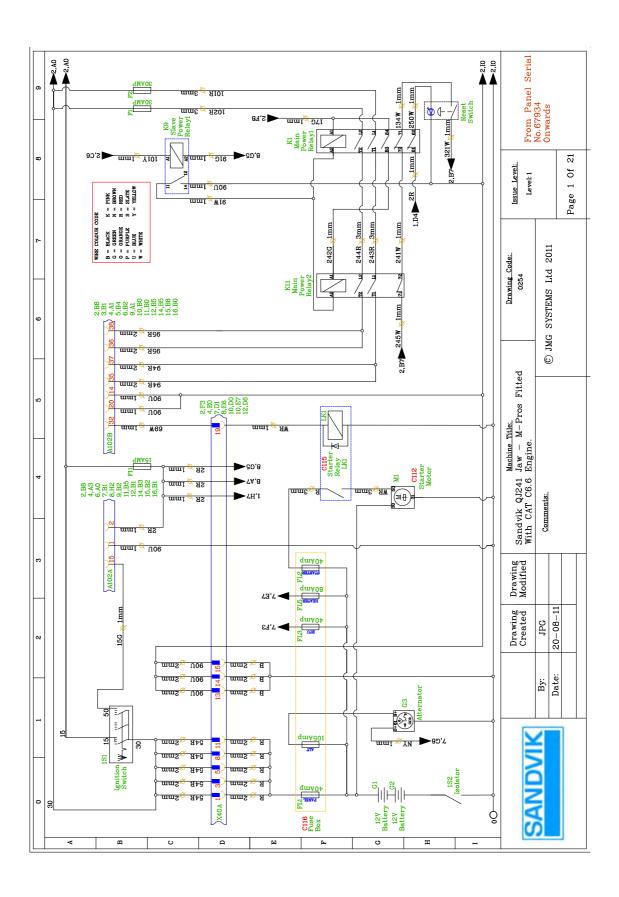
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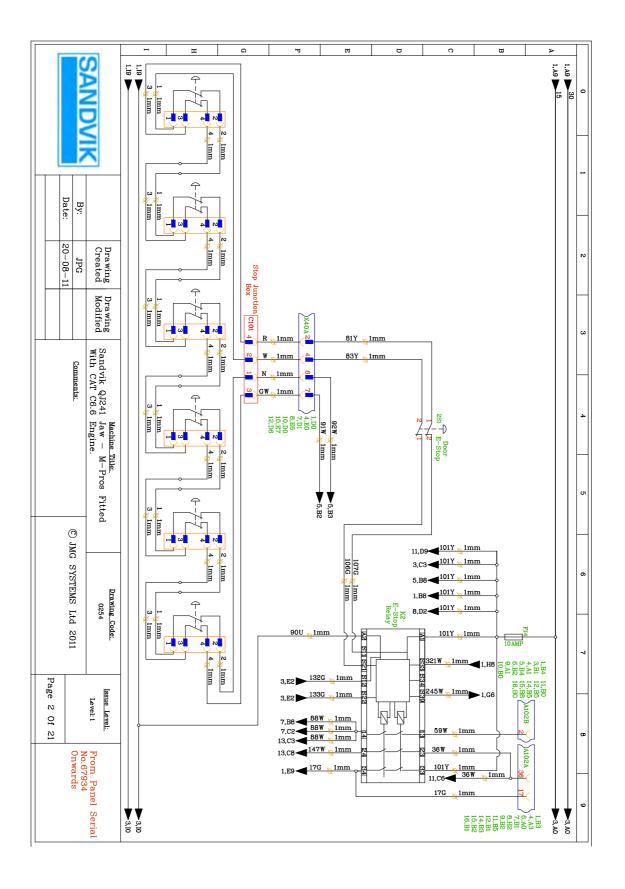
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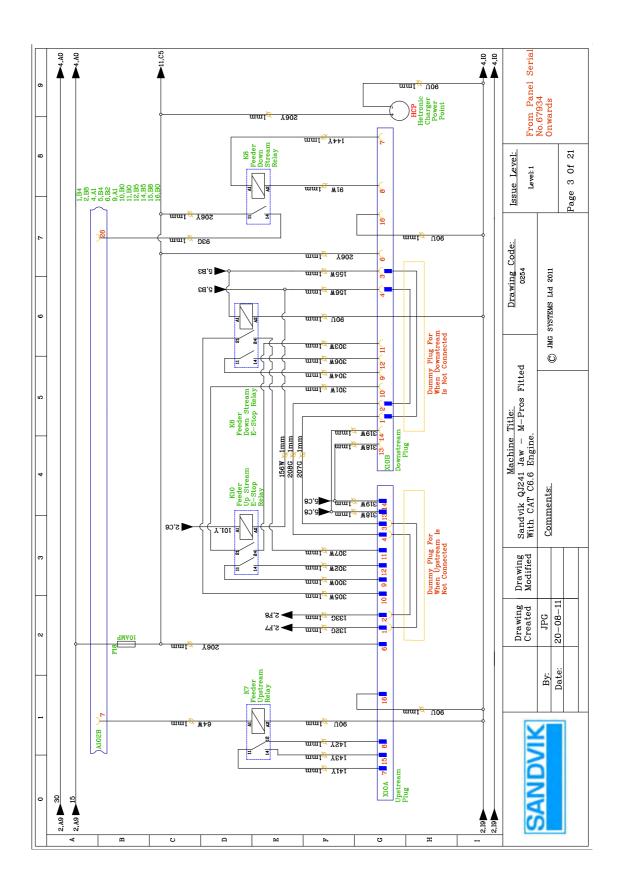
# 9. Electrical and Hydraulics

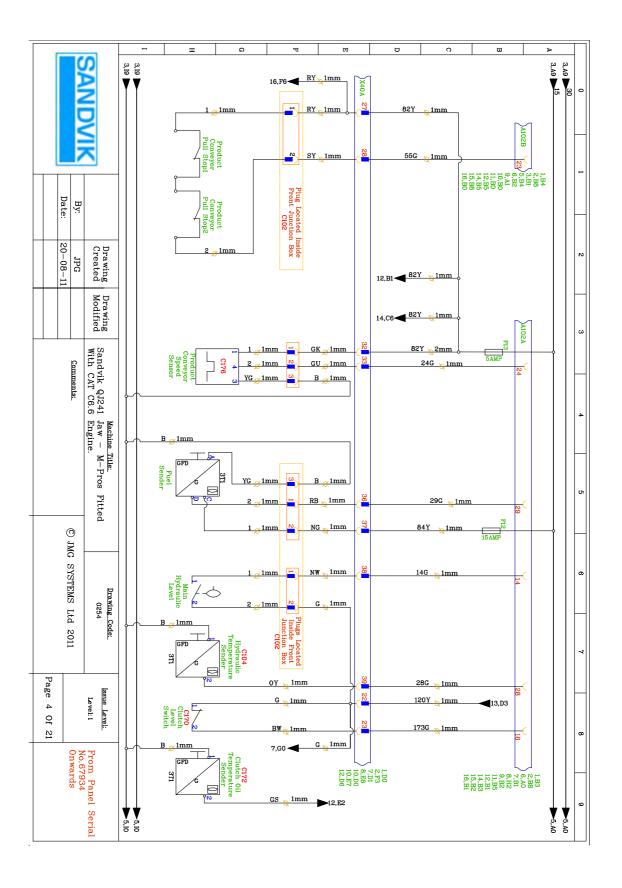
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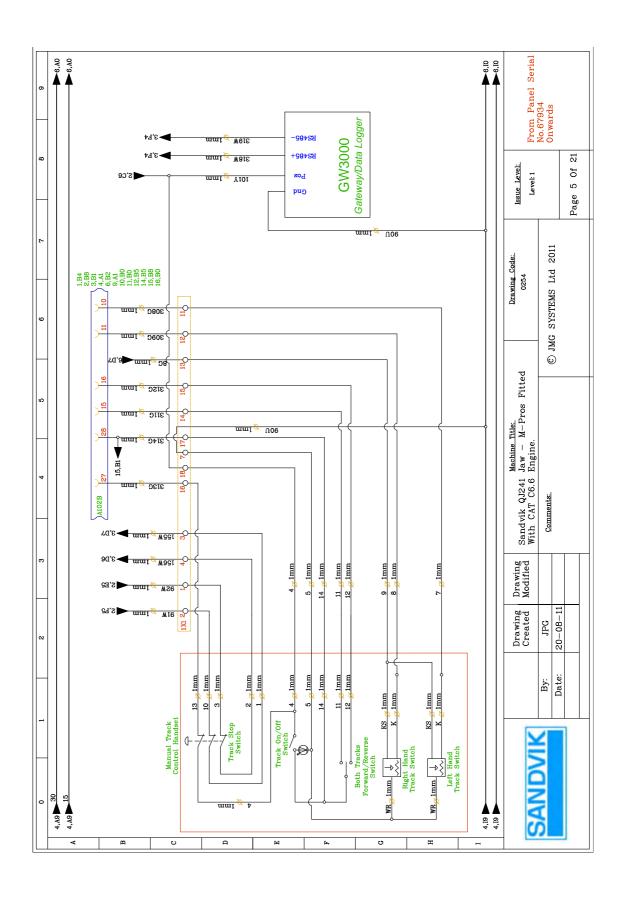
# 9.1. Electrical Schematics

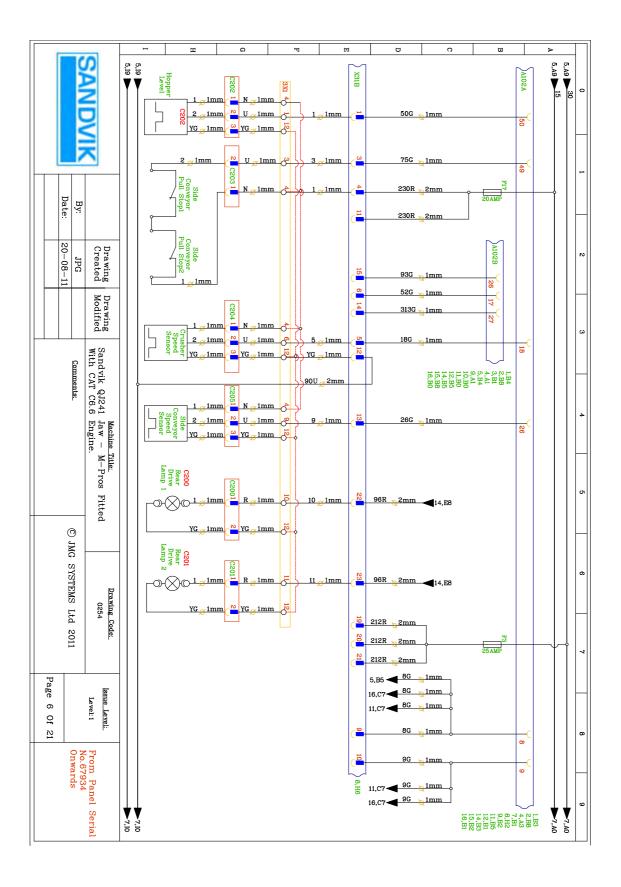


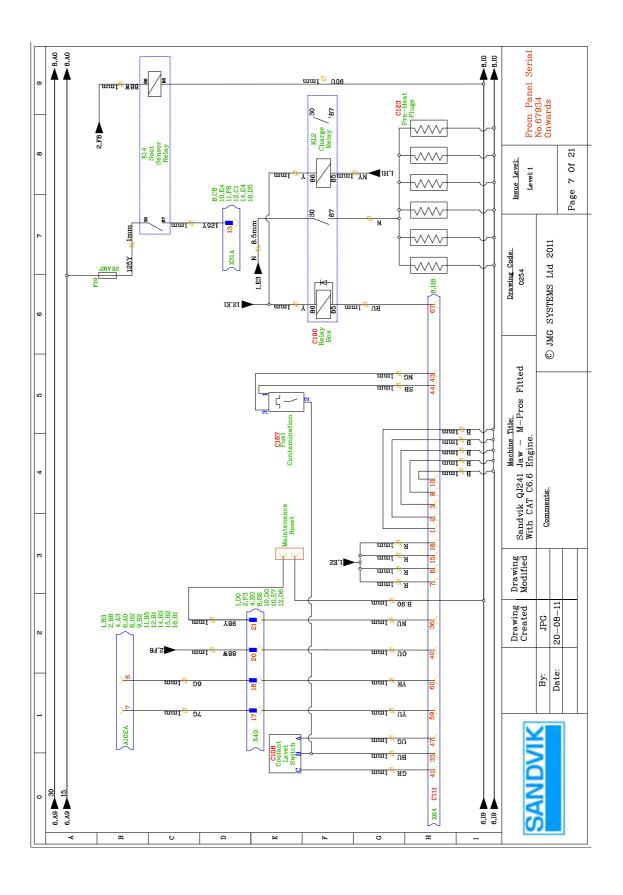


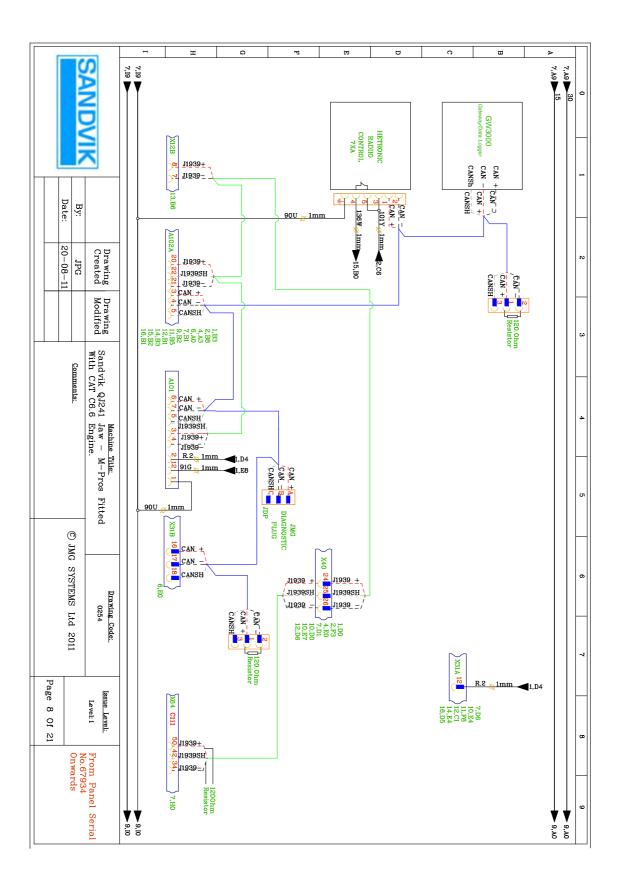


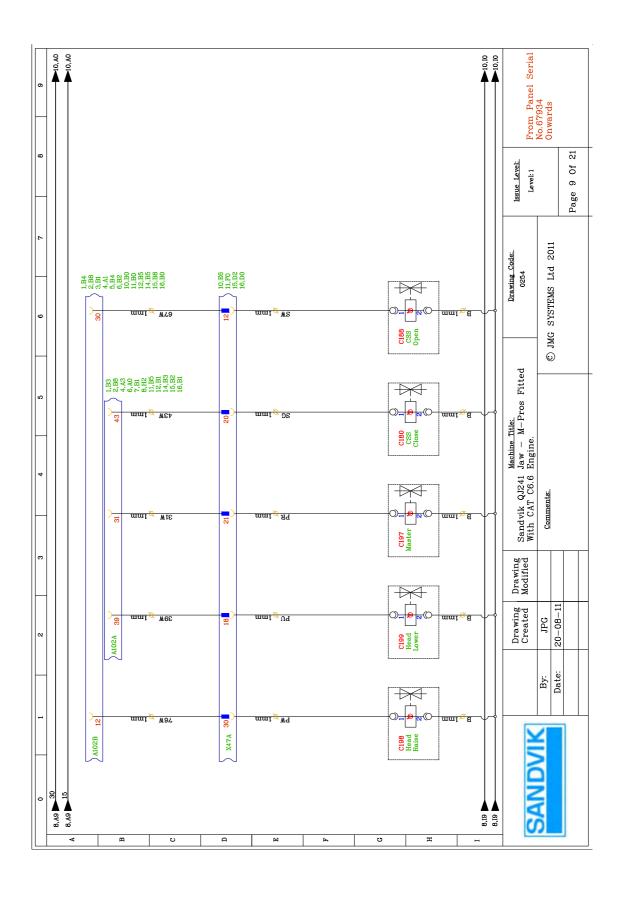


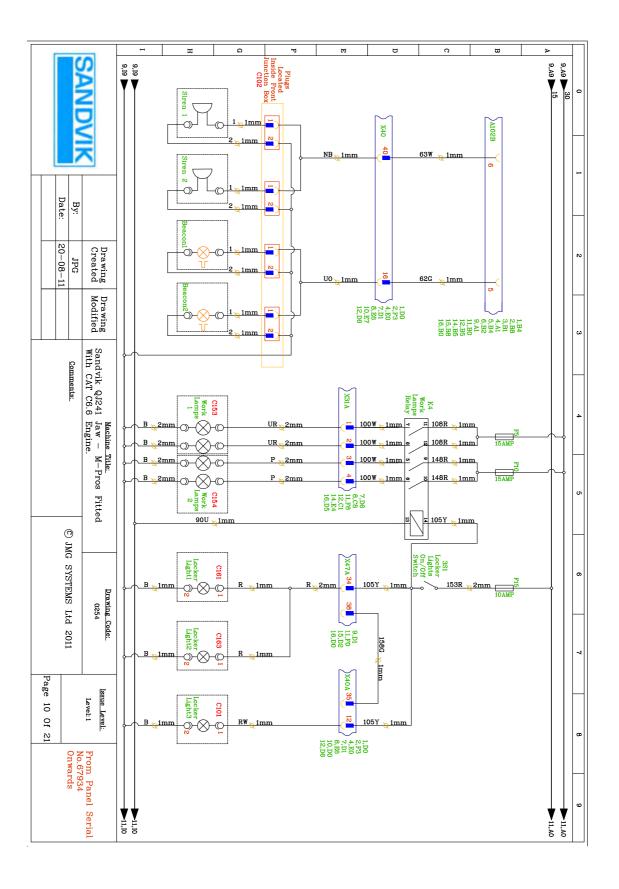


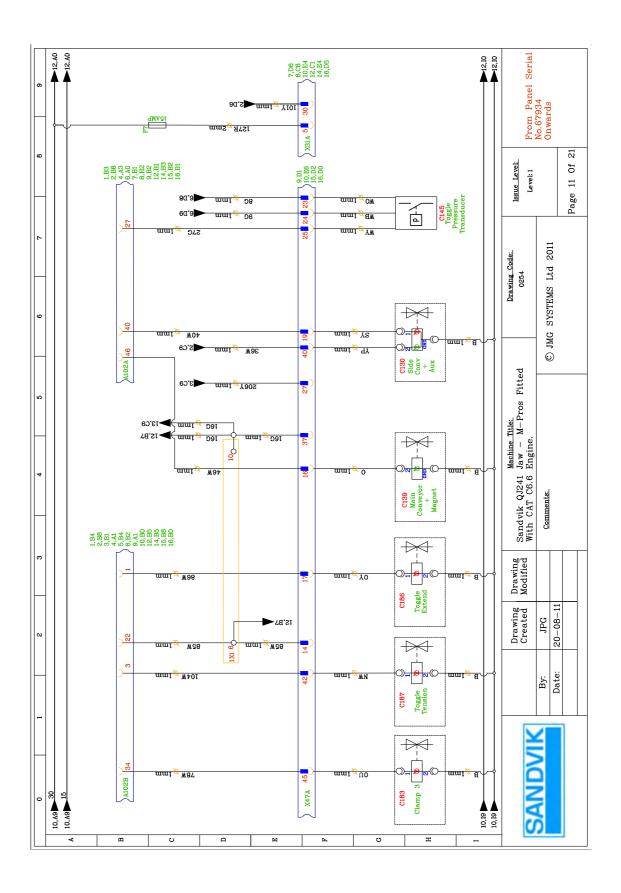


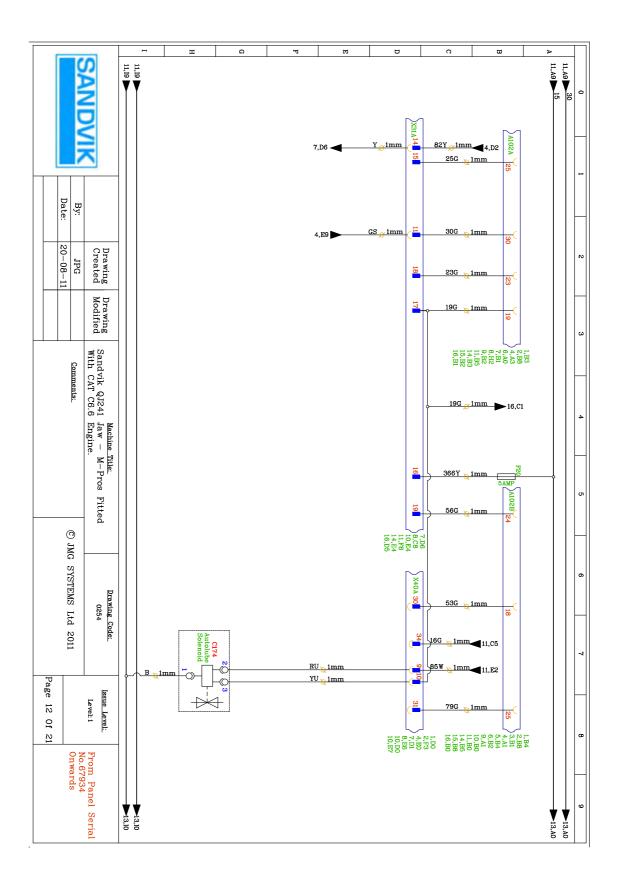


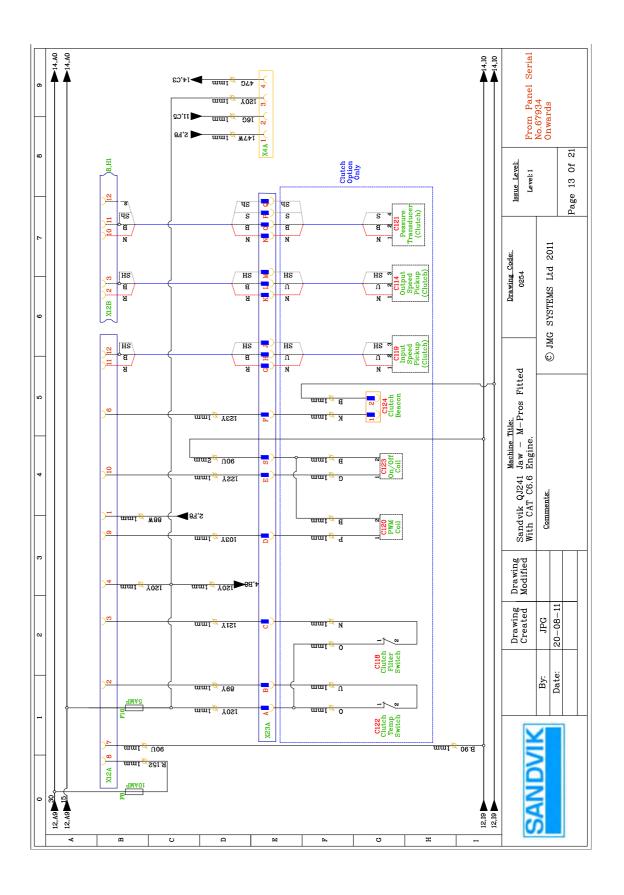


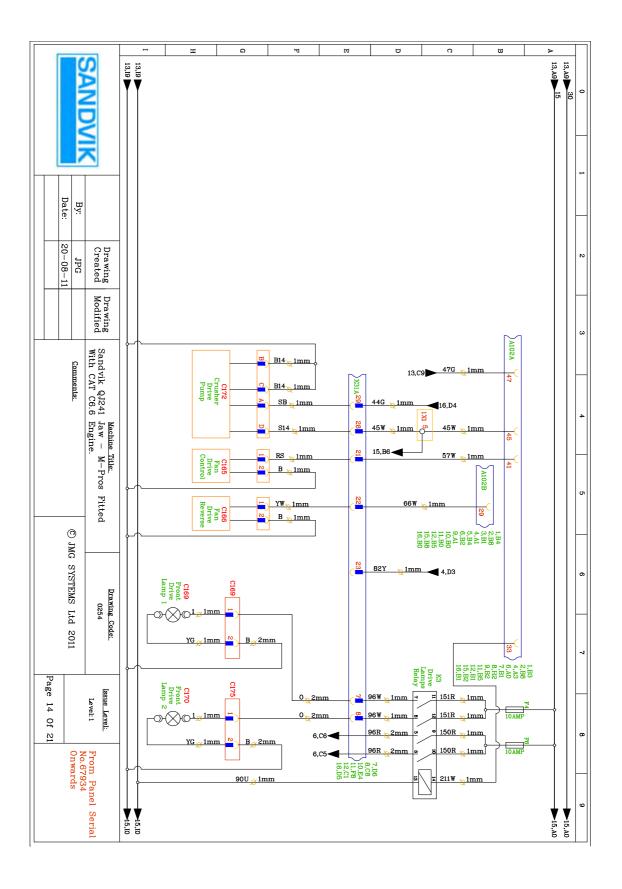


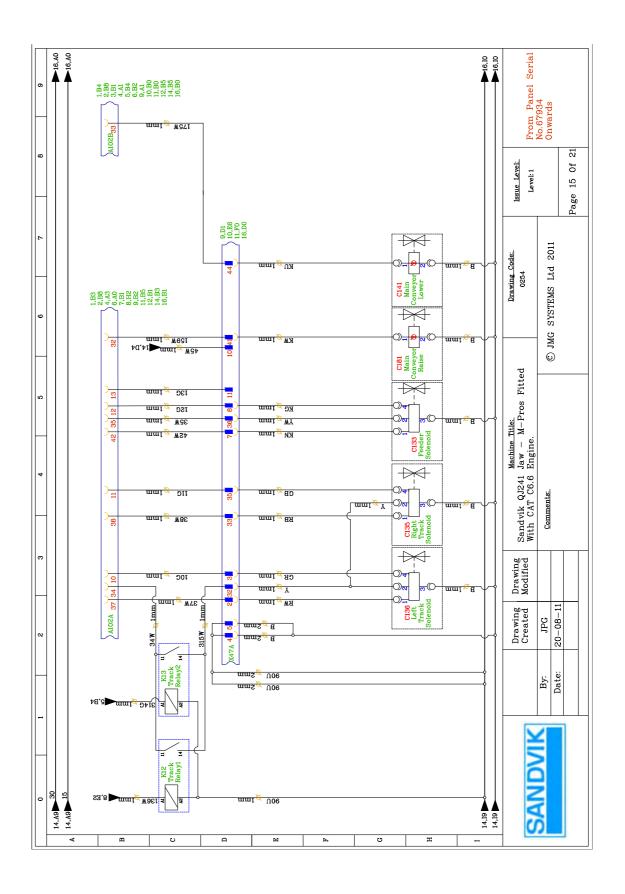


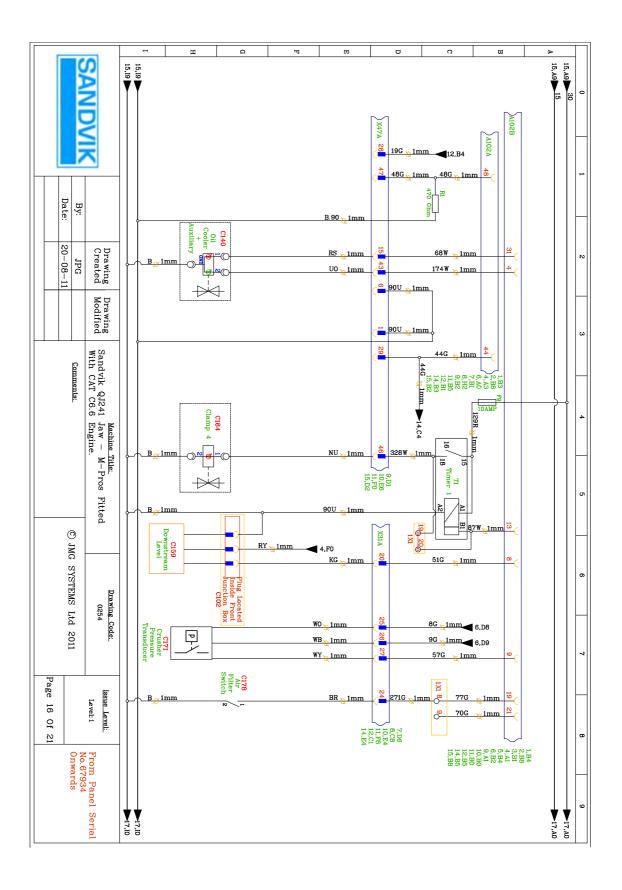




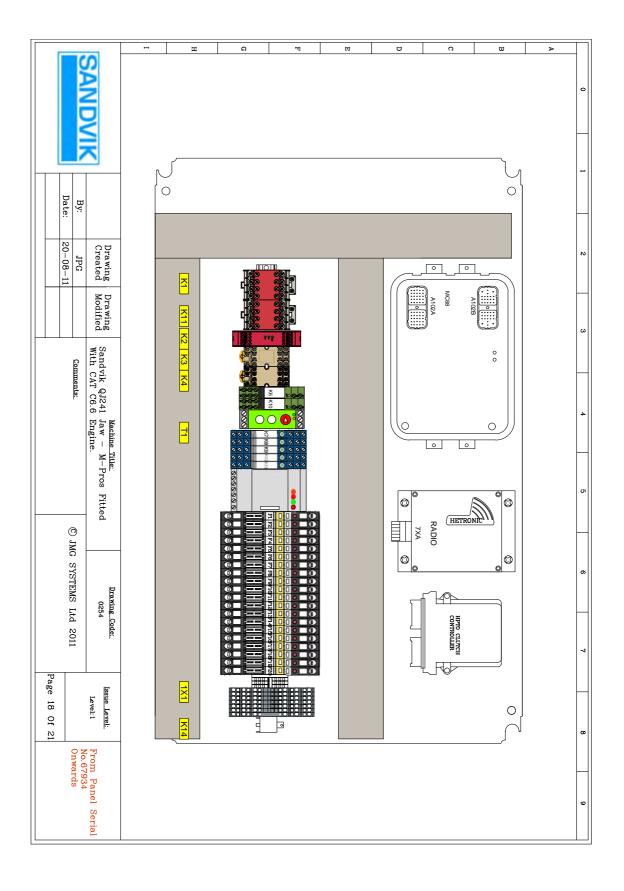


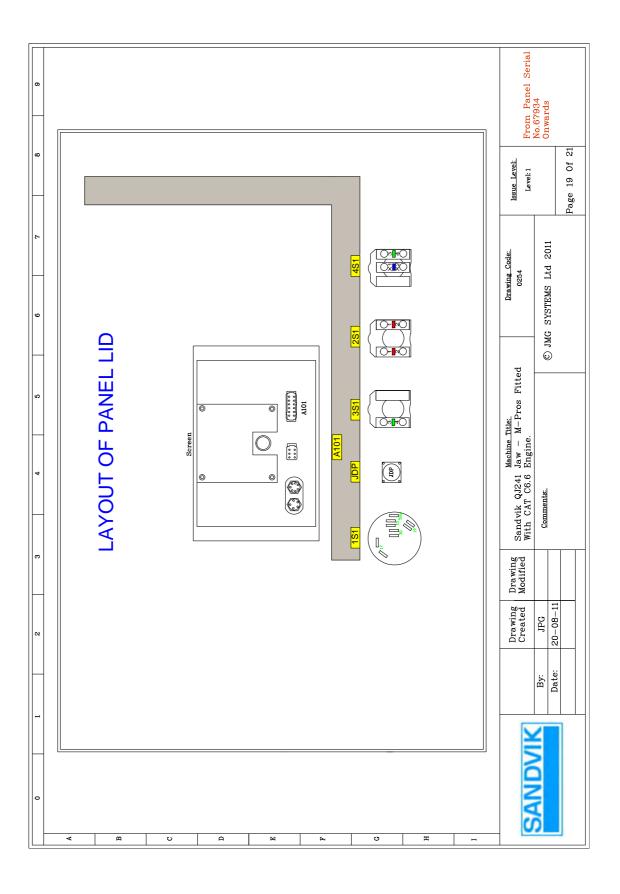


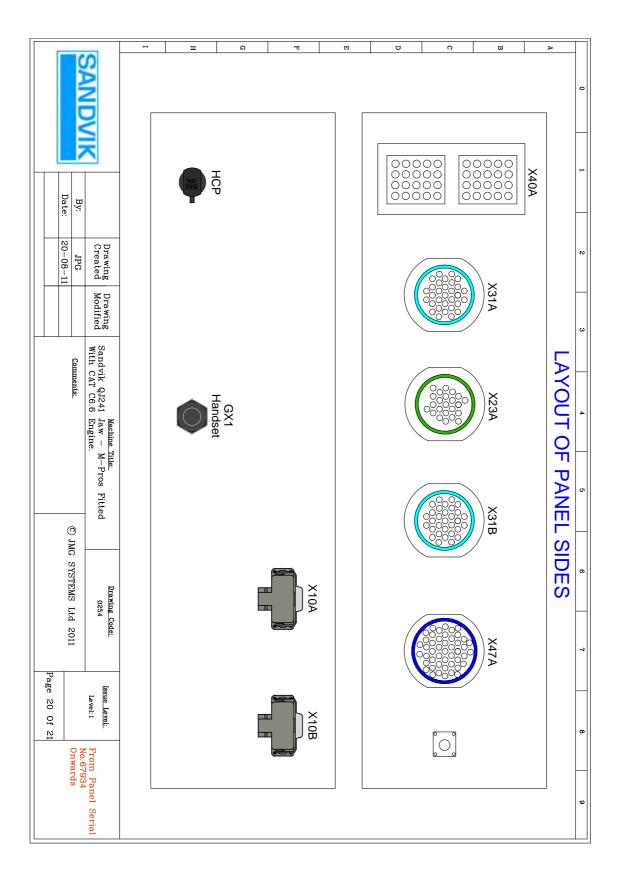


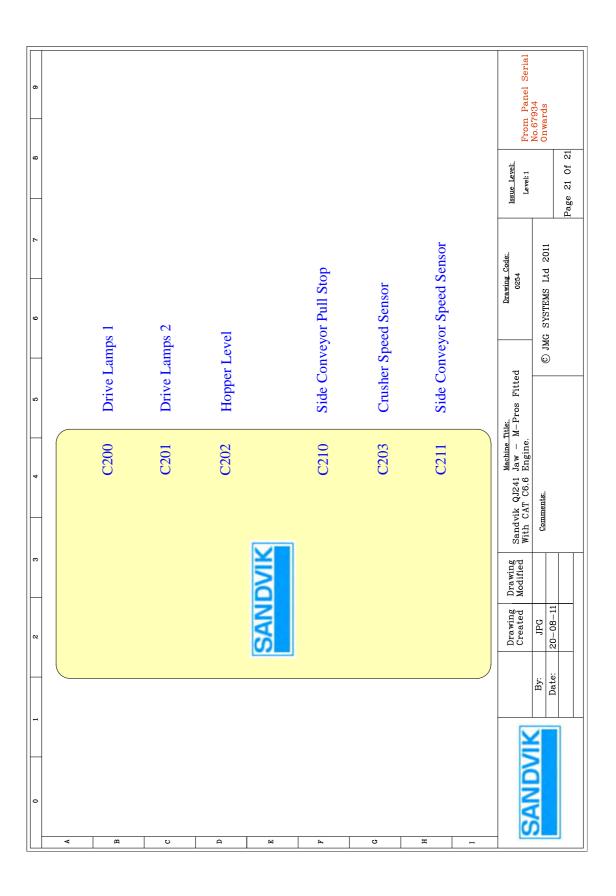


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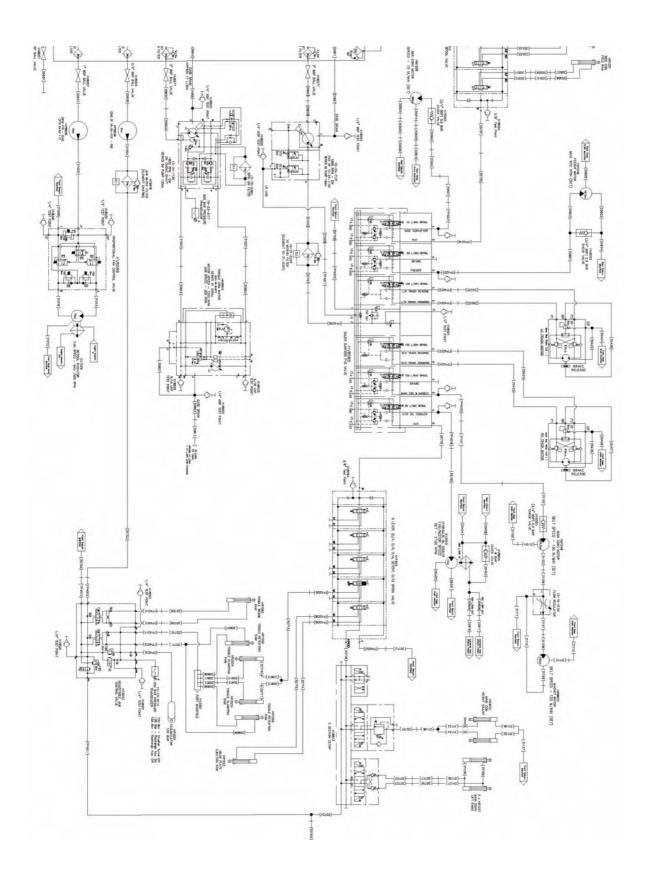




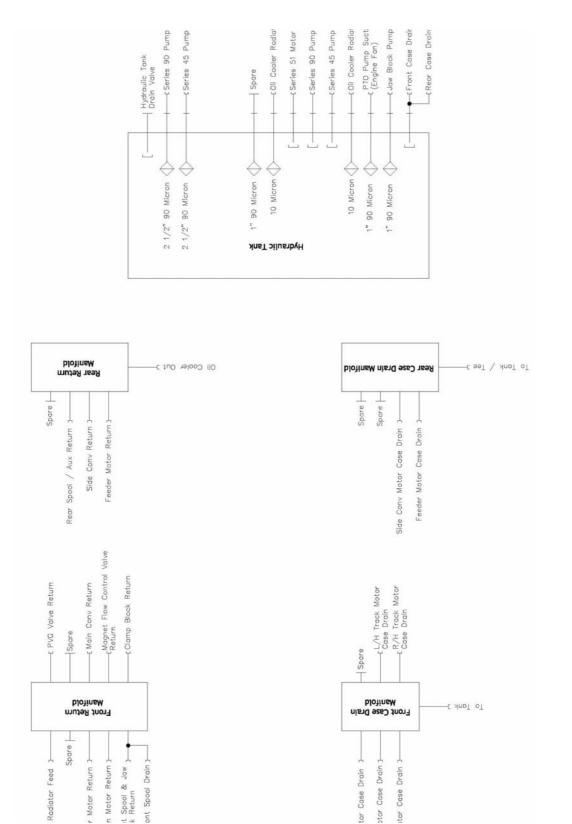




# 9.2. Hydraulic Schematics



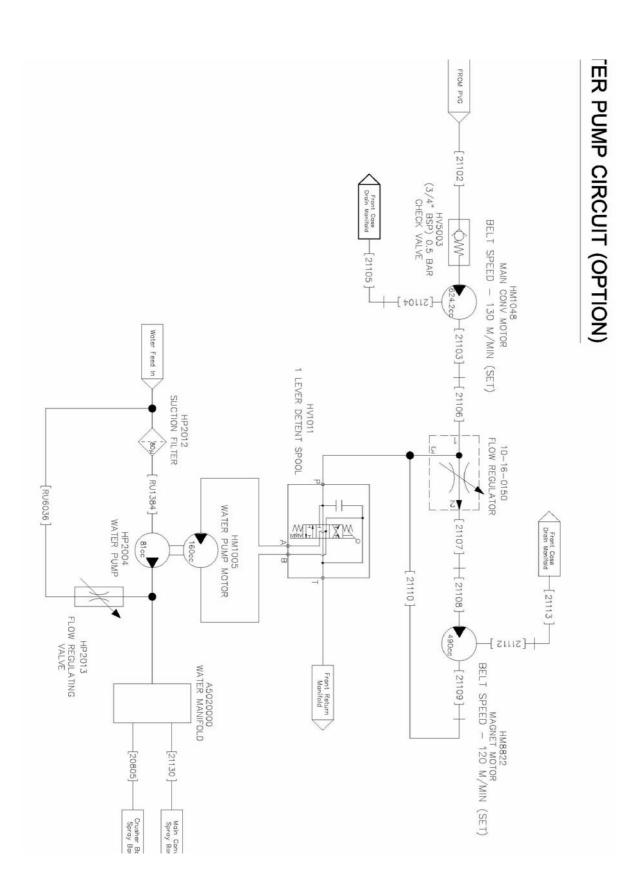
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### Hydraulic Schematics - continued



# **10. Information and Data Sheets**

# **10.1. Original Equipment Manufacturer Information**

**Note:** *Please ensure you read this section carefully. It contains information supplied by original equipment manufactures of components used in the machine, therefore Sandvik has reservations for misprints.* 

- Eriez magnetic separator.
- Strickland tracks.
- Vogel pump.
- Engine (manual supplied separately).

# **10.2. Hazardous Substances**

- Shell Agricultural gas oil.
- Shell antifreeze.
- Shell Albida EP2 grease.
- Shell Naturelle HF-E 46 hydraulic fluid.
- Shell Tellus 46 hydraulic oil.
- Shell Tellus 68 hydraulic oil.
- Shell Omala oil 220.
- Exol Athena EP 90 oil.
- Aeroshell 33 grease.
- Shell Rimula 10W-40.

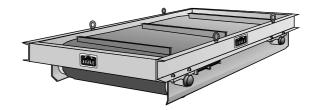
# 10.3. Variations and Options (if applicable)

- Variations.
- Options.
- Optional extra equipment.

# INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

# SUSPENDED PERMANENT MAGNETIC SEPARATORS

# **MODELS CP & OP**



ERIEZ MAGNETICS EUROPE LIMITED

Bedwas House Industrial Estate, Bedwas, Caerphilly. CF83 8YG United Kingdom

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e-mail eriez@eriezeurope.co.uk

### SUSPENDED PERMANENT MAGNETIC SEPARATORS

### **MODELS CP & OP**

#### **INTRODUCTION**

Suspended, permanent magnet heavy-duty separators are designed for use over a moving bed of material from which iron is to be removed. Basically, they are box-shaped units containing blocks of permanent magnet material, arranged to produce a powerful magnetic field. The block arrangement determines the magnetic circuit configuration, designated CP or OP.

Two simple methods of cleaning the extracted ferrous material from the surface of the magnet are available; *manual cleaning* (Fig. 1) or *self cleaning* (Fig. 2). There is a wide range of sizes available for either style and separators can be mounted in-line with the conveyor belt (*Position 1*) or across the conveyor belt (*Position 2*) to suit customer requirements.

Manual cleaned magnets are designed for use when tramp iron contamination levels are small. Periodically, it is necessary to remove the accumulation of tramp iron, either by hand or with a moveable stripper plate.

Where large amounts of tramp iron require separation, self-cleaning magnets are more practical. The construction of the magnet box is the same as for the manual cleaning magnet, with the addition of a short belt conveyor built around the assembly to provide an automatic discharge for the tramp iron.

#### WARNING

# THIS EQUIPMENT CONTAINS MAGNETISED MATERIAL AND MUST BE TREATED WITH UTMOST CAUTION TO SAFEGUARD AGAINST INJURY.

• Do not allow the pole faces to face each other. Opposite polarity poles will come together with considerable force.









- Before handling this equipment personnel with pacemakers should confirm that their pacemaker is not affected by magnetism.
  - Take care when using ferrous tools or ferrous parts near the pole faces.
  - Do not place pre-recorded tapes, computer disks, or credit cards near the magnet box since this could cause erasure.
  - Keep all delicate mechanisms, such as mechanical watches, away from the magnet.

• Do not drill or weld near the magnetic unit without first seeking the advice of: ERIEZ MAGNETICS EUROPE LIMITED

## **INSTALLATION**

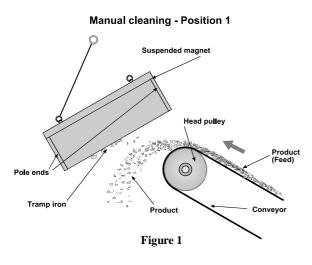
#### General

When unpacking, take care to avoid damage to the equipment and possible personnel injury - *the magnet assembly is very powerful and permanently charged*. Remove loose ferrous material closer than 600 mm to the magnet box. Spanners and other tools within the vicinity where the equipment is to be installed could become magnetically induced and be attracted to the magnet box with considerable force. Also, when installing OP magnets check that the unit is in the correct orientation, with the heavy steel end poles at right angles to the direction of material flow.

#### **Magnet Position**

#### **Position 1** (*In-Line installation*)

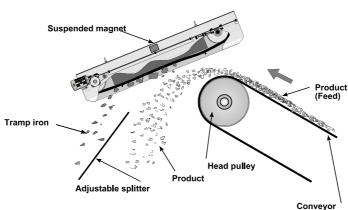
The preferred installation of a suspended magnet is over the trajectory of the product material where it discharges from the belt conveyor. This position is referred to as *Position 1*, (Figs. 1 and 2). For optimum separation in *Position 1* there must be provision to adjust the location of the magnet in relation to the material trajectory.



• For low feed conveyor belt speeds, typically less than 100m/min, greater separation efficiency will be achieved by using a non-magnetic head pulley. *Note: It is preferable if a non-magnetic head pulley is installed, regardless of the speed of the conveyor* 

• When installing a self-cleaning unit, examine the area to ensure there is adequate clearance for the belt to run and that provision has been made to collect discharged tramp iron. A hinged *nonmagnetic splitter*, adjustable in length, will be required to prevent extracted tramp from re-entering the non-magnetics.

• At the working suspension height the centreline of the magnet should be approximately perpendicular to the trajectory of the material and

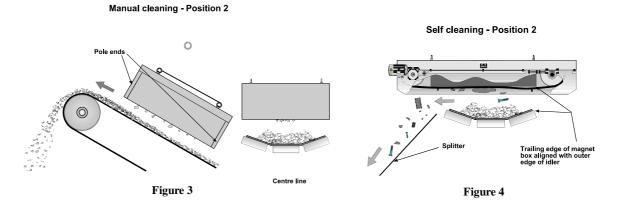


Self cleaning - Position1

#### Position 2 (Cross Belt installation)

A separator mounted over a moving bed of material at right angles to the conveyor is referred to as **Position 2** (Figs. 3 and 4). This installation usually requires a stronger magnet than **Position 1** since tramp iron at the bottom of the burden is more difficult to extract.

- The efficiency of magnetic separators in *Position 2* is dependent upon the speed of the conveyor carrying the feed. As conveyor speed increases above 100m/min separation efficiency may fall.
- Conveyor idlers beneath the separator in *Position 2* must be *non-magnetic*.
- Manually cleaning suspended magnets should be installed on the centreline of the material conveyor, Fig. 3. Self-cleaning suspended magnets should be installed with the trailing edge of the magnet box immediately above the outer edge of the conveyor idler. Refer to Fig. 4.



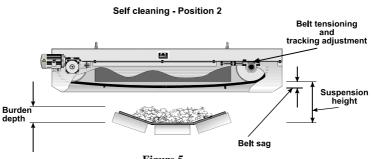
#### **Suspension Height**

The magnetic strength and configuration of an OP/CP separator is selected for a specific suspension height and application. The suspension height quoted should be considered a maximum.

When setting the suspension height, Fig. 5, lower the magnet as close as possible to the top of the burden, without interfering with the material flow. If the unit is self-cleaning, ensure that the separator belt is clear to operate freely whilst carrying tramp iron. Failing to do this could result in tramp iron being knocked back into the non-magnetics.

A clearance of 75 mm between the magnet face and the top of the product burden / trajectory should be maintained for self-cleaning units; this clearance can be reduced to 50 mm for manually cleaned units.

# WARNING: Do not over-tighten the self-cleaning belt as this could damage the bearings. The equipment is designed to operate with belt sag of approximately 25 mm.



#### **Burden Depth**

One factor in achieving optimum separator performance is to control the burden depth.

- **Position 1 installation.** The installation location is calculated on product throughput. Any variation from this will change the trajectory of the product material with respect to the working surface of the magnet and could result in poor separation.
- **Position 2 installation.** A plough or leveller installed before the magnet will remove high spots or surges in material flow.

# COMMISSIONING

#### **Self-Cleaning Separators**

After installation, examine for any obvious visual damage; in particular check that the frame is square and has not been twisted.

Momentarily close the power supply switch to the belt drive and check that the belt is tracking properly and is not wandering laterally. *Never start the belt drive and allow it to run continuously until the belt is properly trained*. If the belt wanders, note the direction and adjust as follows:

Self-cleaning magnet belts run on two pulleys, one fixed and the other adjustable. The adjustable tail pulley has approximately 10 mm of take up available for both belt stretch and tracking. To track the belt, the tail pulley should be adjusted to tighten the belt on the *same side* to which the belt is seen to wanders.

## MAINTENANCE

#### Manual Cleaning Separators No maintenance is required.

#### **Self-Cleaning Separators**

- Belt tracking should be checked frequently and adjusted as necessary. Refer to COMMISSIONING
- Lubricate the bearings on a schedule consistent with other equipment in use at the site for the product and environment.
- If the unit is installed within a separate enclosure, provision must be made to the construction of the enclosure to gain easy access to moving parts.
- Check the self-cleaning belt for damage and, if necessary, replace as follows:

#### **Vulcanised Belt**

Replacing a vulcanised belt requires the self-cleaning gear to be dismantled after the separator has been removed from its installation. This is a major operation and is not always practical. An alternative method is to replace the belt in situ.

- Slacken the bolts securing the non-drive pulley.
- Slacken the belt tensioning screws.
- Cut through the damaged belt and remove it.
- Wrap the new belt and vulcanise.
- Re-tension the belt; allowing for belt sag, refer to INSTALLATION.
- Re-track; refer to COMMISSIONING.
- Tighten the bearing securing bolts.

#### Laced Belt

To replace a laced belt proceed as follows:

- Slacken the bolts securing the non-drive pulley.
- Slacken the belt tensioning screws.
- Remove the braided stainless steel wire.
- Re-tension the belt, allowing for belt sag; refer to INSTALLATION.
- Re-track; refer to COMMISSIONING.
- Tighten the bearing securing bolts.

# **TROUBLE SHOOTING & RECOMMENDED SPARES**

#### **Manual Cleaning Units**

PROBLEM	PROBABLE CAUSE	SOLUTION
1. Magnet will not attract iron	a) Magnet face is overloaded with extracted iron.	a) Examine the face of the magnet for excessive quantities of extracted tramp iron. Discharge more frequently as required.
	b) Magnet set too far from the burden.	<ul> <li>b) Check the clearance between the magnet face and the burden. Refer to SUSPENSION HEIGHT and set accordingly.</li> </ul>
	c) Magnet set too close to the burden.	c). If the magnet is set too close, material surges can act as a wiper and remove iron from the magnet surface. Check clearance and adjust. Refer to SUSPENSION HEIGHT.

#### Self Cleaning Units

PROBLEM	PROBABLE CAUSE	SOLUTION
1. Tramp iron entering the product	<ul> <li>a) Not sufficient clearance for the iron to be discharged.</li> </ul>	a) Position 2 installation: Check the clearance between the bottom of the magnet box and the edge of the conveyor belt for maximum iron size to clear. Adjust as necessary.
	b) Splitter improperly positioned.	b) Position 1 installations: Adjust the splitter angle and length to suit.

#### **Recommended Spares**

- 1 set Bearings
- 1 Drive motor and gearbox
- 1 Belt

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# INSTALLATION, OPERATION AND MAINTENANCE MANUAL



WARNING

Do not attempt to operate these track systems unless you have read and understood these instructions.



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# <u>SECTION : 1</u> GENERAL INFORMATION



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## 1.1 MANUFACTURER'S STATEMENT

Relevant to the incorporation of track systems into host machines.

The tracked undercarriage system is designed as a modular unit for integration to a host machine. It is not intended to be cycled, driven or operated in the free standing condition.

*Strickland Tracks Ltd* will not be held responsible for the attachment method to the host machine and/or any failures of the crawler track system relating to these procedures unless approved in writing by *Strickland Tracks Ltd*.

Modification or abuse of the original design may negate manufacturer's warranty or guarantee which could conflict with health and safety standards and should not be undertaken without prior consultation with the manufacturer. For full warranty cover, any modification or attachment must be approved in writing by *Strickland Tracks Ltd*.

This installation, operation and maintenance manual must be issued to the machine user, *Strickland Tracks Ltd* will not be held responsible for any misuse or failure due to lack of maintenance of the track system in accordance with instructions in this manual. Failure to issue this manual to the machine user will invalidate the track systems warranty.

For further details, please refer to section 18 under Terms and Conditions of Sales agreement. No claims of whatever nature for work carried out to a Strickland crawler undercarriage in the warranty period will be entertained unless we have given our prior authorisation in writing for work or replacements to be fitted.

Help line is available Monday to Friday, 9am to 5pm, for procedures relating to; attachment, safety, operating or maintenance.





# 1.2 INTRODUCTION

The purpose of this manual is to allow customers to correctly install, operate and maintain the crawler track system undercarriage on the appropriate machine.

- Read this manual with care before conducting any maintenance work on undercarriage supplied by *Strickland Tracks Ltd*.
- Continuous improvements to undercarriages produced by *Strickland Tracks Ltd*, may result in some of the illustrations in this manual being slightly different from the actual parts used.
- It is necessary when requesting any spare parts, that all serial numbers relating to the undercarriage are quoted.
- For full technical support contact our Head Office at:

#### **Strickland Tracks Limited**

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 tracksystems@stricklanduk.com

 Website:
 www.stricklandtracks.com

**Note:** For a comprehensive parts list breakdown/hydraulic installation/technical information for your relevant track system, please refer to the separate **Parts List and Hydraulic Specifications** document.

Electronic versions are available at <u>www.stricklandtracks.com</u> by entering your password, which can be obtained by directly contacting us.

Below are typical screenshots for Parts List and Hydraulic Specification documents.



Parts Breakdown







Hydraulic parts list and hydraulic installation information



Track drive ports, operating Pressure and flow information



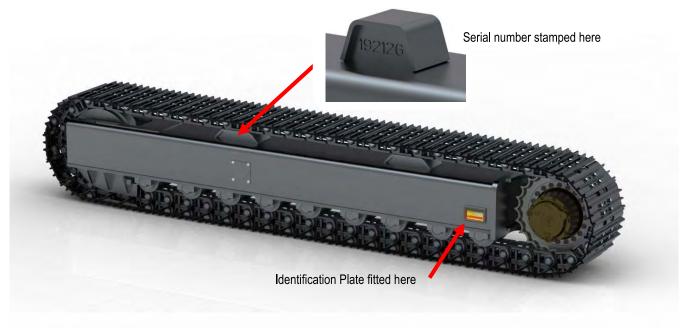


# 1.3 UNDERCARRIAGE IDENTIFICATION

All track systems manufactured by *Strickland Tracks Ltd* can be identified through a 6 digit serial number. This serial number is recorded along with other information on the Identification Plate. Below is a typical image of an identification plate.



This identification plate is located on the outside face of each left and right hand track frame fabrications, forward from the drive end of the tracks. The serial number is also stamped into the skid plate of each track frame in case the identification plate is lost or damaged.







# 1.4 GENERAL SAFETY AND ACCIDENT PREVENTION

Please ensure all safety precautions and instructions are adhered to when installing, operating and/or performing maintenance on the track systems.

### 1.4.1 Protective Equipment

Always wear protective clothing and footwear as required by job conditions when working around this product. Wear protective glasses when in risk of splintering debris. Use welders' gloves, facial/eye protection and other protective clothing appropriate to welding job being performed. Avoid loose clothing.

#### 1.4.2 Unauthorised Modifications

It is important not to carry out modifications to the track system which could compromise proper operation and safety. *Strickland Tracks Ltd* is not responsible for any injury or damage caused by unauthorised modifications.

#### 1.4.3 Pressurised Items

Avoid welding near pressurised hydraulic pipelines, track tensioner, track recoils or other flammable materials. Excessive heating near to pressurised hydraulic pipelines can cause failure, generating a flammable spray with the possibility of severe injuries to nearby persons.

## 1.4.4 Lifting

Use a hoist when lifting components weighing more than 23 Kg (50lbs). Ensure all hooks, chains, slings etc., are in good condition and tested to an adequate safe working load, and be sure hooks or slings are positioned correctly.













# 1.5 SAFE LIFTING AND HANDLING OF TRACK SYSTEM



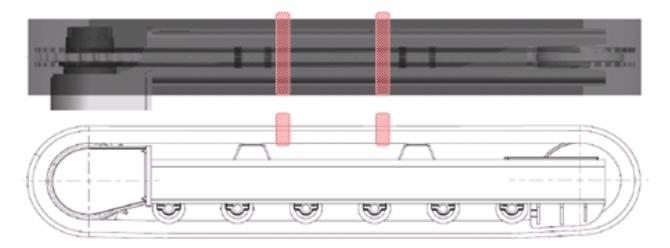
Always check the weight stamped on the identification plate before lifting or moving the track system.

#### 1.5.1 Using Overhead Crane

When using overhead cranes to lift or move a track system, choker chains must be used. Wrap the choker chains around the top of track groups by inserting one lifting eye of the chain through the opposing eye, as illustrated in picture below.



For safety reasons, always use two choker chains in the positions shown below, for even weight distribution of the track system.



Ensure the adjoining sling which connects the choker chains to the crane hoist has an adequate load rating.





The following pictures demonstrate a track system being safely lifted in the air using an overhead crane with choker chains.



## PRECAUTIONS



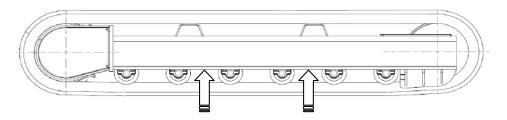
Chains, sling and hoists are identified by their safe-load lifting capacities. Do not lift loads exceeding the rated capacity of chains, sling or hoists. Raise and lower track systems slowly and avoid quick starts or stops. When moving the raised track system, always keep it as close to the floor as possible. If the load starts swinging, quickly stop the crane to avoid any accidental damage to the track system or injuries to any persons working nearby.



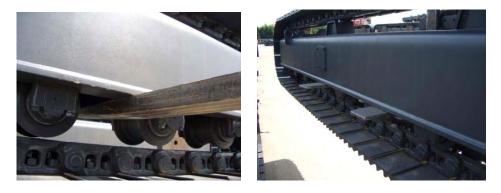


## 1.5.2 Using Forklift Truck

When using a forklift truck to lift the track system, always position the forks under the roller mounting plates. Ensure that the forks are evenly positioned between the lower rollers to balance the track system properly as shown below.



Ensure the forks reach through the track system to the other side of the roller mounting plates, supporting the track system fully as demonstrated below.



The picture shown below illustrates a track system lifted safely and correctly using fork lift truck.



## PRECAUTIONS



Ensure the total weight of the track system does not exceed the safe load capacity of the forklift truck.

Ensure each track system is lifted as a single unit not in pairs.



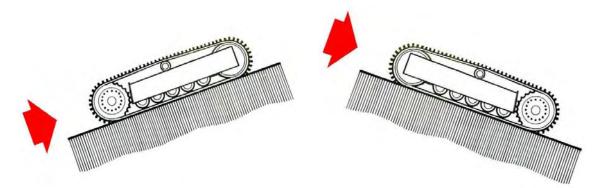
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## 1.6 **OPERATING PRECAUTIONS**

When travelling up a gradient, the tracks should be driven forward (i.e. idlers first, drive sprocket to the rear). When travelling down a gradient, tracks should be driven sprocket first.



#### ALWAYS:-

- Park the machine on flat, level ground. If it is necessary to park the machine on a gradient, the tracks should be solidly blocked.
  - Ensure the terrain the machine is working on is firm enough to adequately support the machine.
- Make certain the machine is tracked at least 10m in either direction on a daily basis, to minimise risk of track chain seizure.
- Ensure the track systems are free from debris before moving the machine.
- Make certain the tracks are not frozen to the ground before moving the machine.
- Ensure no leakage of oil from gearbox, roller and idler before and during tracking.
  - Stop the machine for 30 minutes after tracking it continuously for 30 minutes, to allow the components to cool down.

#### **NEVER:-**

- Attempt to track the machine if there is any build up of material around the tracks and drive sprockets.
- Attempt to track the machine if the tracks are frozen to the ground.
- Push or tow the machine when it is unable to free itself.
- Track the machine constantly more than 30 minutes without providing adequate rest.

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WARNING

Failure to observe the above precautions could result in danger to persons and damage to the track systems and may also invalidate the warranty.







## 1.7 WORKING CONDITIONS

### 1.7.1 Working Material

If your machine will be working in materials which can cause corrosion to carbon steel, you must replace the standard track chains with lubricated chains to avoid seizure of the track joints. Lubricated track chains are available as an optional extra from new or as a retrofit for customers entering adverse working conditions.

#### 1.7.2 **Operating Temperature**

The operating temperature range for track systems is -10°C to +40°C. Always consult *Strickland Tracks Ltd* when temperatures fall outside this working range, as alternate component specifications will be required.





# <u>SECTION : 2</u> TRACK SYSTEM INSTALLATION



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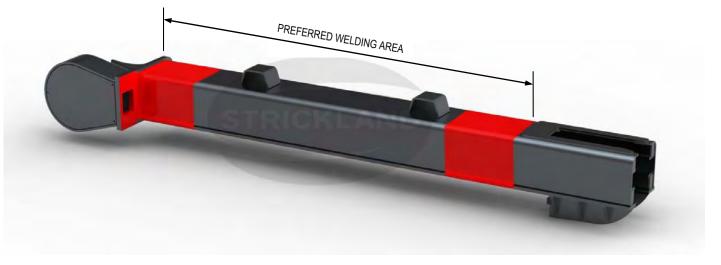
# 2.1 INSTALLATION OF TRACK SYSTEMS

#### 2.1.1 Installation of Weld-on Track System

Weld-on track systems are installed onto machines by welding the track fabrication to structural members of chassis. When welding the track system to machine chassis, the following points must be considered:

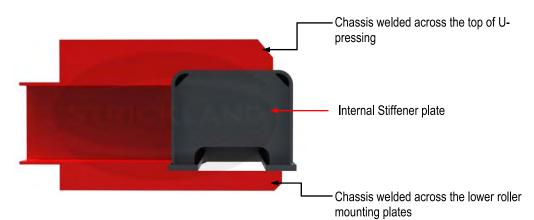
Track system should be welded onto chassis within the preferred welding area. Highlighted in red are the recommended welding positions.

It is highly recommended to weld structural members of the chassis back to the division plate of frame. The division plate divides the drive housing from the main body of the frame. Recommended welding positions are shown below in red.



Ensure the structural members of the chassis are welded onto the track system in line with internal stiffener plates to evenly distribute machine load.

For proper load distribution, we highly recommend welding connections across the top of the Upressing and the lower roller mounting plates as shown below.

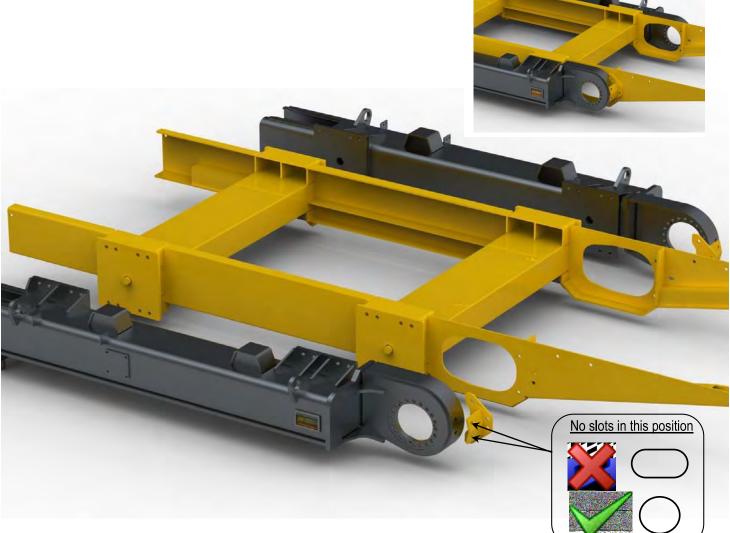






## 2.1.2 Installation of Bolt-on Track System

*Strickland Tracks Ltd* offer a wide range of bolt on track systems which assemble on to the machine via bolt on mounting plates, mating to opposing plates on the host chassis. The image below shows a typical bolt on track system with mounting plates.



In most cases where mounting plates are adopted, there is need to reduce the drive housing section. Due to the reduction of strength this causes, the drive housing must be connected to the chassis using a substantial bracket, typically shown in the above image.

When considering the design of bracket, always ensure slots are not used in the horizontal plane, this will ensure drive housing is braced correctly, and guarantee drive rigidity.

#### PRECAUTIONS



 Prior to assembling track systems, remove any grease or rust left on the machine face of brackets for secure assembly.

Chassis mounting plates must have flatness within the size tolerance ±1mm on machining face to match with the flatness tolerance of mounting plate on the track system. Failure to maintain this tolerance could result in misalignment of the track system installation.

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# 2.2 HYDRAULICS INSTALLATION

Hydraulic installation of each individual track system is fully explained in *Parts List and Hydraulic Specification* document. This document also includes following information:

Hydraulic hose and fitting kit

Track drive ports identification and sizes

Required hydraulic connections

Hydraulic schematic

Direction of rotation of track drive

Operating pressures and flows

Gearbox oil type, quantity and operating temperature, and

Hydraulic filtration and cleanliness.

Electronic versions are available at <u>www.stricklandtracks.com</u> by entering your password, which can be obtained by directly contacting us

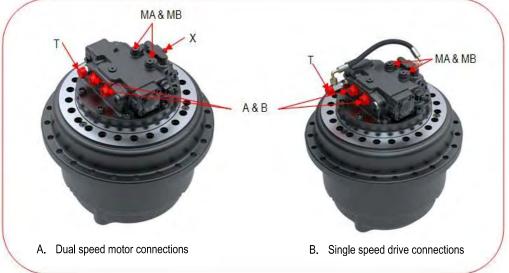
## 2.2.1 Hydraulic Track Drives

Primarily, Strickland track systems are installed with track drive gearboxes with two types of hydraulic motors.

Dual displacement (2-speed) Fixed displacement (single speed)

## 2.2.1.1 Track Drives Fitted with Dual Displacement Motor

These dual displacement track drives are fitted with hydraulically controlled 2-speed motors, switchable between displacements by applying a separate pressure to the displacement change port. They can be run as 2-speed motors or single speed, depending upon the connections made as shown below.



Note:

Drain line connected to port T, must be installed in such a manner that the motor housing cannot empty when standing still, i.e. drain line at highest possible point.





## 2.2.1.2 Track Drives Fitted with Fixed Displacement Motor



## 2.2.2 <u>Track Drive Ports and Port Functions</u>

#### 2.2.2.1 Main Flow Ports, A & B or V1 & V2

Flow and pressure of hydraulic oil is applied to these ports, main drive is achieved. Torque and speed output is dependent on the pressure and flow applied.

#### 2.2.2.2 Case Drain Port, T

Case drain port allows any excess hydraulic oil to return to tank.

#### 2.2.2.3 Brake Release Port, F

With a pressure applied to this port, multi disc parking brake is released, allowing rotation of the track drive. When no pressure is applied, the parking brake is locked on.

#### 2.2.2.4 Displacement Change Port, X

Pilot pressure port for controlling the displacement change of the motor between maximum and minimum, with a relative affect on the output speed of the final drive.

#### 2.2.2.5 Measuring Ports, MA & MB

Measuring ports are used to measure running pressures for testing purposes if required. Ports are blanked off during normal operation.





## 2.2.3 Motion Control / Brake Release Valves

Motion control / brake release valves are designed for use on open loop hydraulic circuits only. These valves are generally supplied fitted and hosed to the hydraulic motor flange as shown in above image, section 2.2.1.2.

The valve has two main functions:

To take a feed from the main pressure line to pressurise the brake release port of the gearbox with a controlled pressure, releasing the multi disc parking brake whenever any flow/pressure is applied to the hydraulic motors, prior to driving the gearbox.

To prevent overrun of the motor as the machine descends any gradient, avoiding over-speeding and therefore a run-away condition. This motion control function operates in both directions of rotation.

#### PRECAUTIONS



- Before connecting track drives to any hydraulic circuit, ensure all pipes are removed and flushed through with the hydraulic system prior to connection.
- To ensure proper function of the hydraulic motor, the filtration of the pressure fluid must provide a cleanliness level of at least: 20/18/15 according to ISO 4406





# <u>SECTION : 3</u> BASIC MAINTENANCE



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# 3.1 CORRECT MAINTENANCE PROCEDURE

In order to maintain the reliability of the track systems, regular maintenance is essential. It is imperative that the tracks are maintained as outlined within this maintenance section.

#### ALWAYS:-

- Perform maintenance on a level and solid surface.
- Ensure the track system is solidly supported if work is necessary under the track systems.
- Remove any build-up of grease, oil or debris.
- Repair all damage and replace worn or broken parts immediately.
- Check for oil leaks and damaged hydraulic hoses.
- Use only specified lubricants. Do not mix different brands or types.
- Use great care when maintaining the hydraulic system since oil may be very hot when the machine has just been working.
- Use only *Strickland Tracks Ltd* supplied / approved replacement parts. Use of unapproved parts will invalidate the warranty.
- Dispose of lubricants in the proper manner.





# 3.2 MAINTENANCE CHECKS

Please note the maintenance intervals specified below are for track systems working under normal conditions. If the track system is used in severe working conditions, the maintenance and safety checks must be performed more frequently.

Components	Checklist	Daily Checks	Weekly Checks	Monthly Checks
Idler	Oil Leakage	$\checkmark$		
IUIEI	Wear Limits			$\checkmark$
	· · · · · · · · · · · · · · · · · · ·			
	Loose nuts and bolts	$\checkmark$		
Lower Roller	Oil Leakage	$\checkmark$		
	Wear Limits			$\checkmark$
Sprockets	Loose nuts and bolts	$\checkmark$		
Sprockets	Wear Limits			$\checkmark$
	Loose nuts and bolts	$\checkmark$		
Track Drive	Oil Quantity		$\checkmark$	
	Oil Leakage	$\checkmark$		
	Any damage to track links, pins and track shoes	$\checkmark$		
	Loose nuts and bolts	$\checkmark$		
Track Group	Tight or Seized track joints	$\checkmark$		
Паск бібир	Track tension		✓	
	Wear Limits on track links			✓
	Wear Limits on track			
	shoes			¥
	,		· · · · · · ·	
Track System Fabrication	Structural damage or failure			$\checkmark$

After identifying any problems, take corrective action immediately; tighten bolts and nuts to correct torque, replace damaged or worn components, and refill oil up to recommended levels.



WARNING

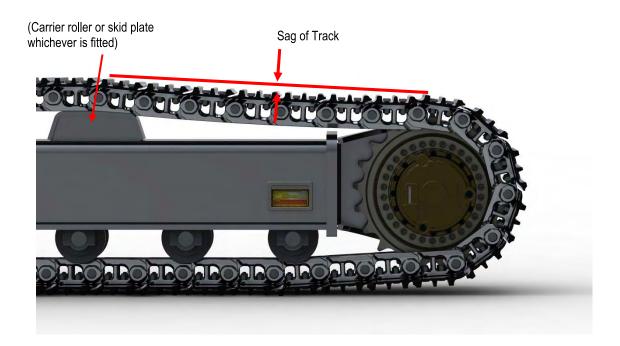
**DO NOT** operate the tracks with damaged or defective components. Any persistent problem should be reported to the machine manufacturer.





## 3.3 CHECKING TRACK TENSION

Stop your machine on solid and level ground and drive 2 metres (minimum) in a forward direction. Measure the sag on the top part of the track on the longest section of unsupported track as shown below.



The sag of the track must be between 5mm and 15mm.

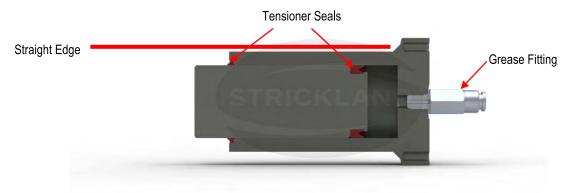
The above conditions must be fulfilled on a new track system. This must also be regularly checked and corrected if necessary, by adding grease to the grease tensioner, as described in Section 3.4.





# 3.4 ADJUSTMENT OF TRACK TENSION

Track systems use a grease cylinder to keep each track chain in tension. Screwed into the end of the grease cylinder is a grease fitting, enabling grease to be pumped into the grease chamber and released from it, tightening and slackening the track.



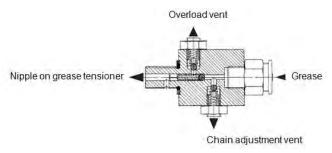
The grease inside the track tensioner (Lithium EP2) is pressurised so care must be taken when loosening the grease fitting.

If the tracks repeatedly become slack, carry out the below mentioned checks:

- 1. Check for any leakage on the outer face of grease fitting, if so replace grease fitting.
- 2. Check if there is any grease leakage at contact surface between the grease tensioner and grease fitting, if so replace bonded seal.
- 3. Make sure the tensioner seals are not damaged. To replace tensioner seals, simply unscrew grease fitting, push or pull out inner cylinder to expose lip seal and inner seal.

Replacement seals should be ordered from the machine manufacturer, if required. Prior to replacing tensioner seals, place a straight edge along the cylinder barrel as shown above to ensure outer sleeve has not swollen due to overloading. If tensioner is damaged, the complete tensioner unit need to be replaced.

If there is a risk of over tensioning or over loading of the grease tensioner, a safety valve can be used. To order safety valves, please contact *Strickland Tracks Ltd* quoting the serial no. of your track system.



Safety Valve for Tensioner





## 3.4.1 Tightening the Track



- 1. Loosen the three screws and swing access cover away from access aperture on the side of the track frame.
- 2. Ensure the grease fitting and grease gun adaptor is clean; ingress of dirt into the grease fitting can result in failure. Connect a grease gun to the grease fitting and add grease until the track tension is within the specified values given in Section 3.3.
- 3. Drive 50 metres forwards and 50 metres backwards and repeat the above procedure if the track slackens.

#### 3.4.2 Slackening the Track

- 1. Loosen the three screws and swing access cover away from access aperture on the side of the track frame.
- 2. Loosen the grease fitting, by turning in an anti-clockwise direction, using gradual increments until the grease begins to be expelled. Care must be taken not to loosen the grease fitting too quickly.
- 3. When the correct track tension has been obtained, tighten the grease fitting by turning in a clockwise direction and clean away all trace of extruded grease. Be sure not to over tighten the grease fitting.

If the track fails to slacken after grease fitting has been loosened; **DO NOT** attempt to remove the tracks or disassemble the track tensioner, and **DO NOT** remove the grease fitting from the tensioner. It is possible that running the tracks a short distance in both directions with the grease fitting loosened may help to expel the grease.



WARNING

The above procedure involves working with grease contained at high pressure and must only be carried out by qualified fitters.



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## 3.5 MASTER PINS

There are two main types of master pins used on Strickland tracks as explained below:

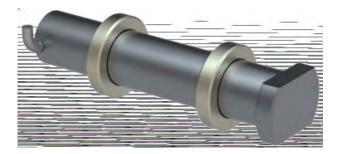
### 3.5.1 Press Type Master Pin

Press type master pins are identified either by an X-mark or a centre drill mark on the end faces. To remove or install press type master pins a hydraulic press must be used (shown in section 3.7.1). Pictorial views of press type master pin including spacers are shown below.



#### 3.5.2 Dowel Type Master Pin

Dowel type master pins are more common and can be identified by the location type head. Dowel type master pins can easily be installed using a copper hammer due to the clearance fit. Pictorial view of a dowel type master pin including spacers is shown below.



**Note:** For further information regarding master pin installed on your track system, please refer to *Parts List and Hydraulic Specifications* document provided with your track system.

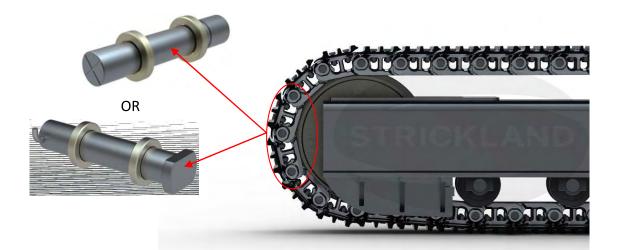




# 3.6 REMOVING THE TRACK

To uncouple the track group the following procedure must be followed:

- 1. Jack up the machine and block safely on firm, level ground.
- 2. Locate the master pin.
  - a. If tracks are installed with Press type master pin. This can be identified by small circular indentations, or by an X marked on each of the end faces.
  - b. If tracks are assembled using Dowel type master pin. The flat head of master pin or slotted face of links should be used for identification.



- 3. Rotate the track until the pin is in approximate position (as shown above) and place a block under the front of track. This prevents the chain from dropping once the master pin has been removed.
- 4. Release the tension on the tracks as described in Section 3.4; this should only be carried out by a qualified fitter.
- 5. Removing master pin.
  - a. In case of Press type master pin, the pin can be pressed out from the chain, separating the track.
  - b. To remove Dowel type master pin, unsecure the dowel first and use copper hammer to strike the master pin out.
- 6. The track can now be pulled from under the machine.



WARNING

When removing the press type master pin, do not use a sledge hammer. This may cause splintering of the metal with the possibility of personal injury.



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# 3.7 **REJOINING THE TRACK**

To rejoin the track group, the following procedure must be followed, but should only be carried out by qualified fitters:

## 3.7.1 Rejoining Track Using Press Type Master Pin

- 1. Position the pin collars into the counter bore of the mating links.
- 2. Ensure the pin holes and the bushings are aligned and insert a dummy pin.
- 3. With the master pin in position, set up the track press.
- 4. Using track press, push the master pin fully into the chain links, pushing the dummy pin through the link. Picture below shows a typical example of C-press.

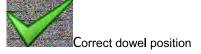


## 3.7.2 Rejoining Track Using Dowel Type Master Pin

- 1. Position the pin collars into the counter bore of the mating links.
- 2. Ensure the pin holes and the bushings are aligned.
- 3. Use the copper hammer to strike the flat head of master pin to tap it into the chain links.
- 4. With the master pin inserted fully into the chain links, it must be secured in position using a dowel (locking pin). Following picture demonstrates the use of copper hammer to tap in the hammer type master pin.









WARNING When rejoining tracks using press type master pin, do not use a sledge hammer. This may cause splintering of the metal with the possibility of personal injury.



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## 3.8 TRACK REPAIR LINK KIT

A typical image of track repair link kit is shown below followed by list of components and their quantities included in kit.



Index	Component Description	Quantity
1	Left hand master link	1
2	Right hand master link	1
3	Master bushing	1
4	Master pin with collars (Press type)	1
5	Master pin with collars (Dowel type)	1
6	Track shoe bolt	4
7	Track shoe nut	4

*Note:* The kit is supplied with the master bushing pressed into the left and right hand links.

To order a new track repair link kit, Please contact *Strickland Tracks Ltd.* quoting your track serial number or track part number or track repair link kit part number. Please refer to *Parts List and Hydraulic Specification* document to identify track repair link kit part number.

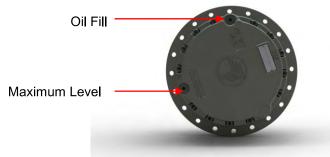




## 3.9 TRACK DRIVE UNITS

## 3.9.1 Oil Filling

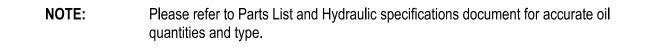
To fill, track the machine until the gearbox casing is level with a plug positioned at 12 o'clock as shown below. Unscrew the two plugs and fill from the upper hole until oil reaches the level of the lower hole.



## 3.9.2 Oil Draining

To drain, track the machine until a plug is at 6 o'clock position as shown below. Unscrew both plugs and allow all oil to discharge into a suitable container. Dispose of waste oil in a safe and approved way.







WARNING

Do not fill oil in the track drive without checking oil level inside it. All track systems are supplied by Strickland Tracks Ltd. with a measured quantity of oil in track drive.



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## 3.10 LEAKS AND SEIZURES

#### 3.10.1 General Components

Many components fitted to crawler track systems such as rollers and idlers are lubricated with oil. Regular checks should be made to ensure these components are not leaking and rotate freely when the tracks are driven. Any items such as rollers which show signs of leaking, or fail to rotate when the tracks are driven should be replaced immediately.

#### 3.10.2 Track Chains

It is important to be aware of the type of conditions in which the tracks are working. If the tracks are working in materials which cause corrosion to carbon steel, you must replace standard tracks with lubricated tracks to avoid seizure of the track joints. Lubricated tracks are available as an optional extra from new or as a retrofit for customers entering adverse working conditions.

Track chains can also seize in particular conditions if they remain stationary for more than a few days, causing kinks in the chain. This can be prevented by tracking the machine 50 meters forward and 50 meters backwards on a daily basis. However, should this problem occur, it may be possible to remedy by applying penetrating fluid to the seized pin, leaving for several hours, then tracking the machine several meters forward and back.

If lubricating the pin is unsuccessful, the problem can be resolved by cutting out the seized link including the pin and bush, replacing it with a complete repair link.

If there are several links seized on a single track chain, it may be necessary to remove the track from the machine and have it repaired at a specialized track repair shop, or to replace the complete track chain.









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## 4.1 WEAR LIMITS

To ensure the most economical use of the track systems, it is important to determine the appropriate time to replace each of the worn parts.

The following section will describe the most accurate methods of measuring the wear of the various track system components. If the wear of these components is monitored and the replacements made, you should ensure the proper functioning of the track system and avoid unnecessary damage and costly renewal expenses.

Exact wear limits are dependent on the specific parts fitted to the track system supplied. Please refer to the Parts Supplement relative to the specification of track system supplied to find the required component part numbers.



WARNING Under no circumstances should the machine be operated if the wear of any component is in excess of 100%.

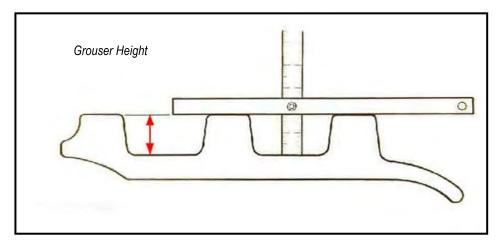






# 4.2 TRACK SHOE WEAR

The most important wear of a track shoe is the relative height of the grouser to the top of the shoe plate. A depth gauge should be used to measure this, as shown in the diagram below:-



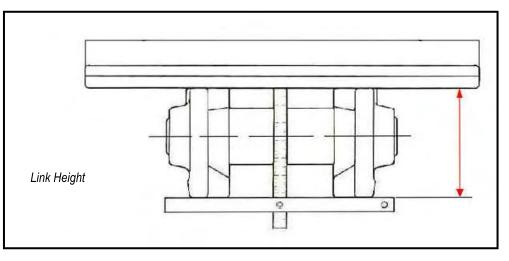
	New Chee	Wear Percentage			
Shoe Part No.	New Shoe mm	25%	50%	75%	100%
			m	m	1
TBG 505X00-12-X	42.5	41.5	40.5	39.5	38.5
TBG 510X00916-X	22.0	21.2	20.4	19.6	18.8
TBG 014X00-58-X	25	24.2	23.4	22.6	21.8
TBG 020X00-18-X	25.3	25	24.7	24.4	24.1
TBG 026X00-34-X	26.5	25.9	25.3	24.7	24.1
TBG 532X00-20-X	28	27.3	26.6	25.9	25.2
TBG 027X00-34-X	26.5	25.9	25.3	24.7	24.1





# 4.3 TRACK LINK WEAR

To measure the wear use a depth gauge and measure the depth from the bottom of the grouser shoe to the running surface of the track link.



Link Part No.	Name I inda		Wear Pe	ercentage	
	New Link mm	25%	50%	75%	100%
			n	im	
TLS 040LH/RH-5	70	69.75	69.5	69.25	69
TLS 045LH/RH-5 TLS 045LH/RH-XHD	83	82.8	82.6	82.4	82.2
TLS 007LH/RH-58-1	96	95.6	95.2	94.8	94.4
TLS 007LH/RH-58-XHD	30	30.0	30.2	34.0	34.4
TLS 210LH/RH-8	103.2	103	102.8	102.6	102.4
TLS 013LH/RH-8	121.5	121.1	120.7	120.3	119.9
TLS 660LH/RH-0	116	115.6	115.2	114.8	114.4

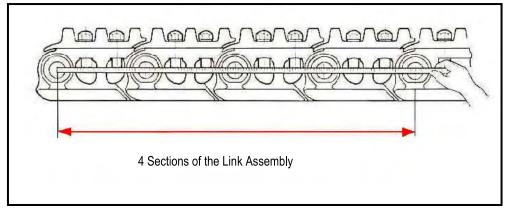




# 4.4 INTERNAL PIN AND BUSH WEAR

To determine the average internal pin and bushing wear measure across 4 sections of track chain comprising of 4 links (5 pins). This track section must not include the master pin, and should be on the upper side of the track. Block the track using a 40mm diameter steel bar in the sprocket, being careful not to foul the track frame or chassis of the machine. Reverse the machine until the track is taut across the top of the track system (maximum 1/8 turn of sprocket).

Measurement is made of the elongation of the chain pitch. A standard steel tape can be used. Measure as shown below:



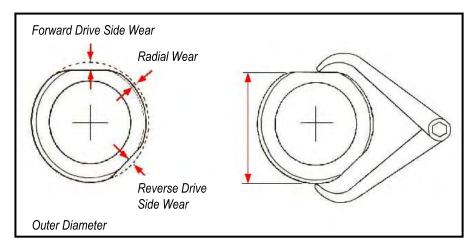
	New Chein	Wear Percentage			
Chain Part No.	New Chain mm	25%	50%	75%	100%
		Mm			
TCA 040XX-X	560.0	560.5	561.0	561.5	562.0
TCA 045XX-X	640.0	640.5	641.0	641.5	642.0
TCA 811XX-X	685.8	686.2	686.6	687.0	687.4
TCA 640XX-X	702.0	702.6	703.2	703.8	704.4
TCA 071XX-X	811.6	812.4	813.2	814.0	814.8
TCA 660XX-X	760.0	761.0	762.0	763.0	764.0
TCA 077XX-X	811.6	812.4	813.2	814.0	814.8





## 4.5 EXTERNAL PIN AND BUSH WEAR

Wear of the bushes is caused at the point of contact between the bushing and the sprocket tooth. To measure this wear use a small outside calliper.



Outside wear of the bushings can be of any of the 3 types shown above. Measurements should be taken in each position and the area where wear is maximum should be considered.

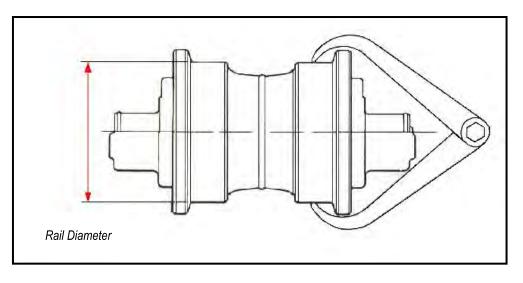
	New Chain Vear Percentage					
Chain Part No.	mm	25%	50%	75%	100%	
			N	lm	1	
TCA 040XX-X	37.0	36.9	36.8	36.7	36.6	
TCA 045XX-X	45	44.9	44.8	44.7	44.6	
TCA 072XX-X	50.8	50.6	50.4	50.2	50.0	
TCA 811XX-X	53.8	53.6	53.4	53.2	53.0	
TCA 640XX-X	58.738	58.6	58.5	58.4	58.3	
TCA 071XX-X	66.675	66.6	66.5	66.4	66.3	
TCA 660XX-X	60.0	59.9	59.8	59.7	59.6	
TCA 077XX-X	66.7	66.6	66.5	66.4	66.3	





## 4.6 LOWER ROLLER WEAR

The tread wear of the roller is the most important wear area and is measured on the roller diameter. The most suitable tool is a large outside caliper.



The correct measurement is to measure the diameter of both tread surfaces of the roller. Consider the tread with the smallest diameter.

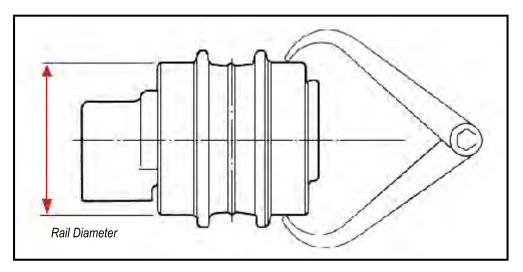
		Wear Percentage					
Roller Part No.	New Roller mm	25%	50%	75%	100%		
			М	m			
LRG 000SC003-X	135.0	134.5	134.0	133.5	133.0		
LRG 000SF60B-X	160.0	159.5	159.0	158.5	158.0		
LRG 000SC40A-X 155.0		154.5	154.0	153.5	153.0		
LRG 000SC60A-X	154.0	153.5	153.0	152.5	152.0		
LRG 000VA774-0	172.0	171.5	171.0	170.5	170.0		
LRG 000SC70A-X	180	179.5	179	178.5	178		





## 4.7 CARRIER ROLLER WEAR

The tread wear of the roller is the most important wear area and is measured on the roller diameter. The most suitable tool is a large outside calliper.



The correct measurement is to measure the diameter of both tread surfaces of the roller. Consider the tread with the smallest diameter.

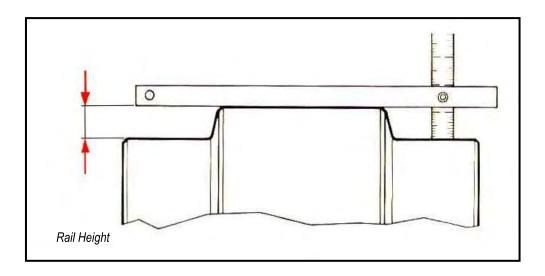
	No Dellar	Wear Percentage					
Roller Part No.	New Roller mm	25%	50%	75%	100%		
		Mm					
CRG 130-A	140.0	139.5	139.0	138.5	138.0		
LRG SF60B-SD	135	134.5	134	133.5	133		





## 4.8 FRONT IDLER WEAR

Radial tread wear is the most important factor. The simplest method of measuring tread wear is to measure the depth of tread from the centre of the idler.



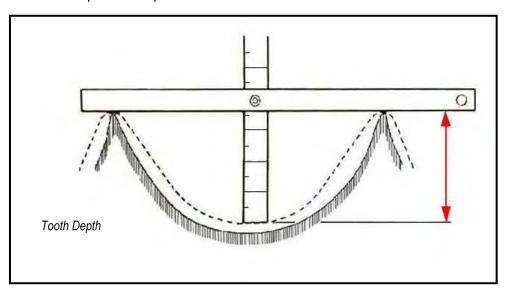
			Wear Pe				
ldler Part No.	New Idler mm	25%	50%	75%	100%		
			Mm				
IRT 140-2761-02	16.0	16.2	16.4	16.6	16.8		
IDG 5061-5 IDG 5061-XHD	17.0	17.2	17.4	17.6	17.8		
IDG 600-A	DG 600-A 17.0		IDG 600-A 17.0 17.2	17.25	17.5	17.75	18.0
IDG 502-A IDG 502-XHD	26.0	26.25	26.5	26.75	27.0		
IDG 660550-7 IDG 660550-A	20.0	20.25	20.5	20.75	21.0		
IDG 610-0	IDG 610-0 20.0		20.5	20.75	21.0		
IDG 0770-0	22.5	22.75	23	23.25	23.5		





## 4.9 SPROCKET WEAR

Sprocket wear is very difficult to assess accurately. In fact, under normal working conditions, the wear occurs in such a way that no trace of the original toothing remains as a valid reference for measuring the wear. It is therefore impossible to provide 100% accurate data for wear measurement.



As an approximate rule, the sprocket should be replaced when wear has reached the limits shown in the above illustration.

As the wear is never uniform, it is necessary to consider the point at which the wear is at a maximum.

	New		Wear Pe	rcentage	
Sprocket Part No.	Teeth	25%	50%	75%	100%
	mm		М	m	
SPA 100-DTXXXX	26.0	26.2	26.4	26.6	26.8
SPA 200-DKXXXX	33.2	33.4	33.6	33.8	34.0
SPA 300-DLXXXX	34.1	34.4	34.7	35.0	35.3
SPA 400-NSXXXX	34.8	34.1	34.4	34.7	35.0
SPA 190-XXXXXX	42.0	42.2	42.4	42.6	42.8
SPA 500-DNXXXX	41.5	41.7	41.9	42.1	42.3









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### 5.1 TRACK TENSION

Track systems use a grease cylinder to keep the track chains in tension. Loss of tension in the tracks can result in the sprocket jumping in the track chain, and also allowing the track chain to run off the idler/sprocket. This can hinder the tracking ability of the machine and damage many of the components of the track systems if not resolved quickly.

The tension of the tracks should be checked on a regular basis according to the parameters set out in Section 3.3 of this manual; General Maintenance. If the tension of the track is outside these parameters, and the adjustment method given in paragraph 3.4 has no effect, please read below checks that can be made and possible causes:

Check 1:	- With the greaser access plate removed (see Section 3.4), make a visual inspection of the greaser, looking for any signs of leaking grease.
Possible Cause:	<ul> <li>If grease is leaking from the base of the greaser, where it screws into the end of the tensioner, either the gasket has failed and needs replacing, or the greaser is not screwed in properly and needs tightening.</li> <li>If grease is leaking from the end of the greaser where the grease gun connects to it, the greaser valve has failed and should be replaced.</li> </ul>
Check 2:	- When the machine is stationary and blocked, make a visual inspection of the track below the adjusting end of the tensioner, looking for any signs of leaking grease. Also, reach under the frame, feeling the adjusting end of the tensioner for any grease.
Possible Cause:	- If grease is leaking from the adjusting end of the cylinder, the seals may have failed. This requires the tensioner to be removed from the tracks frame, to be either fitted with new seals, or replaced with a complete new grease tensioner.

If the above checks have been carried out with no signs of any faults, please contact the helpline for further assistance.

### IF IN DOUBT, PLEASE CONTACT HELPLINE +44 (0)1386 862800.





### 5.2 LOSS OF DRIVE

Crawler track systems are driven using hydraulic motors connected to planetary drive gearboxes. The hydraulic motors are driven using the hydraulics fitted to the machine.

Begin by making a visual inspection of the tracks, particularly around the sprocket, idler and bottom rollers where material / objects can sometimes lodge. Follow this by inspecting all hoses and connections, ensuring there are no leaks or blocks. If there are no physical impedances in the tracks and no faults are found with hoses and connectors, please read below checks that can be made and possible causes:

Check 1:	- Using pressure / flow testing equipment, measure the values of the flow and pressure being applied to the hydraulic motors.
Possible Cause:	- If the values of the flow and pressure passing to the hydraulic motors is less than that required to drive the tracks (see machine manufacturer's separate publication), there may be a fault in the machines hydraulic system.
Check 2:	- Test the pressure being applied to the brake release port on the gearbox. In order to release the brake, this should be fed with a pressure of between 12 and 50 bar.
Possible Cause:	- If the pressure is below 12 bar, do not attempt to drive the tracks. With a pressure below 12 bar, the brake will not release when driving the tracks is attempted. This can cause the brakes to seize requiring a replacement unit to be fitted.
Check 3:	<ul> <li>If a valve is fitted to the hydraulic motor flange, ensure there are no visible faults with the valve, and none of the connections are damaged / leaking.</li> </ul>
Possible Cause:	- If there are no visual faults with the valve, and all other checks identify any faults, the valve block may need replacing.

If the above checks have been carried out with no signs of any faults, please contact the helpline for further assistance.

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### 5.3 Loss of Parallel Drive

Crawler track systems are driven by hydraulic track drive units. Drives consist of a hydraulic motor connected to planetary drive gearbox.

Power is relative to the hydraulic pressure and speed is relative to the hydraulic flow from the machines hydraulic circuit. Please refer to the *Parts List and Hydraulic Specifications* document for maximum pressure and flow settings for each individual track system. Under recommended pressure and flow conditions, if tracked undercarriage shows loss of parallel drive and machine starts slewing, please read below checks that can be made and possible causes:

Check 1:	- Using pressure and flow testing equipment check the values of the flow and pressure being applied at the hydraulic motors.
Possible Cause:	- If hydraulic pressure and flow being supplied to the motors is different from one another, the machine hydraulic pressure and flow settings may need to be adjusted.
Check 2:	- Test to ensure a pressure is being applied to the brake release function on the gearbox. To release the brakes, generally pressure ranges between 12 and 50 bar.
Possible Cause:	- If the pressure being applied at brake release port is below required pressure, do not attempt to drive the track system. Trying to drive the tracks without releasing the brakes could result in gearbox failure and void the warranty.
Check 3:	- Using pressure testing equipment, test pressure on return drain line from motor to ensure back pressure does not exceed 2 bar. Excessive back pressure in the drain can cause automated switching of motor displacement on integrated motors.
Possible Cause:	- Drain Blockage in hydraulic circuit between motor and hydraulic tank.

If the above checks have been carried out with no signs of any faults, please contact the helpline for further assistance.

## IF IN DOUBT, PLEASE CONTACT HELPLINE +44 (0)1386 862800.









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## 6.1 Bolt Torque Table

If not otherwise specified, use the following torque settings. Suggested torque for normal applications  $(\pm 10\%)$ , using bolts/nuts without lubricant. Bolts and nuts with lubricant reduce mean torque by 15%, depending on lubrication used.

Standard Metric Coarse and Fine Thread Bolts and Nuts									
Thread	Coarse		I.S.O. Gr	ade 10.9		Fine	I.S.O. Gr	ade 12.9	
Diameter	Thread	(Approx.	Equivale	nt S.A.E.	Grade 8)	Thread	(Exceed) Grac		
	Pitch	Coar	se	F	ine	Pitch	Fi	ne	
mm	mm	lbs/ft	Nm	lbs/ft	Nm	mm	lbs/ft	Nm	
M8	1.25	27	37	29	40	1.00	35	47	
M10	1.50	54	73	57	78	1.25	67	91	
M12	1.75	95	129	100	135	1.25	110	150	
M14	2.00	150	203	165	223	1.50	190	258	
M16	2.00	230	312	250	339	1.50	290	393	
M18	2.50	320	434	365	495	1.50	425	576	
M20	2.50	450	610	510	691	1.50	600	813	
M22	2.50	620	841	690	935	1.50	805	1091	
M24	3.00	785	1064	860	1166	2.00	1005	1362	
M27	3.00	1158	1570	1254	1700	2.00	1468	1990	

Standard UNC and UNF Bolts and Nuts							
Thread		I.S.O. Gi	rade 10.9		I.S.O. Grade 12.9		
Diameter	(Appr	ox. Equivale	ent S.A.E. Gr	ade 8)	(Exceed) Grac		
	U	NC	U	NF	UN	IF	
Inches	lbs/ft	Nm	lbs/ft	Nm	lbs/ft	Nm	
5/16"	21	28	23	31	-	-	
3/8"	36	49	41	56	-	-	
7/16"	58	79	64	87	70	95	
1/2"	88	119	99	134	132	179	
9/16"	127	172	141	191	186	252	
5/8"	175	237	195	264	264	358	
3/4"	311	422	345	468	457	620	
7/8"	500	678	550	746	736	998	
1"	750	1017	820	1112	1118	1516	



## KFG, KFGS

## Pump Unit

Operating Instructions Version 03



QJ241



## QJ241

### Imprint

This operating manual has been prepared in conformity with the relevant standards and rules applying to technical documentation such as VDI 4500 and EN 292.

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#### Editor

Dipl.-Ing. Silke Waschki

QJ241

# Pump Units of the Series KFG, KFGS

Keep for future use!

**CE Conformity marking** The pumps of the KFG and KFGS series are marked with the EC conformity sign.

## Application of Technical Standards and Guidelines

72/245/EWG (Vehicles)) 89/336/EWG (Electromagnetic Compatibility) 98/37/EG (Machines)

Service Center Berlin: Phone: +49 30 72002-180 Fax: +49 30 72002-138

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### 1 Information Concerning the EC Declaration of Conformity and the Manufacturer's Declaration

For the product designated below:

#### Pump unit Series: KFG(S)...

we herewith certify that it conforms to the pertinent safety requirements set forth in the following Council Directive(s) for the harmonization of the laws of the Member States...

- Electromagnetic compatibility 89/336/EEC
- Electrical equipment designed for use within certain voltage limits (low voltage directive) 73/23/EEC

#### Notes

- (a) This declaration certifies the conformity with the directives listed, but does not entail an express assurance of properties.
- (b) The safety instructions in the documentation accompanying the product must be observed.
- (c) Taking into operation of the certified products is not allowed until evidence has been provided that the machinery, vehicle or similar item, into which the product is integrated, conforms to the regulations and requirements set forth by the applicable directives.

(d) The operation of the products on nonstandard line voltage as well as nonadherence to the installation instructions can affect the EMC properties and electrical safety.

We further declare that the above mentioned product:

- is meant for integration into a machine / for connection to other machinery according to the EC - Machinery Directive 98/37/EC, Annex II B. Taking into service is not admissible until evidence has been provided that the machine in which this part is installed or to which this part is connected, conforms to the regulations set forth in the EC directive 98/37/EC.
- with reference to the EC directive 97/23/EC concerning apparatus subjected to pressure this product must only be used as intended and according to the notes in the documentation. Especially observe the following:

VOGEL products must not be used in conjunction with fluids, group I (hazardous fluids), according to the definition of article 2 paragraph 2 of the directive 67/548/EC dtd. June 27<sup>th</sup>, 1967; and are not approved for application with such. None of the products manufactured by VOGEL are approved for application in connection with gases, liquefied gases, gases dissolved under pressure, steams or fluids that will reach a steam pressure of more than 0.5 bar above the normal atmospheric pressure (1013 mbar) in the admissible application temperature range.

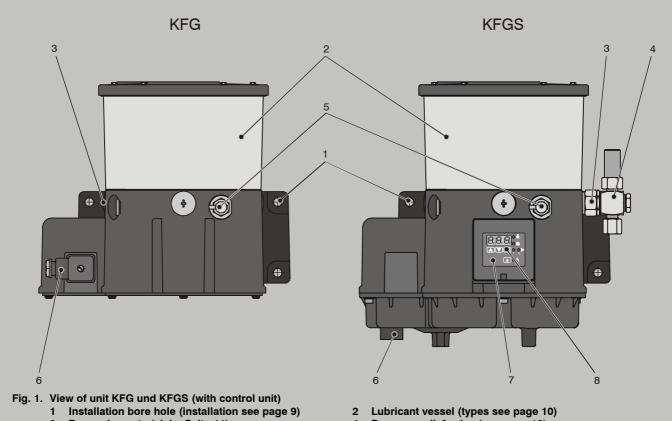
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Provided they are used as intended, the products supplied by us will not reach the limit values set forth in article 3, paragraph 1, numbers 1.1 to 1.3 and paragraph 2 of the directive 97/23/EC. Therefore they do not come under the requirements set forth in annex I of that directive. Therefore, they are not marked with the CE mark concerning the directive 97/23/EC. They are classified by us to come under article 3 paragraph 3 of the directive.

VOGEL products must only be used as intended. Use or taking into operation of the products in areas with potentially explosive atmospheres according to the ATEX directive 94/9/EC is not allowed, regardless of whether these entail gaseous atmospheres or dusty atmospheres.

If required, you may request the declaration of conformity or manufacturer's declaration for this product from our central contact address.





- 3 Pump elements (siehe Seite 11)
- 5 Conical head lubrication nipple (filling see page 13)
- 7 Control general (see page 22)

- 4 Pressure relief valve (see page 12)
- 6 Electrical connection (see page 15)
- 8 Push-buttons (programming see page 28)

### 2 Safety instructions

#### 2.1 General

The components have been manufactured in compliance with the generally established rules of engineering as well as with regulations of labour safety and accident prevention. Their use may still provoke dangers, entailing physical harm to the user or third persons or damage to assets. Therefore, the components may be used only when they are in a proper technical state and with due adherence to the operating instructions. Any faults which, in particular, may affect safety have to be eliminated immediately.

#### Text portions in this Manual marked with this symbol indicate particular dangers or important operations.

## 2.2 Use in compliance with the intended purpose

The pump sets of the VOGEL KFG and KFGS series are applied for feeding centralized lubrication systems in vehicles, equipment and machines. They deliver grease of up to NLGI Class 2.

Any use beyond the above purpose shall be deemed as not being compliant with the intended purpose.

#### 2.3 Authorized staff

Only qualified staff shall be allowed to install, operate, maintain, and repair the components described in this Manual. Qualified staff shall mean persons who have been trained, commissioned, and instructed by the user of the equipment. Such persons, on account of their training, experience and instructions received, are familiar with the relevant standards, rules, accident prevention regulations and operating conditions. They are authorized to carry out the works required in each case and, when doing so, are aware of possible dangers and are able to prevent them.

The definition of qualified staff and the prohibition of employing non-qualified staff is laid down in DIN VDE 0105 or IEC 364.

#### 2.4 Danger by electric current

Only properly trained specialist staff shall be allowed to carry out the electrical connection of the devices, taking into account local conditions for connection and regulations (e.g. DIN, VDE)! Considerable damage to material and persons may be provoked due to the improper connection of devices!

## 2.5 Danger by pressurized systems

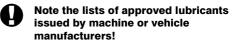
Systems may be pressurized so that they have to be depressurized prior to commencing works for extension, modification, or repair of the systems.

#### 2.6 Approved lubricants

Greases of up to NLGI Class 2, DIN 51818, and a max. flow pressure of 700 mbar. The list of approved lubricants is permanently being updated and can be accessed via the following addresses:

"Schmierstoffe für Progressivanlagen" on: www.vogelag.com

or via the **Service Center Berlin**, phone: +49 30 72002--180.



## 2.7 Danger to the environment caused by lubricants

The lubricants as recommended by manufacturers correspond in their composition to current safety regulations. Nevertheless, oils and greases are basically substances endangering the ground water so that their storage, processing, and transport requires to take special safety measures.

#### 2.8 Installation

When carrying out any installation works on vehicles and machines, regional accident prevention regulations as well as relevant operating and maintenance specifications have to be observed.

#### 2.9 Transport and storage

KFG and KFGS pump sets will be packaged as customary in trade, complying with the regulations of the receiving country and VDA 6-01 as well as DIN ISO 9001.

There are no restrictions as to land, air, or maritime transport. Store in a dry place at a storage temperature from -40  $^{\circ}$ C to +70  $^{\circ}$ C.

#### Packages must be handled with care!

#### 2.10 Exclusion of liability

Willy Vogel AG will not assume liability for damage:

- occurred due to lack of lubricant
- · caused by soiled or improper lubricant
- caused due to the installation of non-original Vogel components or Vogel spare parts
- caused due to any use non-compliant with the intended purpose
- due to faulty installation and filling
- due to wrong electrical connection
- due to wrong programming
- due to improper reaction to failures

### 3 Installation

#### 3.1 General

The pump sets of the KFG and KFGS series form part of centralized lubrication systems in vehicles, machines, and equipment, delivering greases of up to NLGI Class 2.

The pump sets differ in the size of their lubricant vessels, in their way of filling up lubricant, as well as in their control and monitoring of functions.

The installation of function-specific pump elements allows up to three independent lubricant circuits to be operated by only one pump set. (see chapters 3.4 and 3.5).

#### 3.2 Installation

Installation of the pump sets KFG and KFGS shall be done on a vehicle or machine by means of 3 M8 bolts. The mounting should be in a place which is protected from outside influence as far as possible. Any bores required for installation shall be made according to the following diagram.

A boring jig can be ordered under article no. 951-130-115.

When carrying out boring operations, mind existing supply lines and other equipment as well as any further sources of danger, such as exhaust pipes or moving parts. Observe safety distances as well as regional regulations for installation and accident prevention.

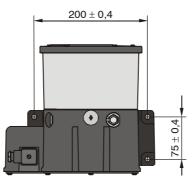
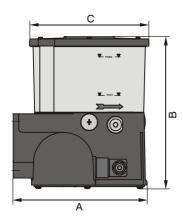


Fig. 2. Bores for installation

US

#### 3.3 Fitting dimensions



#### Table 1. Fitting dimensions

Туре	A (mm)	B (mm)	C (mm)	D (mm)	Weight (kg) with filled lubricant vessel
KFG1-5	210	230	180	226	7
KFG3-5	210	412	226	226	11
KFG5-5	210	585	205	226	15
KFGS1-5	210	282	180	226	7
KFGS3-5	210	464	226	226	11
KFGS5-5	210	637	205	226	15
KFG(S)10-5	210	282	180	226	7
KFG(S)30-5	210	464	226	226	11
KFG(S)50-5	210	637	205	226	15

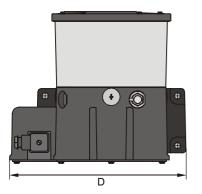


Fig. 3. Fitting dimensions



#### 3.4 Pump elements

The KFG and KFGS pump sets are provided with three lubricant outlets, to each of which a separate pump element can be connected for an independent progressively-acting distributor circuit. Where outlets are not required, a screw plug acc. to DIN 910-M20 x 1.5 - 5.8 with gasket ring acc. to DIN 7603-A20 x 24-AI will be inserted. Alternatively, you can order a screw plug KFG 1.128 from VOGEL. The pump elements shall be ordered in conformity with the necessary volumetric delivery.



Fig. 4. Pump element M14x1,5

All pump elements are provided with an M14x1.5 internal thread for connecting an excess pressure valve with a pipe connector for steel pipes of 6 mm ø or 10 mm ø.

The pump elements are marked with grooves on the outer sides of the wrench contact surface.

#### Table 2. Available pump elements

Article code	Volumetric delivery in cm3/min	Number of grooves	
KFG1.U1	2,5	1	
KFG1.U2	1,8	2	
KFG1.U3	1,3	3	
KFG1.U4	0,8	4	

The values indicated apply to a temperature of 20 °C, a counterpressure of 50 bar, and greases of NLGI-Class 2.

#### Example for ordering:

KFG1-5 24 V DC assembled with 2 pcs. KFG1.U4 left-hand and right-hand 1 pc. KFG1.U1 centre

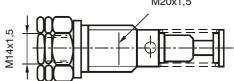


Fig. 5. KFG1.U2 Pump element with constant volumetric delivery without excess pressure valve

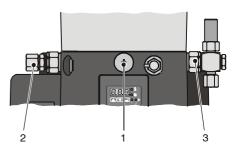


Fig. 6. Connection of pump elements

- Screw plug 1
- Pipe connector 2
- Pump element with 3
  - excess pressure valve



## Installation 0J241

#### 3.5 Excess pressure valve

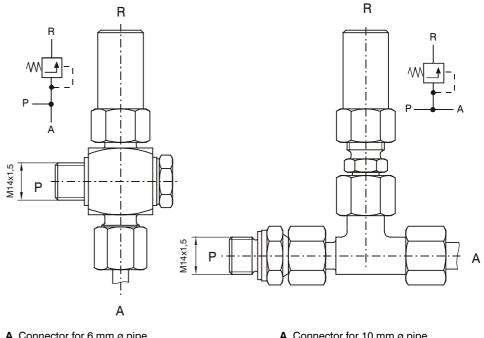
An excess pressure valve protects the entire lubrication system against excessive system pressures. It is mounted directly on the pump element. The opening pressure adjusted for this valve is 300 bar. If any blocking in a progressively-acting distributor or lubrication point causes the operating pressure increase over 300 bar, the valve will open with grease clearly emerging. This serves for visualized system control.

#### Table 3. Excess pressure valves without grease nipples

Article code	Pipe	Opening pressure in bar
161-210-012	ø 6 mm	300 ± 20
161-210-016	ø 10 mm	300 ± 20
161-210-018	ø 8 mm	300 ± 20

#### Table 4. Excess pressure valves with grease nipples

Article code	Pipe	Opening pressure in bar
161-210-014	ø 6 mm	$300 \pm 20$
161-210-025	ø 8 mm	300 ± 20



- A Connector for 6 mm ø pipe
- P Connecting thread for pump element
- R Grease outlet in case of fault

Fig. 7. Excess pressure valves

#### A Connector for 10 mm ø pipe

#### 3.6 Filling up lubricant

#### 3.6.1 Cone-shaped grease nipple

Filling with lubricant shall be done through the cone-shaped grease nipple, DIN 71412 - AM10x1, by means of a common grease gun.

#### 3.6.2 Filler coupling (fluid grease)

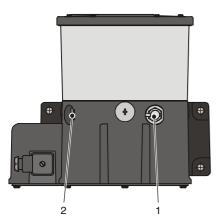
For single parts, see Vogel Catalogue 1-9430, page 51. Remove grease nipple (1) and replace it with filler 995 -000 -705 (3). Mount the coupling sleeve 995-001-500 (4) on the filling pump.

#### 3.6.3 Filling cylinder

5 Fig. 10. Filling

M20x1.5

For single parts, see Vogel Catalogue 1-9430, page 15. Remove screw plug M20 x 1.5 (2) and replace it with filler connector 169-000 - 170 (5). For filling operation, remove protective caps (6) at connector and filling cylinder.



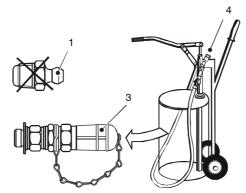


Fig. 9. Filling

#### Fig. 8. Cone-shaped grease nipple

- 1 Cone-shaped grease nipple
- 2 Connection for installation

The positioning of the cone-shaped grease nipple may be changed by screwing it in at position 2. Alternatively, connection 2 may be used for fitting a lubricant return system, if any.

#### 3.6.4 Hinged lid

As special design in the KFG and KFGS series, lubricant can be filled up through a hinged lid.



#### Fill in only clean lubricant with the help of a suitable tool. Soiled lubricant leads to serious system trouble!

#### 3.7 Checking of filling level

#### 3.7.1 Visual checking

The transparent lubricant vessel allows visual checking of the filling level. Such checking needs regularly to be carried out for safety reasons.



#### If the vessel was emptied below the "min" mark, the entire system has to be vented.

#### 3.7.2 Automatic checking

The pumps of the KFGS series are provided for automatic checking of the filling level. If the level falls below the "min" mark, the lubrication process is stopped with the error message "FLL" shown on the display.

#### 3.8 Venting of the system

Take off the main lines at the pump set. Keep pumping until bubble-free lubricant emerges at the screw fitting. Fit the main lines.

Take off the main line at the main distributor. Keep pumping until there is no air in the line. Fit the main line.

Take off the branch lines at the main distributor. Keep pumping until bubble-free lubricant emerges from all connectors of the main distributor. Fit the branch lines.

Then vent the branch lines, branch distributors, lubricant lines and lubrication points and check for proper functioning.

### 4 Electrical connection



Compare operating voltage with the data on the rating plate.

#### 4.1 General conditions of connection

#### Table 5. General conditions of connection

Туре	Nominal voltage	Power absorption (load-dependent)	Power ab- sorption (max.)	Pump starting current (abt. 20 ms)	Max. pre- connected fuse
KFG / KFGS	24 V DC	1,25 A 2)	< 2,5 A	4,5 A	3 A <sup>3) 4)</sup>
application in vehicles	12 V DC	2,4 A <sup>2)</sup>	< 5 A	9 A	5 A <sup>3) 4)</sup>
KFG / KFGS	24 V DC 1)	1,25 A <sup>2)</sup>	< 2,5 A	4,5 A	4 A <sup>4)</sup>
application in the industrial sector	12 V DC 1)	2,4 A <sup>2)</sup>	< 5 A	9 A	6 A <sup>4</sup>
industrial sector	115 V AC	k.A. <sup>5)</sup>	1,5 A	20 A	C6A
4)	230 V AC	k.A. <sup>5)</sup>	0,9 A	40 A	C6A

<sup>1)</sup> Protective measures to be applied for the operation according to the intended purpose

"Function-specific extra-low voltage with safe circuit-breaking" "Protective Extra Low Voltage" (PELV)

<sup>2)</sup> Typical value for ambient temperature = 25 °C and operating pressure =150 bar

<sup>3)</sup> Circuitbreaker acc. to DIN 72581 T.3

<sup>4)</sup> Conductor: cross-section 1.5 mm<sup>2</sup>, length  $\leq$  12 m

<sup>5)</sup> Not specified

## Electrical c01241

#### 4.2 Series KFG

Electrical connection is via a pin-and-socket connector according to DIN 43650 type A.



Fig. 11. X1 Pin-and-socket connection

#### 4.3 External control units

The following external control units are used for controlling the lubrication and pause times as well as for monitoring the lubrication process:

#### Table 6. External control units

Vehicles	Industry
IG502-2-E	IGZ 51-20-E
	IGZ 51-20-S2-E
	IGZ 51-20-S7-E
	IGZ 51-20-S8-E



Mind the operating instructions and functional description provided for the respective control units!

#### Vehicles

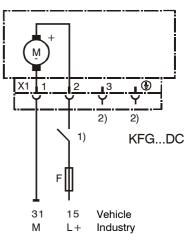
- 15 + Potential supply voltage (ignition switch ON)
- 31 Potential supply voltage (0 V, GND)
- F Fuse according to DIN 72581 T3

#### Industry DC

- L+ + Potential supply voltage (machine main switch ON)
- M Potential supply voltage (0 V, GND)

#### Industry AC

- L1/N Supply voltage machine main switch ON
- PE Protective conductor
- 1) External control unit relay contact "pump ON"
- 2) PIN without internal connection



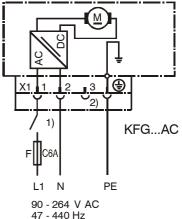


Fig. 12. Connector X1 and PIN assignment

US

#### 4.4 Series KFGS 12/24 VDC

#### 4.4.1 With integrated control

The electrical connection of the KFGS series is made at the bottom side of the set by means of a seven-pin plug.



#### Fig. 13. Connection for cable set (1)



#### The cable set is not part of the supplies!

#### Table 7. Cable set

Article no.	Length of corru- gated sleeving	Length of cores
997-000-630	12 m	12,2 m
997-000-650	16 m	16,2 m

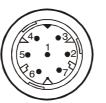


Fig. 14. Seven -pin round plug

#### Table 8. Colour marking

X1-PIN	Colour symbol	Colour of core
1	BN	brown
2	RD-BK	red/ black
3	BU	blue
4	PK	pink
5	BK	black
6	BK	black
7	VT-GN	violet /green

Core ends of the cable set which are not required must be separately insulated and fastened so that there is no risk of short circuit to ground.

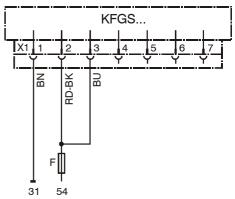
#### 4.5 Connection possibilities

Trailer operation = counter operation without system monitoring

programming: cPA, tCO, COP = OFF see Chapter 7.

#### Table 9. Cable set for trailer operation only!

Article no.	Length of corru- gated sleeving	Length of cores
997-000-760	12 m	12,2 m





31 - Potential supply voltage (0 V, GND)

54 Stop light switch signal

(consider inrush current of pump)

Electrical cQJ241

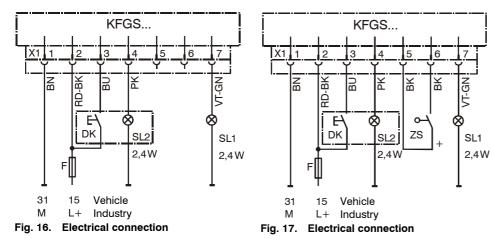
#### 4.6 Timer operation

## 4.6.1 Timer operation without system monitoring

programming: tPA, tCO, COP = OFF

## **4.6.2 Timer operation with system monitoring** programming: tPA, tCO, COP = CS

Core ends of the cable set which are not required must be separately insulated and fastened so that there is no risk of short circuit to ground.



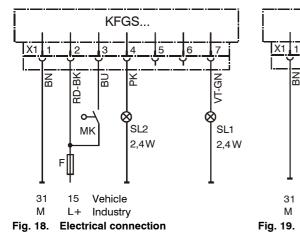
#### Table 10. Caption to Fig. 16 and Fig. 17

15	+ Supply voltage potential (ignition switch ON)	Vehicle
31	- Supply voltage potential (0 V, GND)	
L+	+ Supply voltage potential (machine main switch ON)	Industry
М	- Supply voltage potential (0 V, GND)	
DK	Push-button 1. intermediate lubrication 2. delete fault message	General
SL1	Signal lamp "pump ON"	
SL2	Signal lamp "fault"	
ZS	Cycle switch	Colours of cores see: Table 8
X1	Plug connection	

#### Counter operation 4.7

#### 4.7.1 Counter operation without system monitoring

programming: cPA, tCO, COP = OFF



#### 4.7.2 Counter operation with system monitoring programming: cPA, tCO, COP=CS

BU

Vehicle

Industry

**Electrical connection** 

2 3

RD-BK

F

15

L+

31

Μ

0-

MK

KFGS...

4

Я

SL2

2,4W

5 6

ВĶ Ж

0-

ZS

VT-GN

SL1

2,4W



Core ends of the cable set which are not required must be separately insulated and fastened so that there is no risk of short circuit to ground.

#### Table 11. Caption to Fig. 18 and Fig. 19

15	+ Supply voltage potential (ignition switch ON)	Vehicle
31	- Supply voltage potential (0 V, GND)	
L+	+ Supply voltage potential (machine main switch ON)	Industry
М	- Supply voltage potential (0 V, GND)	
MK	Machine contact	General
SL1	Signal lamp "pump ON"	
SL2	Signal lamp "fault"	
ZS	Cycle switch	Colours of cores see: Table 8
X1	Plug connection	

X1

BN

#### Note:

In counter operation with the machine contact closed, 1 pulse will be counted each time the operating voltage is switched on.

## Electrical cQJ241

#### 4.8 Series KFGS 90-264 VAC

#### 4.8.1 With integrated control

Electrical connection is via a pin-and-socket connector X1 to DIN43650 type A for voltage supply (on front side of unit) as well as a fourpole pinand- socket connector X2 M12x1 to EN60947-5-2 (on bottom side of unit).



Fig. 20. Pin-and-socket connection



Fig. 21. Pin-and-socket connector X1 to DIN43650 type A



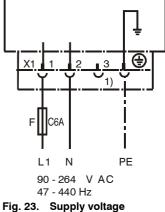
Fig. 22. Pin-and-socket connector X2 to EN60947-5-2

#### Table 12. Colour marking

X2-PIN	Colour symbol	Colour of core
1	BN	brown
2	WH	white
3	BU	blue
4	BK	black

4.9 Connection possibilities

#### Supply voltage



- L1/N Supply voltage
  - (machine main switch ON)
- PE Protective conductor
- F Fuse
- 1) PIN without internal connection

#### 4.10 Timer operation

## 4.10.1 Timer operation without system monitoring

Programming: tPA, tCO, COP = OFF

Connection:

• Signal lamp "fault" SL2 (optional)

4.10.2 Timer operation with system monitoring Programming: tPA, tCO, COP = CS

Connection:

24 VDC

X2

CS

Cycle switch CS

л – SI2

2

Y

R

BU BU

R

- Signal lamp "fault" SL2 (optional)
- a) Connection via terminal box external

b) Direct connection of system components

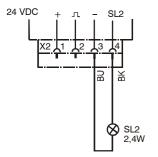


Fig. 24. Electrical connection



Core ends of the cable set which are not required must be separately insulated and fastened so that there is no risk of short circuit to ground.

- Fig. 25. Electrical connection
- X3 Coupling (nickelized) cycle switch CS

SL2

2.4W

¥ ⊡

R

- X4 Coupling (black) signal lamp "fault message" SL2
- X5 Terminal box, Distributor 179-990-700
- 2) Distributor 179-990-700 and 2 cable connectors, e.g. 179-990-371, please order separately

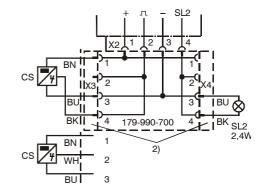


Fig. 26. Electrical connection

# 5 Display and control unit

#### **KFGS series only**

The display and control unit is protected by a transparent plastic cover against splashing water and mechanical damage. For programming, the cover has to be removed and, following programming, reattached.

The display layout has been changed since 2007. For a better understanding, Table 13 shows the symbols of the new display, compared with the inscription of the old front panel foil.



#### Table 13. Elements of the display and control panel

Description		Designation	Function			
New display	Old display					
8.8.8.		Three-digit LED display	Values and operating state			
	PAUSE h/Imp	PAUSE-LED	Pause time			
•		CONTACT- LED	Displays contact time (pump operation)			
1	O CS	CS-LED	Monitoring of system functions with an external cycle switch			
2	PS	PS-LED	Without function in progressively-acting systems			
	FAULT	FAULT-LED	Fault message			
		UP- resp. DOWN- Key	<ul> <li>Activate display</li> <li>Display values and parameters</li> <li>Set values and parameters</li> </ul>			
	SET	SET-Key	<ul><li>Change over between programming and display mode</li><li>Confirm values</li></ul>			
	DK	DK-Key	<ul><li>Activate intermediate lubrication</li><li>Clear fault message</li></ul>			

Fig. 27. Display and control panel

#### 5.1 Three-digit LED display

During normal operation, the display is off. It is activated by briefly operating one of the two pushbuttons **() ()**. It is used for displaying current values and preset parameters. In addition, the display is used for operator prompting during programming of operating parameters.

#### Table 14. Three-digit LED display

Display	Denotation	Explanation	Control function		
Fbb	t = TIMER <b>PA</b> = PAUSE	The control unit operates as a time- controlled contact maker (TIMER) and is in the PAUSE state	Part of lubrication cycle Input and display value in hours		
c P R	c = COUNTER PA = PAUSE	The control unit operates as a contact counter (COUNTER) and is in the PAUSE state	Part of lubrication cycle The unit counts the impulses from the external contact maker and compares them with the preset values		
E C O	t = TIMER CO = CONTACT	The control unit operates as a time- controlled contact maker (TIMER) and is in the pump running time (CONTACT)	CONTACT = time during which the pump is delivering Input and display value in minutes		
c [ 0	c = COUNTER CO = CONTACT	The control device is working as pulse counter and is in the pump operating period (CONTACT)	CONTACT = time during which the pump is delivering Input and display value in pulses		
COP		Display of beginning of menu "monitoring settings"			
0 F F	Monitoring OFF	The monitoring functions PS and CS are deactivated	No system monitoring		
C S	Cycle Switch	Cycle switch monitoring is activated	The cycle switch is monitored for the transmission of signals during the pump running time CONTACT.		

US

#### Table 14 continued

Display	Denotation	Explanation	Control function	
FLL	Fault: Low Level	The minimum level in the reservoir has been reached.	The control unit is in the FAULT mode. The sequence of operations is stopped.	
FES	Fault: Cycle Switch	No signal from cycle switch during pump running time	The control unit is in the FAULT mode. The sequence of operations is stopped.	
0h	Operation Hour Meter	The subsequently displayed values are the operating hours of the control unit.		
ዮኯ	Fault Hour Meter	The values displayed in the following are the fault hours which is the time while the vehicle or machine has been operated in the FAULT mode.		
δίο	<b>Blo</b> ck operation	Signal from cycle switch missing. Contrary to normal operation, the control unit is still in the monitoring mode. If the fault continues to exist for 3 pump running periods, a fault message is displayed.		

LED	LED lights = display mode	LED flashes = programming mode	
Operating voltage is applied to pump unit and control unit. The system is in the PAUSE state		The value for PAUSE may be changed.	
Operating voltage is applied to pump unit and Value for CONTACT can be changed control unit, system is in operating state CONTACT (pump motor ON)			
1	For system monitoring, a cycle switch is used. Monitoring takes place at the progressively-acting distributor while the pump is in operation. (CONTACT)	This mode of monitoring can be switched off in the programming mode. COP = CS (monitoring is active) COP = OFF (monitoring is switched off).	
2	Pressure switch monitoring is not possible in progressively-acting progressivelydistributor systems. LED must not be ON.	acting progressively distributor activated in progressively acting systems. COP = CS or COP = OFF	
• *	The operating voltage is applied to the pump unit and control unit. The control unit is in the operating state FAULT. The fault can be called up via the LED display and displayed as error code after pressing of the pushbutton <b>O</b> . The sequence of operations is stopped.		

# Table 15. Display via light-emitting diodes

# 5.3 Functions of operating keys

# Table 16. Functions of operating keys

Key	Function
	Operating the button during PAUSE will initiate an intermediate lubrication cycle Fault messages are acknowledged and cleared
	Switching on the display in the display mode Calling the next parameter in the programming mode Increases the displayed value by 1
	Switching on the display in the display mode Calling the previous parameter in the programming mode. Decreases the displayed value by 1
	Change over between programming and display mode Confirm entered values

US

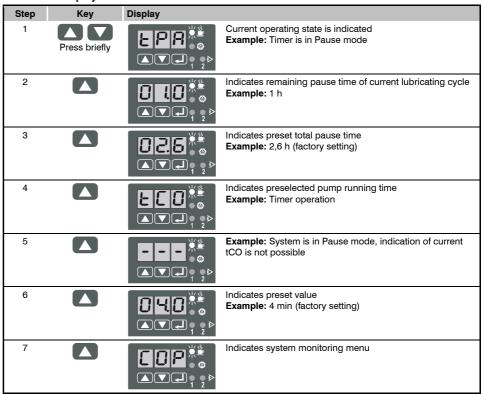
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# 6 Display mode

Lighting of the LED indicators signifies that the unit is in the display mode. **No flashing!** Using this mode, the user can have current settings and operating parameters displayed

# Start the display mode always by briefly pressing one of the two keys

# Table 17. Display mode



# Table 17 continued

	onunueu			
Step	Key	Display		
8		Monitoring deactivated (factory setting)	or monitoring via cycle switch	or Is not permitted for progressive systems!
9			Indicates operating hours	
10/11		Example: Part 1 of total value. Note down!	Part 2 of total value, Total value: 00533,8 h Maximum value: 99999,9 h	
12			Indicates fault hours	
13/14		Example: Part 1 of total value. Note down!	Part 2 of total value, Total value: 00033,8 h Maximum value: 99999,9 h	
15		LED indicators extinguish O Oh and Fh values are sto	red in an undeletable way in th	e EEPROM

# ProgrammiQJ241

# 7 Programming

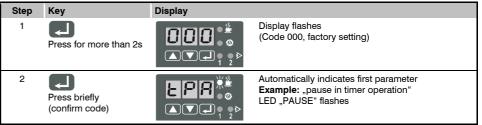
- 7.1 Starting the programming mode
- You can see from the **flashing of the LED** indicators that the programming mode is active.

# 7.2 Changing the lubrication interval times

# Note concerning step 2:

the manufacturer's code 000 has already been changed, you have to select the new code with keys 🖾 🖾 and confirm it with key 🛃.

# Table 18. Starting the programming mode



# Table 19. Changing the lubrication interval times

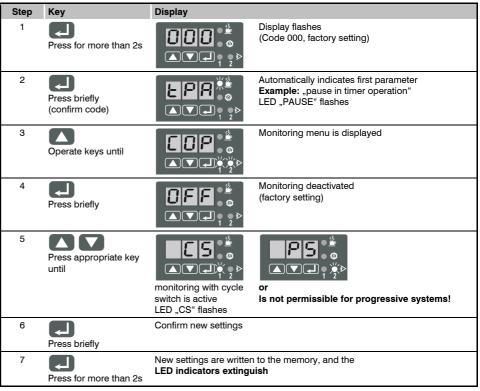
Step	Кеу	Display	
1	Press for more than 2s		Display flashes (Code 000, factory setting)
2	Press briefly (confirm code)		Automatically indicates first parameter Example: "pause in timer operation" LED "PAUSE" flashes
3	Press briefly		Pause time 1 h (factory setting)
4			Set new value <b>Example:</b> 6,8 h = 6 h 48 min

## Table 19 continued

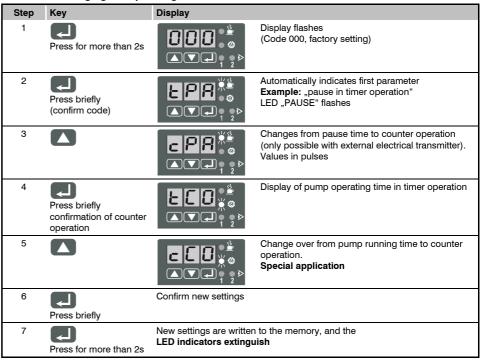
Step	Key	Display	
5	Press briefly (confirm new value)	₽₽₽ ★@ ▲▼₽₽	Indicates next parameter "pump running time in timer operation" LED "contact" flashes
6	Press briefly		Pump running time: 4,0 min (factory setting) For permissible setting range for KFG/KFGS, see Technical data, section 10
7			Set new value <b>Example:</b> 3 min
8	Press briefly	Confirm new value	
9	Press for more than 2s	Changes are written to the memory, and the LED indicators extinguish.	

7.3 Changing the system monitoring

# Table 20. Changing the system monitoring



- 7.4 Changing the operating mode
- Table 21. Changing the operating mode



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# ProgrammiQJ241

# 7.5 Changing the code



The code set by the manufacturer has, thus, been cleared, and the newly set value is effective. Note down the new value and keep it at a safe place. If the code is forgotten, the parameters can no longer be programmed. You will have to return the pump unit in this case to your dealer or local VOGEL office.

### Important!

Do not use the figures 321 as new code.

# 7.6 Programming ranges

### Table 23. Programming ranges

Function		Programming ranges 1)	
	Pause time	0,1 h to 99,9 h	
	Pump running time	0,1 min to 99,9 min	
	Pulses	1 to 999	

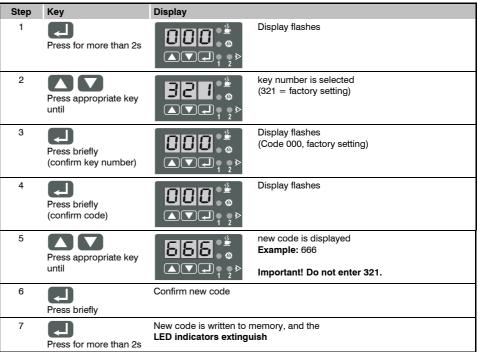
<sup>1)</sup> For permissible settings for KFG(S) 90-264 VAC, see Technical data section 10.

# 7.7 Display ranges

### Table 24. Display ranges

Display	Display ranges	
Fault hours	0,1 h to 99.999,9 h	
Operating hours	0,1 h to 99.999,9 h	

#### Table 22. Changing the code



# 8 Operating modes

# 8.1 Timer operation

Pause and pump operation dependent on time.

# 0

# Set tPA and tCO in programming mode.

The time-dependent preset values for PAUSE and CONTACT control the lubrication cycle.

PAUSE:	Values in <b>hours</b>
CONTACT:	Values in <b>minutes</b>

# 8.2 Counter operation

Pause dependent on number of pulses. Pump operation is time-dependent

# Set cPA and tCO in programming mode. An external pulse generator needs to be connected as described in chapter 4.5, page 17.

PAUSE:Values in pulsesCONTACT:Values in minutes

The external transmitter controls the pause time in accordance with the machine movements and preset values. The pump running time (tCO) is programmed in minutes. 8.2.1 Operation in vehicles only for trailers and semi-trailers

Lubricating operation without system monitoring COP = OFF.

The pump set is not equipped with permanent power supply.

# The pump is electrically connected with the stop light circuit. Please observe regional regulations for installation!

The control device counts the brake signals during the **PAUSE**. When the preset value of the pulses **cPA** to be counted has been reached, lubrication will be released.

Braking times of a vehicle are usually smaller than the set pump operating time **tCO** (the factory setting is 4 min).

During the following braking processes the control device will perform lubricating operations until the set pump operating time **tCO** is reached.

After that a new lubrication cycle will start with the pause **cPA**.

# Operating r01241

#### 8.3 No system monitoring

In this mode of operation, the lubrication cycle is controlled exclusively by the preset values for PAUSE and CONTACT.



Die The monitoring function must be disabled COP = OFF. System faults are not automatically detected and displayed.

#### 8.4 With system monitoring

In this mode, additional monitoring of the system functions is performed by external switches.

# The following can be monitored:

- the level in the lubricant reservoir
- · the function of the progressive feeder via a cycle switch

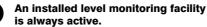


Faults are automatically detected and displayed. The monitoring function is active COP = CS



**H** 

#### Level monitoring 8.5



When the level in the lubricant reservoir drops below the minimum mark, the lubrication cycle will stop, and a fault message is output in the display.



- Fig. 28. Fault message
- FLL: Fault Low Level



Retrofitting of a pump set with the "filling level monitoring" feature. which did not have this feature before, is possible only in the factory. The set needs then to be sent to the factory.

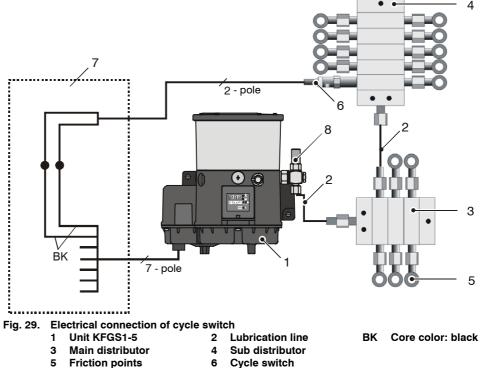
8.6 Monitoring by cycle switch



Possible only for centralized lubrication systems with progressively-acting distributors. For greases up to NLGI Class 2.

The cycle switch monitors the movement of the pistons in the progressively-acting distributor during the CONTACT time.

In the programming mode, the following monitoring feature must be activated: **COP = CS** 



- 7 Electric compartment
- 8 Excess pressure valve

# 01241 Faults

#### 9 Faults



Check level in reservoir at regular intervals. If the reservoir has been emptied completely, the entire system must be bled after topping up.

All fault messages are displayed as a central-

ized alarm via the light-emitting diode  $\bullet$ When a fault message is output, the normal sequence of operations is stopped by the control unit. and the fault concerned is stored and displayed. The cause of the fault can be read on the display. This considerably facilitates the fault diagnosis. This function is available only, if system monitoring is active, however.

#### 9.1 **Displaying faults**

Start display mode with one of the two keys Operate 
until fault is displayed. (Table 25):

9.2 Clearing the fault message

All fault messages can be acknowledged and cleared with key 
. When the unit is operated in the Timer mode, this can also be performed via a connected external pushbutton.

The further sequence of operations is stopped.

### Table 25.

**Displaying faults** Display Meaning FES Fault Cycle Switch: No signal from cycle switch during pump running time. (see section 9.5 - block operation) F I I Fault Low Level: Lubricant has dropped below minimum level in reservoir.

Before clearing the fault message, determine and rectify cause of fault. The user himself shall be liable for any damage resulting from the operation of the vehicle without lubrication.

The time for which the control unit and the pump unit have been operated without lubrication is stored in an undeletable manner in the EEPROM as fault hours Fh.

# 9.3 Storing the fault times

### Fault time counter

The time passed from the generation of a fault message till its acknowledgement is added in hours. After acknowledgement, this value will automatically be recorded by the fault hour meter.

### Fault hour counter

In the fault hour counter, all fault times which have occurred during the entire operating period of the unit are totaled up. After calling up parameter Fh, you can read out the current reading of the counter in the display mode in two blocks of three digits each (see section 6).

The counter can display a maximum of 99,999.9 hours. The smallest storable interval is 0.1 hour = 6 minutes.

The memory cannot be erased.

# 9.4 Maintenance and repair

Carry out the following maintenance and inspection works at regular intervals:

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- Check level in reservoir
- Check the plant components for leakage at regular intervals
- Check the bearings visually for a proper lubricating condition
- · Check electrical cables for damage
- · Check electrical connections and contacts
- You can check the basic function of the control unit and system components by initiating an intermediate lubrication cycle
- Check electrical connections in case of fault
  messages
- Replace defective fuses only by equivalent new ones

### Any works beyond the abovementioned scope shall be performed only by approved VOGEL service personnel.

The service life of the pump elements depends to a decisive extent on the cleanness of the lubricants used.

# Faults QJ241

The control unit responds to a missing signal from the cycle switch by changing over to the block mode. Possible causes:

- Defective lubricant lines
- Clogged progressive feeder
- Defective cycle switch
- · Lack of lubricant

# No signal from cycle switch during pump running time:

- Normal operation is aborted
- Block pause commences with interrogation of cycle switch

# No signal from cycle switch during block pause:

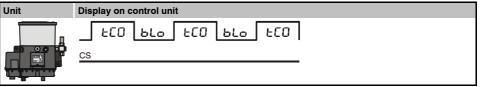
 Second lubrication cycle commences in block mode

As soon as a signal from the cycle switch is received, block operation is aborted, and the normal lubrication cycle commences with the pause.



A total of three lubrication cycles will be performed with checkback of the cycle switch.

# Table 26. No signal from cycle switch



Three pump operation periods and two block pauses without signal from the cycle switch! → Abortion of block operation, display of fault message!



Fig. 30. Display

# Table 27. Duration of block pause

Pause normal operation tPA	Block pause blo
0,1 h = 6 min	6 min
0,2 h = 12 min	12 min
0,3 h and longer	15 min



Determine and eliminate cause of fault!

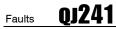
# Page 38

# 9.6 Pump faults

# Table 28. Pump faults

Fault	Cause	Remedy
Pump Stirring arm in the grease storage vessel does not rotate during the activated pump operation period	Mechanical damage, e.g., motor defective.	Exchange pump     Disconnect main lubricant line at outlet of pressure relief valve     Disconnect electrical connection     Unscrew three fastening screws     Dismount defective pump     Install new pump, and connect lubricant line as well as electrical cable     Put pump into operation and carry out functional test!     Make sure that pause and contact time values are correct!
	Electrical connection interrupted	<ul> <li>Check fuse, and replace it, if necessary</li> <li>Check electrical connections</li> <li>Check cable set for damage!</li> </ul>
<b>Pump no function</b> When pressing the <b>C</b> key, although all electrical connections are in order.	<ul><li>Electrical control has failed</li><li>Pump drive/motor defective</li></ul>	Exchange pump
Pump is not delivering lubricant, although the stirring arm is rotating.	Lubricant level in reservoir below minimum	Top up lubricant reservoir up to "max"
	• Check valve in pump element does not close. (Can be seen from the fact that the outlet can be kept closed with the finger when the main line is dismounted.)	Exchange pump element Pay attention to: Metering mark with grooves
	Suction problems due to air inclusions in grease	Dismount pump element, and operate pump via key 🚺 until grease emerges at housing outlet
	• Pump element does not build up pressure, pump element is worn. (Can be seen from the fact that the outlet can be kept closed with the finger when the main line is dismounted.)	Exchange pump element Pay attention to: Metering mark with grooves





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# Table 28 continued

Fault	Cause	Remedy
Pressure relief valve on pump opens, and lubricant emerges	<ul> <li>System pressure exceeds 300 bars, e.g., due to clogging of distributor or clogged lubrication point</li> </ul>	Check system, and carry out repair or modification of system so that the system pressure at 20 °C will not exceed 200 bars as a maximum
	<ul> <li>Valve damaged or soiled so that it does not close properly</li> </ul>	Exchange pressure relief valve

# 10 Technical data

Protective measures to be applied for appropriate operation in the machine area KFG(S) 12/24 VDC:

- "Functional extra-low voltage with protective separation", "Protective Extra Low Voltage" (PELV)
- Disconnect unit for performing insulation and voltage test to EN 60204-1 1992

### Table 29. Technical data

Data	Value			
	KFG(S) 1-5	KFG(S) 3-5	KFG(S) 5-5	
Weight	see Table 1, page 10	see Table 1, page 10	see Table 1, page 10	
Reservoir volume	21	6,3 l	101	
Reservoir material	PA6i	PMMI	PMMA	
	12/24 VDC	90264 VAC		
Permissible operating temperature	-25 °C to +75 °C	-25 °C to +60 °C		
Electrical specification	see Table 5, page 15	see Table 5, page 15		
Type of protection to DIN 40050, T9	IP5k5	IP55		
Operating mode/operating time to VDE0530/ DIN 41756	S1 continuous operation	at -25 °C40 °C: S1 continuous operation at 40 °C60 °C: running time 010 min min. pause time = 4 x running time (20% ED) running time 1015 min minimum pause time = 2h		
Expected motor life	typically 3000h	typically 3000h		
	All types			
Max. back pressure	300 bars			
Number of outlets (if fewer than 3 outlets are required, screw plugs must be used in place of the pump elements)	max. 3			
Outputs	see Table 2, page 11			
Conforms to EC directives	see chapter 1, page 5			
Lubricant	Greases NLGI grade 1 to 2 with EP additives, compatible with plastics, NBR elastomers, copper and copper alloys			
Flow pressure	up to max. 700 mbarc			
Electrical data see chapter 4, page 15				

Service QJ241

# 11 Service

Please contact our sales offices or our international representatives if you have any questions or problems.

You can find a list with current addresses on the Internet at:

• www.vogelag.com

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Notes	QJ241	US

Ν	otes

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Willy Vogel Aktiengesellschaft A company of the SKF group

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# EG Einbauerklärung für unvollständige Maschinen nach EG-Maschinenrichtlinie 2006/42/EG, Anhang II Teil B 951-190-032

# EC Declaration of Incorporation

for partly completed machinery in accordance with EC-Machinery Directive 2006/42/EC, Appendix II Part B

Für das Produkt: For the following designated product:	Kolbenpumpe mit Behälter Piston Pump with Reservoir
Baureihe:	KFG(C)*, KFG(L)*, KFG(S)*, 772*
Product line:	KFG(C)*, KFG(L)*, KFG(S)*, 772*

wird hiermit bestätigt, dass es den wesentlichen Schutzanforderungen der Maschinenrichtlinie 2006/42/EG entspricht und zum Einbau in eine Maschine / zum Zusammenbau mit anderen Maschinen zu einer Maschine bestimmt ist. Die Inbetriebnahme des bescheinigten Produktes ist so lange untersagt, bis die Konformität der Gesamtmaschine, des Fahrzeuges o.ä., in welches das Produkt eingebaut wurde, mit den nationalen Arbeitsschutzbestimmungen, insbesondere der Umsetzung der Arbeitsmittelbenutzungsrichtlinie, hergestellt wurde. Hier angewendete harmonisierte Normen sind insbesondere DIN EN 809:1998-07, DIN EN ISO 12100-1:2004-04 und DIN EN ISO 12100-2:2004-04.

it is hereby confirmed that it conforms to the essential protection requirements set out in the Machinery Directive2006/42/EC and that it is intended for installation in a machine / for assembly with other machinery to form a machine. The certified product must not be started up until it is assured that the machine, vehicle or the like in which the product was installed meets the provisions and requirements of the national directives to be applied. This is in particular important for the implementation of the Use of Work Directive. The harmonized standards applied here are, in particular DIN EN 809:1998-07, DIN EN ISO 12100-1:2004-04 and DIN EN ISO 12100-2:2004-04.

Das bescheinigte Produkt entspricht weiterhin allen relevanten Bestimmungen der Richtlinie(n): Furthermore the certified product conforms to all relevant requirements of the directive(s):

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Elektromagnetische Verträglichkeit 2004/108/EG Electromagnetic compatibility 2004/108/EC

Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (Niederspannungs-Richtlinie) 2006/95/EG Electrical equipment for use within certain voltage limits (Low-voltage Directive) 2006/95/EC

Elektromagnetische Verträglichkeit von motorbetriebenen Fahrzeugen und deren elektrischen und elektronischen Komponenten 2006/28/EG Automotive electromagnetic compatibility 2006/28/EC

# SKF Lubrication Systems Germany AG

2. Industriestraße 4 · 68766 Hockenheim · Deutschland Tel. +49 (0)6205 27-0 · Fax +49 (0)6205 27-101 · www.skf.com/schmierung

Vorsitzender des Aufsichtsrates Henrik Lange Vorstand Frank Bechtloff (Vorsitzender), Andreas Breuer Sitz der Gesellschaft: Berlin – Registergericht Amtsgericht Charlottenburg, HRB 95216 B





In Bezug auf die Druckgeräte-Richtlinie 97/23/EG darf das bescheinigte Produkt nur bestimmungsgemäß und entsprechend den Hinweisen aus der Dokumentation verwendet werden.

In accordance with the Pressure Equipment Directive 97/23/EC the certified product may only be used for its intended purpose and in accordance with the information contained in the documentation. Der Hersteller verpflichtet sich, die technischen Unterlagen zum bescheinigten Produkt einzelstaatlichen Stellen auf Verlangen elektronisch zu übermitteln.

The manufacturer commits to transfer the technical documentation of the certified product in electronic form on request to the competent authorities of the Member States.

Die zum bescheinigten Produkt gehörenden technischen Unterlagen nach Maschinenrichtlinie 2006/42/EG Anhang VII Teil B wurden vollständig erstellt.

All required documents for the technical documentation of the certified product, in accordance with Machinery Directive 2006/42/EC Appendix VII Part B, are completely established.

Der Dokumentationsverantwortliche ist: Person responsible for documentation: stellv. Leiter Konstruktion Werk Hockenheim , Tel.: +49 6205 27 566 assistant Manager Engineering, Plant Hockenheim

Diese Erklärung erfolgt verantwortlich für den Hersteller / Importeur. This declaration takes responsibility for the manufacturer / importer.

SKF Lubrication Systems Germany AG

vertreten durch represented by

Berlin, den 04.01.2010

Frank Bechtloff Vorsitzender des Vorstandes President

Jürgen Kreutzkämper Leiter Konstruktion und Entwicklung Director R&D Lubrication Systems

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Vorsitzender des Aufsichtsrates: Henrik Lange Vorstand: Frank Bechtloff (Vorsitzender), Andreas Breuer Sitz der Gesellschaft: Berlin – Registergericht: Amtsgericht Charlottenburg: HRB 95218 B

# EG Konformitätserklärung 951-200-026

# EC Declaration of Conformity

Für das Produkt:	Kolbenpumpe mit Behälter
For the following designated product:	Piston Pump with Reservoir
Baureihe:	KFG(C)*, KFG(L)*, KFG(S)*, 772*

Product line:

KFG(C)\*, KFG(L)\*, KFG(S)\*, 772\*

wird hiermit bestätigt, dass es den nachfolgend gekennzeichneten wesentlichen Schutzanforderungen, die in den Richtlinien des Rates zur Angleichung der Rechtvorschriften der Mitgliedsstaaten festgelegt sind, entspricht. *it is hereby confirmed that it conforms to the essential protection requirements set out in the Directive(s) of the Council for harmonization of the Member States' legal regulations.* 

$\boxtimes$	Elektromagnetische Verträglichkeit 2004/108/EG Electromagnetic compatibility 2004/108/EC Hinweise unter (a) beachten Observe the remarks in (a)	
$\boxtimes$	Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (Niederspan- nungs-Richtlinie) 2006/95/EG Electrical equipment for use within certain voltage limits (Low-voltage Directive) 2006/95/EC	
	Elektromagnetische Verträglichkeit von motorbetriebenen Fahrzeugen und deren elektrischen und elektronischen Komponenten 2006/28/EG Automotive electromagnetic compatibility 2006/28/EC	
	Maschinenrichtlinie 2006/42/EG Machinery Directive 2006/42/EC Hinweise unter (b) beachten, siehe auch Einbauerklärung Observe the remarks in (b), also see Declaration of Incorporation	

Weitere Angaben über die Einhaltung dieser Richtlinie(n) enthält der Anhang zu dieser Erklärung. Der Anhang ist Bestandteil dieser Erklärung.

Further details on compliance with this/these Directive(s) are contained in the appendix to this declaration. The appendix is constituent part of this declaration.

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Vorsitzender des Aufsichtsrates: Henrik Lange Vorstand: Frank Bechtloff (Vorsitzender), Andreas Breuer Sitz der Gesellschaft: Berlin – Registengericht: Antsgericht Charlottenburg, HRB 95218 B





Der Dokumentationsverantwortliche ist: Person responsible for documentation:

stelly. Leiter Konstruktion Werk Hockenheim , Tel.: +49 6205 27 566 assistant Manager Engineering, Plant Hockenheim

Diese Erklärung erfolgt verantwortlich für den Hersteller / Importeur. This declaration takes responsibility for the manufacturer / importer.

SKF Lubrication Systems Germany AG

vertreten durch represented by

Berlin, den 04.01.2010

Frank Bechtloff Vorsitzender des Vorstandes President

Jürgen Kreutzkämper Leiter Konstruktion und Entwicklung Director R&D Lubrication Systems

Diese Erklärung bescheinigt die Übereinstimmung mit der(n) genannten Richtlinie(n), beinhaltet jedoch keine Zusicherung von Eigenschaften.

This declaration certifies conformity with the aforementioned directive(s), but does not contain any assurance of properties.

- Die Sicherheitshinweise in der dem Produkt beigefügten Dokumentation sind zu beachten. The safety instructions in the documentation included with the product must be observed.
- Der Betrieb der Produkte an nicht normgerechter Netzspannung, sowie die Nichtbeachtung von (a) Installationshinweisen kann Auswirkungen auf die EMV-Eigenschaften und auf die elektrische Sicherheit haben.

Operation of the products on non-standard mains voltage as well as nonobservance of installation instructions can affect the EMC properties and electrical safety.

Die Inbetriebnahme des bescheinigten Produktes ist so lange untersagt, bis die Konformität der (b) Gesamtmaschine, des Fahrzeuges o.ä., in welches das Produkt eingebaut wurde, mit den nationalen Arbeitsschutzbestimmungen, insbesondere in Umsetzung der Arbeitsmittelbenutzungsrichtlinie, hergestellt wurde.

The certified product must not be started up until it is assured that the machine, vehicle or the like in which the product was installed meets the provisions and requirements of the national directives to be applied. This is in particular important for the implementation of the Use of Work Directive.

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Vorsitzender des Aufsichtsrates Henrik Lange Vorstand Frank Bechtloff (Vorsitzender), Andreas Breuer Sitz der Gesellschaft. Berlin – Registergericht, Amtsgericht Charlottenburg, HRB 95218 B

# Anhang zur EG Konformitätserklärung Appendix to EC Declaration of Conformity

Die Übereinstimmung wurde festgestellt: *Conformity was ascertained:* 

1. durch Anwendung folgender (harmonisierter) europäischer Normen bezüglich der(n) Richtlinie(n): 1. through application of the following (harmonized) European standards in respect to the Directive(s):

# Elektromagnetische Verträglichkeit 2004/108/EG Electromagnetic compatibility 2004/108/EC

Ausgabedatum Edition
2005-08
2007-01

# Niederspannungs-Richtlinie 2006/95/EG Low-voltage Directive 2006/95/EC

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2. durch die Prüfstelle bezüglich der(n) Richtlinie(n):
 2. by the testing agency in respect to Directive(s):

# Elektromagnetische Verträglichkeit 2004/108/EG

Electromagnetic compatibility 2004/108/EC Name: Name: Anschrift: Address: Bescheinigung: Certificate: Ausgestellt am: Issued on:

# Niederspannungs-Richtlinie 2006/95/EG

Low-voltage Directive 2006/95/EC Name: Name: Anschrift: Address: Bescheinigung: Certificate: Ausgestellt am: Issued on:

# Maschinenrichtlinie 2006/42/EG (ggf. Einbauerklärung anfordern) Machinery Directive 2006/42/EC (ask for Declaration of Incorporation if peressary)

Referenznummer	Ausgabedatum
Reference number	Edition

# Maschinenrichtlinie 2006/42/EG

Machinery Directive 2006/42/EC Name: Name: Anschrift: Address: Bescheinigung: Certificate: Ausgestellt am: Issued on:

# SKF Lubrication Systems Germany AG

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Vorsitzender des Aufsichtsrates: Henrik Lange Vorstand: Frank Bechtloff (Vorsitzender), Andreas Breuer Sitz der Gesellschaft: Berlin – Registergericht: Amtsgericht Charlottenburg, HRB 95218 B

Data Sheet No. F32002 Revision: 02 10 2002

REPLACES F32002 : 11 01 01

This data sheet has been prepared in accordance with the requirements of the Data Sheet Directive 91/155/EEC.

### RECOMMENDED USES

Shell Agricultural Gas Oil is recommended for use as :

a fuel for small industrial boilers for horticultural and agricultural space heating applications, furnaces and dryers.

If Shell Agricultural Gas Oil is used for a purpose not covered in this section, Shell UK Ltd would be grateful to receive information on the application.

## KNOWN MISUSES/ABUSES

Shell Agricultural Gas Oil is not to be used as :

a solvent or cleaning agent. It should never be siphoned by sucking the liquid up a tube by mouth, or stored near sources of heat or ignition.

The disposal of Shell Agricultural Gas Oil to soil, watercourses and drains is a legal offence.

# 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

PRODUCT :	SHELL AGRICULTURAL GAS OIL
COMPANY :	SHELL UK OIL PRODUCTS LIMITED
TECHNICAL CONTACT:	PRODUCT HSE DEPARTMENT
ADDRESS :	STANLOW MANUFACTURING COMPLEX, PO BOX 3. ELLESMERE PORT. CH65 4HB
TELEPHONE :	0151-350-4000
EMERGENCY TELEPHONE NUMBER :	0151-350-4595

## 2: COMPOSITION/INFORMATION ON INGREDIENTS

Shell Agricultural Gas Oil is a preparation manufactured from gas oils, derived from crude petroleum, and additives, none of which impart any additional hazard to the finished product.

The hydrocarbon components will include straight-run gas oil, and may contain vacuum and/or cracked gas oil components.

It is a requirement of H.M. Customs and Excise that all reduced duty fuels contain Quinizarin and C.I. Solvent Red 24. Rebated fuels marketed within the European Union must also contain C.I. Solvent Yellow 124. Shell Agricultural Gas Oil contains C.I.Solvent Red 24, Quinizarin and C.I. Solvent Yellow 124 at 4 ppm, 1.75 ppm and 6 ppm respectively.

-----

The following components, which have health effects, are present at significant concentrations. ----

CONC.	COMPONENT	EINECS	CLAS	S RISK PHRASES		
< 100%	Fuels, diesel	269-822-7	Xn Xn N	R40 Limited evidence of a carcinogenic effect R65 Harmful: may cause lung damage if swallowed R66 Repeated exposure may cause skin dryness and cracking R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment		
Exposure limit values exist for the following constituents:						

None.

- - - - -

## **3: HAZARD IDENTIFICATION**

Shell Agricultural Gas Oil is classified for supply purposes as : Harmful (R40: Limited evidence of a carcinogenic effect and R65: Harmful: may cause lung damage if swallowed), and Dangerous for the Environment (R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment).

Shell Agricultural Gas Oil satisfies the criteria for the additional risk phrase - R66: Repeated exposure may cause skin dryness or cracking.

Shell Agricultural Gas Oil is a combustible liquid, which may explode under certain conditions, e.g. in the presence of electrostatic charges generated, for example, during pumping or tank cleaning or by other sources of ignition or flame impingement on containers.

Accidental ingestion can lead to vomiting and aspiration into the lungs, which can result in chemical pneumonitis, which can be fatal.

Prolonged and repeated skin contact can lead to defatting of the skin, drying, cracking, dermatitis, erythema, oil acne and oil folliculitis. Warty growths have occurred and these can become cancerous.

Exposure to high vapour concentrations can lead to nausea, headache and dizziness. Excessive and prolonged exposure to mists may cause a chronic inflammatory reaction of the lungs and a form of pulmonary fibrosis.

It should be assumed that the flashpoint of Shell Agricultural Gas Oil is equal to or less than 60.5 Deg. C. unless the carrier has obtained contrary test data. Consequently, Shell Agricultural Gas Oil is classified for conveyance purposes as a flammable liquid.

Shell Agricultural Gas Oil will not biodegrade in anaerobic conditions and, hence, can be persistent. It contains components which have a high potential to bioaccumulate.

#### 4: FIRST AID MEASURES

#### INHALATION

Remove the affected person to fresh air. If breathing has stopped administer artificial respiration. Give cardiac massage if necessary. If the person is breathing, but unconscious, place in the recovery position. Obtain medical assistance immediately.

### <u>SKIN</u>

Flush the contaminated skin with water. Use soap if available. Contaminated clothing should be soaked with water, removed, and laundered before reuse.

# EYES

Flush the eye with copious quantities of water. If irritation persists refer for medical attention.

### INGESTION

DO NOT INDUCE VOMITING. If ingestion is suspected, wash out the mouth with water, and send to hospital immediately. Show this Data Sheet to the physician drawing attention to "Notes for Doctors" in Section 11 below.

#### 5: FIRE-FIGHTING MEASURES

Extinguishants

- Large Fire : - Small Fire : Foam/Water Fog - NEVER USE WATER JET Foam/Dry Powder/CO2/Sand/Earth

#### 6: ACCIDENTAL RELEASE MEASURES

# LAND SPILLAGES

IMMEDIATE EMERGENCY ACTION Clear people away from the area to a safe place Do not operate electrical equipment unless flameproof Summon aid of emergency services if warranted Treat or refer casualties if necessary

FURTHER ACTION - FIRE

IF SAFE : -Stop product flow Use foam, dry powder or carbon dioxide extinguishers Containers exposed to fire can be cooled by water fog/spray \*\*\* NEVER USE WATER JET \*\*\*

FURTHER ACTION - SPILLAGE IF SAFE : -Extinguish naked lights, eg cigarettes - AVOID MAKING SPARKS Position fire fighting equipment Try to stop the flow of liquid product Prevent product entering waterways, drains etc. (Covering with wet sacking helps) Use sand, earth or other suitable material If product reaches waterways, drains etc. inform local and fire authorities Reclaim product directly or absorb in suitable medium and transfer to suitable, clearly marked containers See section 13 for disposal of contaminated product and waste

# MARITIME SPILLAGES

Any spillage of Shell Agricultural Gas Oil which results in overside pollution must be treated in accordance with the guidelines laid down in the respective Vessel Oil Spill Response Contingency Plan, as required by MARPOL 73/78 Annex 1, Regulation 26. Where the vessel is not required to comply with such legislation, the Owner's and/or Charterer's instructions must be followed. In the absence of any other guidelines, any spillage in territorial/coastal waters must be immediately reported to the appropriate maritime authority, e.g. coast guard, the vessel's local agent if applicable, and the vessel's Owner/Charterer. In international waters, any spillage should be reported to the nearest coastal state, and additional guidance should sought immediately from the vessel's Owner/Charterer.

# 7: HANDLING AND STORAGE

#### HANDLING

Shell Agricultural Gas Oil is designed to be used in closed systems and in off-road vehicle fuel systems. No special handling precautions are necessary other than care to avoid skin contact with the product. Owing to its classification as a carcinogen, care should be taken to minimise contact. Electrical continuity is required between the transport and storage vessels during product transfer.

#### STORAGE

The main considerations relating to the storage of Shell Agricultural Gas Oil are the suitability of the storage vessel and the avoidance of sources of ignition.

### 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### EXPOSURE LIMIT VALUES

The following limits are taken from The Health and Safety Executive's Guidance Note EH40 Occupational Exposure Limits 2000.

None.

## RECOMMENDED PROTECTIVE CLOTHING

Impervious gloves and overalls where regular contact is likely, and goggles if there is a risk of splashing

# QJ241

# 9: PHYSICAL AND CHEMICAL PROPERTIES

## **10: STABILITY AND REACTIVITY**

# **CONDITIONS TO AVOID**

Sources of ignition. Extremes of temperature.

#### MATERIALS TO AVOID

Strong oxidising agents, eg. chlorates which may be used in agriculture.

# **DECOMPOSITION PRODUCTS**

The substances arising from the thermal decomposition of these products will largely depend upon the conditions bringing about decomposition. The following substances may be expected from normal combustion :

Carbon Dioxide Carbon Monoxide Water Particulate Matter Polycyclic Aromatic Hydrocarbons Unburnt Hydrocarbons Unidentified Organic and Inorganic Compounds Nitrogen Oxides Sulphur Oxides

#### **11: TOXICOLOGICAL INFORMATION**

# ACUTE HEALTH HAZARDS AND ADVICE

Shell Agricultural Gas Oil is classified as harmful owing to the aspiration hazard.

Shell Agricultural Gas Oil carries the additional risk phrase - repeated exposure may cause skin dryness or cracking.

The main hazards are: in the case of inhalation of higher vapour concentrations, of effects on the central nervous system; in the case of skin contact of, defatting and irritation; in the unlikely event of ingestion, of aspiration into the lungs with possible resultant chemically induced pneumonia.

Exposure to higher vapour concentrations can lead to nausea, headache, dizziness, loss of consciousness, and, in oxygen deficient environments, death. A person exposed to significant concentrations of vapour may display drunken behaviour, and his judgement can be impaired.

If the product is accidentally ingested, irritation to the gastric mucous membranes can lead to vomiting. If this occurs, there is a high probability of the product being aspirated into the lungs, which can lead to chemical pneumonitis which can be fatal.

# INHALATION

Under normal conditions of use Shell Agricultural Gas Oil is not expected to present an inhalation hazard.

#### Precautions :

Inhalation of vapours should be avoided. Where, exceptionally, higher concentrations of the vapour may be encountered, e.g. in the event of a spillage in a badly ventilated area, persons should not be allowed to enter the area, even in an emergency, until the atmosphere has been checked and passed as safe for entry by a competent person.

### First Aid :

Remove the affected person to fresh air. If breathing has stopped administer artificial respiration. Give cardiac massage if necessary. If the person is breathing, but unconscious, place in the recovery position. Obtain medical assistance immediately.

# <u>SKIN</u>

Shell Agricultural Gas Oil is slightly irritating to the skin, and has a defatting action on the skin.

#### Precautions :

Avoid contact with the skin by the use of suitable protective clothing.

#### First Aid :

Flush the contaminated skin with water. Use soap if available. Contaminated clothing should be soaked with water, removed, and laundered before reuse.

## <u>EYES</u>

Shell Agricultural Gas Oil may cause discomfort to the eye.

#### Precautions :

If there is a risk of splashing while handling the liquid, suitable eye protection should be used.

### First Aid :

Flush the eye with copious quantities of water. If irritation persists refer for medical attention.

#### INGESTION

Shell Agricultural Gas Oil is classified as harmful owing to the aspiration hazard. Ingestion can lead to vomiting and aspiration into the lungs, which can result in chemical pneumonitis, which can be fatal.

#### Precautions :

Accidental ingestion is unlikely. Normal handling and hygiene precautions should be taken to avoid ingestion.

# First Aid :

DO NOT INDUCE VOMITING Wash out the mouth with water, and, if ingestion is suspected, send to hospital immediately. Show this Data Sheet to the physician drawing attention to "Notes for Doctors" below.

### CHRONIC HEALTH HAZARD AND ADVICE

Shell Agricultural Gas Oil is classified as a category 3 carcinogen.

The main hazards arise from skin contact and in the inhalation of mists.

Skin contact over prolonged and repeated periods can lead to defatting of the skin, dermatitis, erythema, oil acne and oil folliculitis. Where occupational and personal hygiene practices have been of a poor standard, warty growths have occurred and these can become cancerous.

Excessive and prolonged inhalation of mists may cause a chronic inflammatory reaction of the lungs and a form of pulmonary fibrosis.

# NOTES FOR DOCTORS

#### HIGH PRESSURE INJECTION INJURIES

High pressure injection injuries require surgical intervention and possibly steroid therapy to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. PROMPT surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetic, and wide exploration is essential.

### INGESTION AND ASPIRATION OF PETROLEUM PRODUCTS

There may be a risk to health where low viscosity products are aspirated into the lungs following vomiting, although this is uncommon in adults. Such aspiration would cause intense local irritation and chemical pneumonitis. Children, and those in whom consciousness is impaired, will be more at risk. Emesis of lubricants is not usually necessary, unless a large amount has been ingested, or some other compound has been dissolved in the product. If this is indicated - for example, when there is rapid onset of CNS depression from a large ingested volume - gastric lavage under controlled hospital conditions, with full protection of the airway is required. Supportive care may include oxygen, arterial blood gas monitoring, respiratory support and, if aspiration has occurred, treatment with corticosteroids and antibiotics. Seizures should be controlled with Diazepam, or appropriate equivalent drug.

### **12: ECOLOGICAL INFORMATION**

Shell Agricultural Gas Oil contains fuels, diesel which is classified as toxic to aquatic organisms/ may cause long-term adverse effects in the aquatic environment.

# <u>AIR</u>

Shell Agricultural Gas Oil is a mixture of mainly non-volatile components, which when released to air will react rapidly with hydroxyl radicals and ozone.

# <u>WATER</u>

If released to water, Shell Agricultural Gas Oil will evaporate at a very slow rate. A small proportion will dissolve. Dissolved components will be either absorbed in sediments or evaporate to air. In aerobic water and sediments they will biodegrade, but in anaerobic conditions they will persist.

### SOIL

Small volumes released on land will evaporate at a very slow rate, with a proportion of the product being absorbed in the upper soil layers and being subject to biodegradation. Larger volumes may penetrate into anaerobic soil layers in which the product will persist. The product may reach the water table on which it will form a floating layer, and move along with the groundwater flow. In this case the more soluble components, such as aromatics, will cause groundwater contamination.

#### **13: DISPOSAL CONSIDERATIONS**

Shell Agricultural Gas Oil is a special waste owing to its supply classification. It should be disposed of to a licensed waste contractor. Any disposal route should comply with local byelaws and the requirements of the Environmental Protection Act, 1990.

### **14: TRANSPORT INFORMATION**

It should be assumed that the flashpoint of Shell Agricultural Gas Oil is equal to or less than 60.5 Deg. C. unless the carrier has obtained contrary test data.

UN Number : Proper Shipping Name : Symbol : Packing Group : Marine Pollutant :	1202 Gas Oil Flammable Liquid III No
IATA/ICAO Hazard Class :	3
IMO Hazard Class :	3.3
Class : Classification Code : Hazard Identification No. :	3 F1 30
Hazchem Code :	3 Z

### **15: REGULATORY INFORMATION**

Demonstra fen Cumulu

This material has been classified according to the requirements of the Chemicals (Hazard Information and Packaging for Supply) Regulations.

Dangerous for Supply		
Symbols :		St Andrew's Cross Dead Fish and Tree
Categories of Danger :		Category 3 Carcinogen Harmful
Risk Phrases :		<ul> <li>R40 Limited evidence of a carcinogenic effect</li> <li>R65 Harmful: may cause lung damage if swallowed</li> <li>R66 Repeated exposure may cause skin dryness or cracking</li> <li>R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment</li> </ul>
Safety Phrases :		<ul> <li>S2 Keep out of the reach of children</li> <li>S24 Avoid contact with the skin.</li> <li>S36/37 Wear suitable protective clothing and gloves</li> <li>S61 Avoid release to the environment. Refer to special instructions / safety data sheets</li> <li>S62 If swallowed, do not induce vomiting : seek medical advice immediately and show this label or container</li> </ul>
Contains :		Fuels, diesel

### **16: OTHER INFORMATION**

The references set out below give further information on specific aspects.

### **LEGISLATION**

Consumer Protection Act 1987 Control of Pollution Act 1974 Environmental Protection Act 1990 Factories Act 1961 Health and Safety at Work Act 1974

Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations Chemical (Hazards, Information, and Packaging for Supply) Regulations Control of Substances Hazardous to Health Regulations Dangerous Substances in Harbour Areas Regulations Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations Road Traffic (Carriage of Dangerous Substances in Packages etc.) Regulations Road Traffic (Carriage of Dangerous Substances in Road Tankers and Tank Containers) Regulations Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations Reporting of Injuries, Diseases and Dangerous Occurrences Regulations Special Waste Regulations

### **GUIDANCE NOTES**

CS/15 HS(G)22	The cleaning and gas freeing of tanks containing flammable residues Electrical apparatus for use in potentially explosive atmospheres
HS(G)50	The storage of flammable liquids in fixed tanks (up to 10000m3 total capacity)
HS(G)51	The storage of flammable liquids in containers
HS(G)50	The storage of flammable liquids in fixed tanks (exceeding 10000m3 total capacity)
HS(G)140	The safe use and handling of flammable liquids
HS(G)71	The storage of packaged dangerous substances
EH/40	Occupational Exposure Limits
EH/58	The Carcinogenicity of Mineral Oils
MS24	Health surveillance of occupational skin disease

### **BRITISH STANDARDS**

- BS 799 Specification for Oil Burning Equipment
- BS 2000 Methods of Test for Petroleum and its Products
- BS 2869 Fuel Oils for Oil Engines and Burners for Non-Marine Use
- BS 5345 Selection, Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres
- BS 5410 Oil Firing
- BS 5958 Control of Undesirable Static Electricity
- BS 6380 Low Temperature Properties and Cold Weather Use of Diesel Fuel and Gas Oils (Classes A1, A2 and D of BS 2869)

### **OTHER LITERATURE**

Concawe Report 01/97 Petroleum Products - First Aid Emergency and Medical Advice

Department of the Environment - Waste Management - The Duty of Care - A Code of Practice

European Model Code of Safe Practice in the Storage and Handling of Petroleum Products Institute of Petroleum Marketing Safety Code Department of Trade - Code of Portable Tanks and Road Tank Vehicles for the Carriage of Liquid Dangerous Goods in Ships

### **ADDRESSES**

Concawe, Boulevard du Souverain 165 B - 1160 Brussels, Belgium Institute of Petroleum, 61 New Cavendish Street, London W1 Data Sheet No. L84042 Revision : 23 08 2004

This data sheet has been prepared in accordance with the requirements of the Data Sheet Directive 91/155/EEC.

### RECOMMENDED USES

Antifreeze Concentrate is recommended for use as :

an antifreeze

If Antifreeze Concentrate is used for a purpose not covered in this section, Shell UK Ltd would be grateful to receive information on the application.

### KNOWN MISUSES/ABUSES

Antifreeze Concentrate is not to be used as :

The most common misuse is that of ingestion by children. For this reason, Antifreeze Concentrate contains an aversive agent. It is most important that Antifreeze Concentrate be kept safely out of reach or locked away.

The disposal of Antifreeze Concentrate to soil, watercourses and drains is a legal offence.

### 1: IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

PRODUCT :	ANTIFREEZE CONCENTRATE
COMPANY :	SHELL UK OIL PRODUCTS LIMITED
TECHNICAL CONTACT:	PRODUCT HSE DEPARTMENT
ADDRESS :	STANLOW MANUFACTURING COMPLEX, PO BOX 3, ELLESMERE PORT, CH65 4HB
TELEPHONE :	0151-350-4000
EMERGENCY TELEPHONE NUMBER :	0151-350-4595

### 2: COMPOSITION/INFORMATION ON INGREDIENTS

Antifreeze Concentrate is a preparation manufactured from ethanediol (ethylene glycol), additives and a taste aversive agent.

CONC.	COMPONENT	EINECS	CLAS	S RISK PHRASES
>90%	Ethanediol	203-473-3	Xn	R22 Harmful if swallowed

Exposure limit values exist for the following constituents:

Ethanediol

### **<u>3: HAZARD IDENTIFICATION</u>**

Antifreeze Concentrate is classified as dangerous for supply.

Antifreeze Concentrate is not classified as dangerous for conveyance.

It contains ethanediol to which exposure limits apply.

Ethanediol is readily biodegradable and poses a significant risk of oxygen deletion in aquatic systems.

### **<u>4: FIRST AID MEASURES</u>**

### INHALATION

Remove the person affected to fresh air. If rapid recovery does not occur, obtain medical attention.

### <u>SKIN</u>

Wash contaminated skin with water. Use soap if available. Do not delay.

### EYES

Flush the eye with copious quantities of water for up to 10 minutes. Refer for medical attention.

#### INGESTION

The normal advice given in the case of ingestion of hydrocarbon products is that vomiting should be avoided due to the risk of aspiration into the lungs, however, owing to the toxic effects and rapid absorption from the stomach, this advice is modified for Antifreeze Concentrate as follows :

SEEK QUALIFIED MEDICAL ASSISTANCE IMMEDIATELY.

IF THE PATIENT IS UNCONSCIOUS, DO NOT INDUCE VOMITING.

WITH A CONSCIOUS PATIENT, if hospital assistance is not likely to be immediately available, attempt to induce vomiting.

SHOW A COPY OF THIS DATA SHEET TO THE PHYSICIAN, draw attention to "Notes for Doctors" in Section 11 below.

#### 5: FIRE-FIGHTING MEASURES

Extinguishants

- Large Fire : - Small Fire : Alcohol Resistant Foam/Water Fog - NEVER USE WATER JET Alcohol Resistant Foam/Water Fog/Dry Powder/CO2/Sand/Earth

#### Special Protective Equipment for Firefighters

The choice of protective equipment must only be undertaken in the light of a dynamic risk assessment by the officer in charge of the incident. Whilst the content of this section may inform the choice of protective equipment used, the choice of protective equipment will be highly dependent on local conditions.

For large fires, the officer in charge may consider; self contained breathing apparatus (EN 137).

Further guidance on protective equipment for professional fire fighters can be obtained from the home office.

#### DECOMPOSITION PRODUCTS

Refer to section 10 - stability and reactivity.

### 6: ACCIDENTAL RELEASE MEASURES

Extinguish naked flames, avoid contact with skin, eyes, and clothing. Wear plastic or rubber gloves, goggles or face shield and boots. Make best endeavours to prevent entry to drains or watercourses.

LARGE SPILLS should be bunded by a suitable medium such as sand or earth. The liquid should be reclaimed directly or in an adsorbent medium and then transferred to suitable, clearly marked containers and disposed of in accordance with local byelaws and the requirements of the Environmental Protection Act 1990. Any containers used to collect the spilled material or absorbent should be labelled to indicate contents and hazards.

SMALL SPILLS should be soaked up with sand or earth and disposed of as for large spills.

### 7: HANDLING AND STORAGE

### HANDLING

Antifreeze Concentrate does not require any special handling techniques, but it should be handled in suitable containers and spillage avoided. Avoid contact with skin, eyes and clothing. Do not breathe mists, aerosols or vapours. Maximum handling temperature 60 Deg. C.

#### **STORAGE**

The storage of Antifreeze Concentrate is not subject to any special controls or restrictions. It should be stored in properly designed, closable, labelled containers, eg mild steel or high density polyethylene (HDPE). Keep away from children, foodstuffs and animal feed.

### 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### EXPOSURE LIMIT VALUES

The following limits are taken from The Health and Safety Executive's Guidance Note EH40 Occupational Exposure Limits 2002.

UK Occupational Exposure Standards :

Ethanediol, particulate	10 mg/cubic metre 8-hour TWA value
Ethanediol, vapour	60 mg/cubic metre 8-hour TWA value 125 mg/cubic metre 15-min TWA value

#### RECOMMENDED MONITORING PROCEDURES

Reference should be made to HSE's publication Methods for the Determination of Hazardous Substances (MDHS) 14/3 and 88.

#### PERSONAL PROTECTIVE EQUIPMENT

The use of personal protective equipment is only one aspect of an integrated approach to the Control Of Substances Hazardous to Health.

The management of Health and Safety at Work Regulations 1992 require employers to identify and evaluate the risks to health and to implement appropriate measures to eliminate or minimise those risks.

The choice of personal protective equipment is highly dependent upon local conditions, e.g. exposure to other chemical substances and micro-organisms, thermal hazards (protection from extremes of cold and heat), electrical hazards, mechanical hazards and appropriate degree of manual dexterity required to undertake an activity.

Whilst the content of this section may inform the choice of personal protective equipment used, the limitations of any data which can be provided must be fully understood, e.g. personal protective equipment chosen to protect employees from occasional splashes maybe entirely inadequate for activities involving partial or complete immersion.

If the levels of vapour or particulate in air are likely to exceed the occupational exposure standards then consideration should be given to the use of local exhaust ventilation to reduce personal exposure. The choice of personal protective equipment should only be undertaken in the light of a full COSHH and risk assessment by a suitably qualified competent person (e.g. a professionally qualified occupational hygienist).

Effective protection is only achieved by correctly fitting and well maintained equipment and employers should ensure that appropriate training is given. All personal protective equipment should be regularly inspected and replaced if defective.

In the first instance, further guidance maybe obtained through HSE's publication "COSHH - a brief guide to the regulations" (INDG136(rev1)).

### Hand Protection :-

Chemical protective gloves are made from a wide range of materials, but there is no single glove material (or combination of materials) which gives unlimited resistance to any individual or combination of substances or preparations. The extent of

the breakthrough time will be affected by a combination of factors which include permeation, penetration, degradation, use pattern (full immersion, occasional contacts) and how the glove is stored when not in use.

Theoretical maximum levels of protection are seldom achieved in practice and the actual level of protection can be difficult to assess.

Effective breakthrough time should be used with care and a margin of safety should be applied. HSE guidance on protective gloves recommends a 75% safety factor to be applied to any figures obtained in a laboratory test.

Nitrile gloves may offer relatively long breakthrough times and slow permeation rates. Test data, e.g breakthrough data obtained through test standard EN374-3:1994 are available from reputable equipment suppliers.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. A non perfumed moisturiser should be applied.

#### **Respiratory Protection**

At standard temperature and pressure, the Occupational Exposure Standards are unlikely to be exceeded.

Care should be taken to keep exposures below applicable occupational exposure limits. If this cannot be achieved, use of a respirator fitted with an organic vapour cartridge combined with a particulate prefilter should be considered.

Half masks (EN 149) or valved half masks( EN 405) in combination with type A2 (EN 141) and P2/3 (EN 143) prefilters maybe considered.

If Antifreeze Concentrate is subjected to elevated temperatures, say, half masks (EN 149) or valved half masks( EN 405) in combination with type AX (EN 371) and P2/3 (EN 143) prefilters maybe considered.

### Eye Protection

Goggles conforming to a minimum standard of BS EN 166 345B should be considered if there is a possibility of eye contact with Antifreeze Concentrate through splashing.

Higher rated eye protection must be considered for highly hazardous operations or work areas, employees involved in metalworking operations such as chipping, grinding or cutting may require additional protection to avert injury from fast moving particles or broken tools.

### 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State :	Liquid at ambient temperature
Appearance :	Dyed or colourless
Odour :	Characteristic
Acidity/Alkalinity :	pH 7-9 (solution in water at 50gms/100mls)
Initial Boiling Point :	>150 Deg. C.
Freezing Point :	<-30 Deg. C. (50% solution in water)
Flashpoint :	>100 Deg. C.
Flammability :	Not applicable
Autoflammability :	417 Deg. C. *
Flammability Limits - Upper :	Not determined
- Lower :	3.0 % vol. *
Explosive Properties :	Not applicable
Oxidising Properties :	<10 Pa
Vapour Pressure @ 20 Deg. C. :	1.12-1.14
Relative Density @ 20 Deg. C. :	Completely miscible
Solubility :	Not determined
Fat solubility/solvent :	>1.0 *
Partition Coefficient, n-octanol water :	Not determined
Vapour Density (Air =1) :	Not determined
Viscosity @ 20 Deg. C. :	Not determined
Values marked with a * refer to ethanediol	Not determined

### **10: STABILITY AND REACTIVITY**

### CONDITIONS TO AVOID

Extremes of temperature. Store between 0 and 50 Deg. C.

### MATERIALS TO AVOID

Strong oxidising agents, eg. chlorates which may be used in agriculture.

### **DECOMPOSITION PRODUCTS**

The substances arising from the thermal decomposition of these products will largely depend upon the conditions bringing about decomposition. The following substances may be expected from normal combustion :

Carbon Dioxide Carbon Monoxide Water Unidentified Organic and Inorganic Compounds Particulate Matter Nitrogen Oxides

#### **11: TOXICOLOGICAL INFORMATION**

### Basis of Assessment

Toxicological data may not have been determined specifically for all end points (e.g. mutagenicity, carcinogenicity, reproductive toxicity, repeated dose and acute toxicity, corrosivity, irritation, sensitisation etc.) for this substance/preparation. Assessment will be based on a combination of test data, human experience, toxicological data generated on similar components and the conventional method.

Antifreeze Concentrate is classified as harmful by ingestion (deaths have been reported on swallowing large quantities). The toxicity of ethanediol is principally due to it's metabolites. Renal damage has been observed in man with the deposition of oxalate crystals.

At very high doses in animal experiments, foetotoxicity has been observed, but it's relevance to man has still to be clarified.

Antifreeze Concentrate contains an aversive agent which has an extremely bitter taste.

#### ACUTE HEALTH HAZARDS AND ADVICE

### INHALATION

Due to its low vapour pressure, Antifreeze Concentrate is not considered likely to present an inhalation hazard at ambient temperature. At elevated temperatures, the vapour may irritate the respiratory tract.

#### Precautions :

Inhalation of vapour, mists and aerosols should be avoided. If this cannot be achieved by safe working practices, suitable respiratory protection should be used.

#### First Aid :

Remove the person affected to fresh air. If rapid recovery does not occur, obtain medical attention.

### <u>SKIN</u>

Antifreeze Concentrate is expected to be slightly irritating to the skin and is harmful by skin absorption on prolonged or repeated exposure.

#### Precautions :

All contact must be avoided by the use of suitable protective clothing Launder contaminated clothing before reusing.

### First Aid :

Wash contaminated skin with water. Use soap if available.

### EYES

Antifreeze Concentrate is expected to be moderately, possibly severely, irritating to the eye.

### Precautions :

If there is a risk of splashing while handling the liquid, suitable eye protection should be used.

### First Aid :

Do not delay. Flush the eye with copious quantities of water for up to 10 minutes. Refer for medical attention.

### INGESTION

Ingestion of ethanediol may lead to serious intoxication, and possibly death. There may be effects on the central nervous system, on the cardio-pulmonary system, and on the kidneys, with renal failure. Ingestion of as little as 100 millilitres may be fatal for an adult. Antifreeze Concentrate is rapidly absorbed causing symptoms resembling alcohol intoxication, and cardio-vascular effects. Death may occur from renal or hepatic failure : survivors usually have complete recovery of renal function, although cerebral damage may be permanent.

#### Precautions :

Accidental ingestion is unlikely except in the case of children. Normal handling and hygiene precautions to avoid ingestion, especially by keeping out of reach of children.

### First Aid :

The normal advice given in the case of ingestion of hydrocarbon products is that vomiting should be avoided owing to risks of aspiration into the lungs. Owing to the toxic effects and rapid absorption from the stomach, this advice is modified for Antifreeze Concentrate as follows :

SEEK QUALIFIED MEDICAL ASSISTANCE IMMEDIATELY.

IF THE PATIENT IS UNCONSCIOUS, DO NOT INDUCE VOMITING.

WITH A CONSCIOUS PATIENT, if hospital assistance is not likely to be immediately available, attempt to induce vomiting.

SHOW A COPY OF THIS DATA SHEET TO THE PHYSICIAN.

### CHRONIC HEALTH HAZARD AND ADVICE

Continued exposure to vapour of Antifreeze Concentrate can induce unconsciousness, nystagmus and lymphocyosis. Death from ingestion of the liquid is due to renal or hepatic failure. Survivors usually have complete recovery of renal function. Cerebral damage may however be permanent. There is no human or animal evidence for carcinogenicity or mutagenicity.

#### HEALTH ADVICE TO PHYSICIANS

Treat by observation and supportive measures as indicated by the patient's condition.

The essentials of therapy are :

- 1. Supportive treatment of respiratory distress and shock.
- 2. Correction of metabolic acidosis and hypocalcemia.
- 3. Rapid and sustained diuresis when possible with the use of hypertonic mannitol.
- 4. Immediate peritoneal or haemodialysis.
- 5. Thiamine and pyridoxine supplements.
- 6. Intravenous administration of ethanol if the diagnosis is recognised within 6 hours after ingestion, and
- 7. Treatment for renal failure with dialysis as needed to keep patient free from signs and symptoms of uraemia.

### **12: ECOLOGICAL INFORMATION**

Ecotoxicological data may not have been determined specifically for all end points for this substance/preparation. Assessment will be based on a combination of test data, other available evidence, ecotoxicological data generated on similar components and the conventional method.

Antifreeze Concentrate should be managed in the environment as a preparation at most slightly toxic but posing an indirect hazard to the aquatic environment because of ready biodegradation leading to oxygen depletion. Avoid gross contamination of the soil. Minimise contamination of water because of deoxygenation hazard. Spilled material should be contained and removed as completely as possible. Final traces can be dispersed with water.

### <u>AIR</u>

Antifreeze Concentrate is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities.

#### WATER

If released to water, Antifreeze Concentrate will dissolve. In view of deoxygenation hazard, consider dilution or (artificial) reaeration. It will not bioaccumulate significantly.

#### SOIL

If released to soil Antifreeze Concentrate is highly mobile and will, in significant quantities, permeate to lower soil levels and may reach groundwater in which it will dissolve.

#### **13: DISPOSAL CONSIDERATIONS**

Antifreeze Concentrate should be disposed of to a licensed waste contractor.

Any disposal route must satisfy the requirements of the of the Environmental Protection Act, 1990, the Environment Act 1995, and should comply with any local byelaws. byelaws.

Antifreeze Concentrate is controlled by the Special Waste Regulations 1996.

Envirowise offers free advice through a national helpline. Initial contact by industry and commerce should be made to the Environment and Energy helpline (0800 585 794). The Envirowise programme is sponsored by Government and seeks to encourage good practice in environmental protection technology and techniques.

Further guidance can also obtained from the local environment agency agency office.

#### **14: TRANSPORT INFORMATION**

Not Dangerous for Conveyance

### **15: REGULATORY INFORMATION**

Dangerous for Supply		
Category of Danger :	Harmful	
Symbols :	St Andre	w's Cross
Risk Phrases :	Harmful	if swallowed
Safety Phrases:	S2 S24/25 S46	Keep out of reach of Children Avoid contact with skin and eyes If swallowed, seek medical advice immediately and show this container or label
Contains :	Ethanedi	ol

### Additional Information

Safety data sheet available on request

### **LEGISLATION**

Consumer Protection Act 1987 Control of Pollution Act 1974 Environmental Protection Act 1990 Environment Act 1995 Factories Act 1961 Health and Safety at Work Act 1974

Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations Chemical (Hazards, Information, and Packaging for Supply) Regulations Control of Substances Hazardous to Health Regulations Dangerous Substances in Harbour Areas Regulations Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations Road Traffic (Carriage of Dangerous Substances in Packages etc.) Regulations Road Traffic (Carriage of Dangerous Substances in Road Tankers and Tank Containers) Regulations Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations Reporting of Injuries, Diseases and Dangerous Occurrences Regulations Special Waste Regulations 1996 Health and Safety (First Aid) Regulations 1981 Personal Protective Equipment (EC Directive) Regulations 1992 Personal Protective Equipment at Work Regulations 1992

### **16: OTHER INFORMATION**

### **GUIDANCE NOTES**

	UK Chemicals Regulatory Atlas, An Overview of how to guide your chemical through to regulatory compliance (DTI).
HSG71	The storage of packaged dangerous substances
EH/40	Occupational Exposure Limits
MS24	Health surveillance of occupational skin disease
HSG 53	The selection, use and maintenance of respiratory protective
	equipment: A practical guide
HSG 206	Cost and effectiveness of chemical protective gloves for the
	workplace: Guidance for employers and health and safety specialists.
HSG 136	Workplace transport safety : guidance for employers
INDG234 (rev)	Are you Involved in the Carriage of Dangerous Goods by Road or Rail.

### **OTHER LITERATURE**

Department of the Environment - Waste Management - The Duty of Care - A Code of Practice

**QJ241** 

# 1. MATERIAL AND COMPANY IDENTIFICATION

Material Name Uses	:	AeroShell Grease 33 Synthetic grease for aircraft. For further details consult the AeroShell Book on www.shell.com/aviation.
Manufacturer/Supplier	:	SOPUS Products PO Box 4427 Houston, TX 77210-4427 USA
MSDS Request	:	877-276-7285
Emergency Telephone Nun Spill Information Health Information	:	877-242-7400

# 2. COMPOSITION/INFORMATION ON INGREDIENTS

A lubricating grease consisting of highly-refined mineral oil and additives. The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

# 3. HAZARDS IDENTIFICATION

Appearance and Odour	Emergency Overview Blue-green. Semi-solid. Slight hydrocarbon.
Health Hazards	<ul> <li>High-pressure injection under the skin may cause serious damage including local necrosis.</li> </ul>
Safety Hazards Environmental Hazards	<ul> <li>Not classified as flammable but will burn.</li> <li>Not classified as dangerous for the environment.</li> </ul>
Health Hazards	: Not expected to be a health hazard when used under normal conditions.
Health Hazards Inhalation	: Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact	<ul> <li>Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis</li> </ul>
Eye Contact	: May cause slight irritation to eyes.
Ingestion	: Low toxicity if swallowed.
Other Information	<ul> <li>High-pressure injection under the skin may cause serious damage including local necrosis. Used grease may contain harmful impurities.</li> </ul>
Signs and Symptoms	: Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection. Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in

**Material Safety Data Sheet** 

AeroShell Grease 33 MSDS# 56235E Version 5.0 Effective Date 07/07/2008 According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Aggravated Medical Condition Environmental Hazards Additional Information	:	nausea, vomiting and/or diarrhoea. Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin. Not classified as dangerous for the environment. Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
4. FIRST AID MEASURES		
General Information	:	Not expected to be a health hazard when used under normal conditions.
Inhalation	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
Skin Contact	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	:	Treat symptomatically. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

# 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point Upper / lower Flammability or Explosion limits	:	> 215 °C / 419 °F (PMCC / ASTM D93) Typical 1 - 10 %(V)(based on mineral oil)
Auto ignition temperature Specific Hazards	-	> 320 °C / 608 °F Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic

# AeroShell Grease 33

MSDS# 56235E Version 5.0 Effective Date 07/07/2008 According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

# Material Safety Data Sheet

Suitable Extinguishing Media Unsuitable Extinguishing Media		compounds. Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only. Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

# 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

Protective measures	:	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or
Clean Up Methods	:	other appropriate barriers. Shovel into a suitable clearly marked container for disposal or reclamation in accordance with local regulations.

# 7. HANDLING AND STORAGE

General Precautions	:	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Handling	:	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Storage	:	Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: -50 - 50 °C / -58 - 122 °F
Recommended Materials	:	For containers or container linings, use mild steel or high density polyethylene.
Unsuitable Materials	:	PVC.
Additional Information	:	Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

## **Occupational Exposure Limits**

Contains no components with occupational exposure limit values

Material

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Notation

# **Material Safety Data Sheet**

Source

Туре

ppm

mg/m3

Oil mist, mineral	ACGIH	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	ACGIH	STEL(Mist.)		10 mg/m3	
Additional	Information			semi-solid consi likely to occur.	stency, generation of
Exposure ( Personal P	rotective	dependii based of Appropri airborne mist forn concentr : Persona	ng upon pote n a risk asse iate measure concentratic ned, there is rations to be I protective e	ntial exposure c ssment of local s include: Adeq ons. Where mate greater potentia generated. equipment (PPE)	uate ventilation to control erial is heated, sprayed or I for airborne ) should meet
Equipment Respirator	y Protection	: No respi condition practices material concentri health, s specific Check w air-filterin combina combine	iratory protect ns of use. In a s, precaution . If engineerin rations to a le select respira conditions of <i>v</i> ith respirator ng respirator ttion of mask	tion is ordinarily accordance with s should be take ng controls do no evel which is add tory protection e use and meetin y protective equ s are suitable, so and filter. Select	heck with PPE suppliers. required under normal good industrial hygiene en to avoid breathing of ot maintain airborne equate to protect worker equipment suitable for the g relevant legislation. uipment suppliers. Where elect an appropriate at a filter suitable for and vapours [boiling point
Hand Prote	ection	: Where h gloves a US: F73 suitable gloves. S usage, e resistand seek adv be repla hand cau using glo	and contact pproved to re 9) made from chemical pro Suitability and e.g. frequency ce of glove m vice from glo ced. Persona re. Gloves m oves, hands	elevant standard in the following m tection: PVC, ne d durability of a y and duration o naterial, glove th ve suppliers. Co al hygiene is a ke ust only be worr should be washe	may occur the use of ls (e.g. Europe: EN374, naterials may provide eoprene or nitrile rubber glove is dependent on f contact, chemical ickness, dexterity. Always intaminated gloves should ey element of effective n on clean hands. After ed and dried thoroughly. urizer is recommended.
Eye Protec	tion				d if splashes are likely to
Protective	Clothing			rdinarily required	d beyond standard issue
Monitoring	Methods	: Monitoria zone of v	ng of the con workers or in	the general wo	bstances in the breathing rkplace may be required to adequacy of exposure

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Environmental Exposure Controls	<ul> <li>controls. For some substances biological monitoring may a be appropriate.</li> <li>Minimise release to the environment. An environmental assessment must be made to ensure compliance with loca environmental legislation.</li> </ul>	
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# 9. PHYSICAL AND CHEMICAL PROPERTIES

**Material Safety Data Sheet** 

Appearance Odour pH Initial Boiling Point and Boiling Range	<ul> <li>Blue-green. Semi-solid.</li> <li>Slight hydrocarbon.</li> <li>Not applicable.</li> <li>Data not available</li> </ul>
Dropping point	: > 225 °C / 437 °F
Flash point	: > 215 °C / 419 °F (PMCC / ASTM D93)
Upper / lower Flammability or Explosion limits	: Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	: > 320 °C / 608 °F
Vapour pressure	: < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Density	: < 1,000 kg/m3 at 15 °C / 59 °F
Water solubility	: Negligible.
n-octanol/water partition coefficient (log Pow)	: > 6 (based on information on similar products)
Kinematic viscosity	: Not applicable.
Vapour density (air=1)	: > 1 (estimated value(s))
Evaporation rate (nBuAc=1)	: Data not available

# **10. STABILITY AND REACTIVITY**

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition	:	Hazardous decomposition products are not expected to form
Products		during normal storage.

# **11. TOXICOLOGICAL INFORMATION**

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser. May cause an allergic skin reaction in sensitive individuals.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.

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Carcinogenicity :	Product contains mineral oils of types shown to be non- carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
Reproductive and : Developmental Toxicity	Not expected to be a hazard.
Additional Information :	Used grease may contain harmful impurities that have accumulated during use. The concentration of such harmful impurities will depend on use and they may present risks to health and the environment on disposal. ALL used grease should be handled with caution and skin contact avoided as far as possible. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

# **12. ECOLOGICAL INFORMATION**

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Mobility	:	Semi-solid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation Other Adverse Effects	:	Contains components with the potential to bioaccumulate. Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.
13. DISPOSAL CONSIDERATIO	NS	
Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in

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Local Legislation	:	collector or contractor should be established beforehand. Disposal should be in accordance with applicable regional,
5		national, and local laws and regulations.

## **14. TRANSPORT INFORMATION**

**Material Safety Data Sheet** 

## US Department of Transportation Classification (49CFR)

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

### IMDG

This material is not classified as dangerous under IMDG regulations.

### IATA (Country variations may apply)

This material is not classified as dangerous under IATA regulations.

### **15. REGULATORY INFORMATION**

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

### Federal Regulatory Status

### **Notification Status**

EINECS	All components listed or
	polymer exempt.
TSCA	All components listed.
DSL	All components listed.

SARA Hazard Categories (311/312)

No SARA 311/312 Hazards.

## State Regulatory Status

## California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

# **16. OTHER INFORMATION**

**NFPA Rating (Health,** : 0, 1, 0 **Fire, Reactivity)** 

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# Material Safety Data Sheet

MSDS Version Number	:	5.0
MSDS Effective Date	:	07/07/2008
MSDS Revisions MSDS Regulation	:	A vertical bar ( ) in the left margin indicates an amendment from the previous version. The content and format of this MSDS is in accordance with the
Uses and Restrictions	:	OSHA Hazard Communication Standard, 29 CFR 1910.1200. This product should not be used with certain types of rubber without first determining the compatibility between the rubber and the grease. Contains a synthetic oil and should not be used in contact with incompatible seal materials. This product must be used, handled and applied in accordance with the requirements of the equipment manufacturer's manuals, bulletins and other documentation.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.



# Material Safety Data Sheet

### 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name Uses Product Code	<ul> <li>Shell Naturelle Fluid HF-E 46</li> <li>Hydraulic oil</li> <li>001A9034</li> </ul>
Manufacturer/Supplier	<ul> <li>Shell UK Oil Products Limited PO Box 3 Ellesmere Port CH65 4HB United Kingdom</li> </ul>
Telephone Fax	: +44-(0) 151-350-4000 : +44-(0) 151-350-4843
Emergency Telephone Number	: +44-(0) 151-350-4595

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

**Preparation description** : Blend of synthetic esters and additives.

### Hazardous Components

Chemical Name	CAS	EINECS	Symbol(s)	R-phrase(s)	Conc.
Alkyl thiadiazole	89347-09-1	289-493-3	Xi	R43	0.10 - 0.50 %
Hindered phenol				R53	1.00 - 3.00 %

### Additional Information : Refer to chapter 16 for full text of EC R-phrases.

## 3. HAZARDS IDENTIFICATION

EC Classification	:	Not classified as dangerous under EC criteria.
Health Hazards	:	Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. High-pressure injection under the skin may cause serious damage including local necrosis. Used oil may contain harmful impurities.
Signs and Symptoms		Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection. Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.
Safety Hazards Environmental Hazards	:	Not classified as flammable but will burn. Not classified as dangerous for the environment.

# Material Safety Data Sheet

4. FIRST AID MEASURES	
General Information	: Not expected to be a health hazard when used under normal conditions.
Inhalation	<ul> <li>No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.</li> </ul>
Skin Contact	: Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop. Obtain medical attention even in the absence of apparent wounds.
Eye Contact	<ul> <li>Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.</li> </ul>
Ingestion	<ul> <li>In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.</li> </ul>
Advice to Physician	Treat symptomatically. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

# 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific Hazards	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Extinguishing Media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	:	Do not use water in a jet.
Protective Equipment for Firefighters	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

### 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

Protective measures : Avoid contact with skin and eyes. Use appropriate containment



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Clean Up Methods : Additional Advice :	to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly. Local authorities should be advised if significant spillages cannot be contained.
7. HANDLING AND STORAGE	
General Precautions	Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine
	appropriate controls for safe handling, storage and disposal of this material.
Handling :	Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.
Storage :	Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50°C / 32 - 122°F The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance maybe obtained from the local environmental agency office.
Recommended Materials :	For containers or container linings, use mild steel or high
Unsuitable Materials : Additional Information :	density polyethylene. PVC. Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion. Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication "COSHH Essentials".

# 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

# **Occupational Exposure Limits**

Exposure Controls	The level of protection and types of controls depending upon potential exposure conditio based on a risk assessment of local circums Appropriate measures include: Adequate ve airborne concentrations. Where material is h mist formed, there is greater potential for air concentrations to be generated.	ns. Select controls stances. Intilation to control neated, sprayed or
Personal Protective	Personal protective equipment (PPE) should	d meet

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Equipment Respiratory Protection	<ul> <li>recommended national standards. Check with PPE suppliers.</li> <li>No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point &gt;65 °C (149 °F)] meeting EN141.</li> </ul>
Hand Protection	: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	<ul> <li>Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.</li> </ul>
Protective Clothing	: Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	: Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	: Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

# 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Odour pH Boiling point Pour point Flash point Explosion / Flammability limits in air	<ul> <li>Green. Liquid.</li> <li>Slight hydrocarbon.</li> <li>Not applicable.</li> <li>&gt; 280 °C / 536 °F estimated value(s)</li> <li>Typical -51 °C / -60 °F</li> <li>Typical 219 °C / 426 °F (COC)</li> <li>Typical 1 - 10 %(V) (based on mineral oil)</li> </ul>
Auto-ignition temperature Vapour pressure Density Water solubility n-octanol/water partition coefficient (log Pow)	<ul> <li>&gt; 320 °C / 608 °F</li> <li>&lt; 0.5 Pa at 20 °C / 68 °F (estimated value(s))</li> <li>Typical 919 kg/m3 at 15 °C / 59 °F</li> <li>Negligible.</li> <li>&gt; 6 (based on information on similar products)</li> </ul>

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Kinematic viscosity	:	Typical 46.1 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 1 (estimated value(s))
Evaporation rate (nBuAc=1)	:	Data not available

### 10. STABILITY AND REACTIVITY

# 11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 >2000 mg/kg , Rat Expected to be of low toxicity: LD50 >2000 mg/kg , Rabbit
Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser. May cause an allergic skin reaction in sensitive individuals.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Components are not known to be associated with carcinogenic effects.
Reproductive and Developmental Toxicity	:	Not expected to be a hazard.
Additional Information	:	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed.

### **12. ECOLOGICAL INFORMATION**

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity		Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract).
Mobility	:	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be

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Persistence/degradability Bioaccumulation Other Adverse Effects	:	mobile. Readily biodegradable. Contains components with the potential to bioaccumulate. Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.
13. DISPOSAL CONSIDERATIO	NS	
Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations. EU Waste Disposal Code (EWC): 13 01 12 readily biodegradable hydraulic oils. Classification of waste is always the responsibility of the end user.

# **14. TRANSPORT INFORMATION**

### ADR

This material is not classified as dangerous under ADR regulations.

### RID

This material is not classified as dangerous under RID regulations.

### ADNR

This material is not classified as dangerous under ADNR regulations.

### IMDG

This material is not classified as dangerous under IMDG regulations.

### IATA (Country variations may apply)

This material is not classified as dangerous under IATA regulations.

### **15. REGULATORY INFORMATION**

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

EC Classification	:	Not classified as dangerous under EC criteria.
EC Symbols	:	No Hazard Symbol required

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### according to EC directive 2001/58/EC

# Material Safety Data Sheet

EC Risk Phrases EC Safety Phrases EINECS TSCA Sensitiser not sufficient to classify	<ul> <li>Not classified.</li> <li>Not classified.</li> <li>All components listed or polymer exempt.</li> <li>All components listed.</li> <li>Contains thiadiazole derivative. May produce an allergic reaction.</li> </ul>
Other Information	Environmental Protection Act 1990 (as amended). Health and Safety at Work Act 1974. Consumers Protection Act 1987. Control of Pollution Act 1974. Environmental Act 1995. Factories Act 1961. Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations. Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. Control of Substances Hazardous to Health Regulations 1994 (as amended). Road Traffic (Carriage of Dangerous Substances in Packages) Regulations. Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations. Road Traffic (Carriage of Dangerous Substances in Road Tankers in Tank Containers) Regulations. Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. Health and Safety (First Aid) Regulations 1981. Personal Protective Equipment (EC Directive) Regulations 1992. Personal Protective Equipment at Work Regulations 1992.

# 16. OTHER INFORMATION

# R-phrase(s)

R43 R53	Not classified. May cause sensitisation by skin contact. May cause long-term adverse effects in the aquatic environment.			
MSDS Version	Number :	1.		
MSDS Effective	e Date :	09.03.2007		
MSDS Revision	ns :	A vertical bar () in the left margin indicates an amendment from the previous version.		
MSDS Regulat	ion :	The content and format of this safety data sheet is in accordance with Commission Directive 2001/58/EC of 27 July 2001, amending for the second time Commission Directive 91/155/EEC.		
MSDS Distribu	tion :	The information in this document should be made available to all who may handle the product.		
Disclaimer	:	This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not		

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# Material Safety Data Sheet

therefore be construed as guaranteeing any specific property of the product.

RIMULA(R) X MULTIGRADE OIL 15W/40 54916	10/28/94				
SHELL MATERIAL SAFETY DATA SHEET BE SAFE. READ OUR PRODUCT SAFETY INFORMATION AND PASS IT ON. PRODUCT LIABILITY LAW REQUIRES IT! ************************************					
RIMULA(R) X MULTIGRADE OIL 15W/40					
MANUFACTURER'S NAME AND ADDRESS SHELL OIL COMPANY PRODUCT SAFETY & COMPLIANCE P.O. BOX 4320 HOUSTON, TX 77210					
TELEPHONE NUMBERS: 24 HOUR EMERGENCY ASSISTANCE SHELL: 713-473-9461 CHEMTREC: 80	0-424-9300				
GENERAL MSDS ASSISTANCE SHELL: 713-241-4819					
SECTION I   NAME					
PRODUCT: RIMULA(R) X MULTIGRADE OIL 15W CHEM NAME: MIXTURE (SEE SECTION II-A) CHEM FAMILY: PETROLEUM HYDROCARBON; HEAVY D MOTOR OIL	ACUTE HEALTH HAZARD: 1				
CHEM NAME: MIXTURE (SEE SECTION II-A)	ACUTE HEALTH HAZARD: 1 DUTY FIRE HAZARD: 1 REACTIVITY: 0				
CHEM NAME: MIXTURE (SEE SECTION II-A) CHEM FAMILY: PETROLEUM HYDROCARBON; HEAVY D MOTOR OIL SHELL CODE: 54916	ACUTE HEALTH HAZARD: 1 DUTY FIRE HAZARD: 1 REACTIVITY: 0				
CHEM NAME: MIXTURE (SEE SECTION II-A) CHEM FAMILY: PETROLEUM HYDROCARBON; HEAVY D MOTOR OIL SHELL CODE: 54916 SECTION II-A   PRODUCT/INGRED NO. COMPOSITION	ACUTE HEALTH HAZARD: 1 DUTY FIRE HAZARD: 1 REACTIVITY: 0 DIENT CAS PERCENT				
CHEM NAME: MIXTURE (SEE SECTION II-A) CHEM FAMILY: PETROLEUM HYDROCARBON; HEAVY D MOTOR OIL SHELL CODE: 54916 SECTION II-A   PRODUCT/INGRED NO. COMPOSITION P RIMULA X MULTIGRADE OIL 15W/40 1 SOLVENT REFINED, SOLVENT DEWAXED, HYDROTREATED HEAVY PARAFFINIC	ACUTE HEALTH HAZARD: 1 PUTY FIRE HAZARD: 1 REACTIVITY: 0 DIENT CAS PERCENT				
CHEM NAME: MIXTURE (SEE SECTION II-A) CHEM FAMILY: PETROLEUM HYDROCARBON; HEAVY D MOTOR OIL SHELL CODE: 54916 SECTION II-A   PRODUCT/INGRED NO. COMPOSITION P RIMULA X MULTIGRADE OIL 15W/40 1 SOLVENT REFINED, SOLVENT DEWAXED,	ACUTE HEALTH HAZARD: 1 PUTY FIRE HAZARD: 1 REACTIVITY: 0 DIENT CAS PERCENT 64742-54-7 0-70				

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# oj241

0 FIRE 1 REACTIVITY 0
ACUTE TOXICITY DATA
ACUTE DERMAL LD50 ACUTE INHALATION LC50
>5.0 G/KG, RABBIT*
>5.0 G/KG, RABBIT*
HEALTH INFORMATION

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

### EYE CONTACT:

BASED ON INFORMATION AVAILABLE TO SHELL, PRODUCT IS PRESUMED TO BE PRACTICALLY NONIRRITATING TO THE EYES.

### SKIN CONTACT:

BASED ON INFORMATION AVAILABLE TO SHELL, PRODUCT IS PRESUMED TO BE SLIGHTLY IRRITATING TO THE SKIN. PROLONGED OR REPEATED CONTACT MAY CAUSE VARIOUS SKIN DISORDERS SUCH AS DERMATITIS, FOLLICULITIS OR OIL ACNE.

### INHALATION:

INHALATION OF VAPOR (GENERATED AT HIGH TEMPERATURES ONLY) OR OIL MIST FROM THIS PRODUCT MAY RESULT IN MILD IRRITATION OF THE UPPER RESPIRATORY TRACT.

### INGESTION:

LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN SLIGHTLY TOXIC IF SWALLOWED.

SIGNS AND SYMPTOMS:

IRRITATION AS NOTED ABOVE.

### AGGRAVATED MEDICAL CONDITIONS:

PREEXISTING SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BUZADSURE TO THIS PRODUCT.

### OTHER HEALTH EFFECTS:

THIS PRODUCT AND ITS COMPONENTS ARE NOT CLASSIFIED AS CARCINOGENS BY INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC), NATIONAL TOXICOLOGY PROGRAM (NTP) OR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

SECT	SECTION IV   OCCUPATIONAL EXPOSURE LIMITS						
	OSHA		ACGIH				
NO.	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	OTHER		
==== P	======================================	NONE	======================================	10 MG/M3*			
*OIL	MIST, MINERAL						
SECT	ION V   	EMERGENCY A	ND FIRST AID PR	OCEDURES			

- EYE CONTACT: FLUSH EYES WITH WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION.
- SKIN CONTACT: REMOVE CONTAMINATED CLOTHING/SHOES AND WIPE EXCESS FROM SKIN. FLUSH SKIN WITH WATER. FOLLOW BY WASHING WITH SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING UNTIL CLEANED.
- INHALATION: REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GET MEDICAL ATTENTION.
- INGESTION: DO NOT INDUCE VOMITING. IF VOMITING OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF LIQUID INTO THE LUNGS. GET MEDICAL ATTENTION.\*
- NOTE TO PHYSICIAN: \*IF MORE THAN 2.0 ML PER KG HAS BEEN INGESTED AND VOMITING HAS NOT OCCURRED, EMESIS SHOULD BE INDUCED WITH SUPERVISION. KEEP VICTIM'S HEAD BELOW HIPS TO PREVENT ASPIRATION. IF SYMPTOMS SUCH AS LOSS OF GAG REFLEX,

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CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE USING A CUFFED ENDOTRACHEAL TUBE SHOULD BE CONSIDERED.

SECTION VI	SUPPLEMENTAL	HEALTH	INFORMATION	

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NONE IDENTIFIED.

PHYSICAL DATA SECTION VII BOILING POINT (DEG F): SPECIFIC GRAVITY (H20=1): VAPOR PRESSURE (MM HG): NOT AVAILABLE NOT AVAILABLE <0.1 MELTING POINT (DEG F): SOLUBILITY (IN WATER): VAPOR DENSITY (AIR=1): -17 (POUR POINT) NEGLIGIBLE NOT AVAILABLE VISCOSITY: 13-15 (CST @ 212 DEG F) EVAPORATION RATE (NORMAL BUTYL ACETATE = 1): NOT AVAILABLE APPEARANCE AND ODOR: AMBER OIL. SLIGHT HYDROCARBON ODOR. \_\_\_\_\_ SECTION VIII FIRE AND EXPLOSION HAZARDS \_\_\_\_\_ FLASH POINT AND METHOD: FLAMMABLE LIMITS/% VOLUME IN AIR: 380 DEG F (PMCC) LOWER: N/AV UPPER: N/AV EXTINGUISHING MEDIA:

USE WATER FOG, FOAM, DRY CHEMICAL OR CO2. DO NOT USE A DIRECT SQLAAT OF WATER. PRODUCT WILL FLOAT AND CAN BE REIGNITED ON SUFACE OF WATER.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS:

MATERIAL WILL NOT BURN UNLESS PREHEATED. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

SECTION IX | REACTIVITY

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:

AVOID HEAT, FLAME AND CONTACT WITH STRONG OXIDIZING AGENTS.

### HAZARDOUS DECOMPOSITION PRODUCTS:

THERMAL DECOMPOSITION PRODUCTS ARE HIGHLY DEPENDENT ON THE COMBUSTION CONDITIONS. A COMPLEX MIXTURE OF AIRBORNE SOLID, LIQUID, PARTICULATES AND GASES WILL EVOLVE WHEN THIS MATERIAL UNDERGOES PYROLYSIS OR COMBUSTION. CARBON MONOXIDE, HYDROGEN SULFIDE, ALKYL MERCAPTANS, SULFIDES, OXIDES OF CALCIUM, NITROGEN, SULFUR AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED UPON COMBUSTION.

SECTION X Construction SECTION

**RESPIRATORY PROTECTION:** 

IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SECTION IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS AND PARTICULATES.

PROTECTIVE CLOTHING:

WEAR CHEMICAL RESISTANT GLOVES AND OTHER PROTECTIVE CLOTHING AS REQUIRED TO MINIMIZE SKIN CONTACT. WEAR SAFETY GOGGLES TO AVOID EYE CONTACT. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE http://www.islandoilsupply.com/shell/msds/060052.txt

THE BESTATICTION IS PROVIDED BY NITRILE GLOVES.

ADDITIONAL PROTECTIVE MEASURES:

SECTION XI | ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES:

MAY BURN ALTHOUGH NOT READILY IGNITABLE. USE CAUTIOUS JUDGMENT WHEN CLEANING UP LARGE SPILLS. \*\*\* LARGE SPILLS \*\*\* WEAR RESPIRATOR AND PROTECTIVE CLOTHING AS APPROPRIATE. SHUT OFF SOURCE OF LEAK IF SAFE TO DO SO. DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND OR OTHER SUITABLE MATERIAL; DISPOSE OF PROPERLY. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE. \*\*\* SMALL SPILLS \*\*\* TAKE UP WITH AN ABSORBENT MATERIAL AND DISPOSE OF PROPERLY.

SECTION XII | SPECIAL PRECAUTIONS

MINIMIZE SKIN CONTACT. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOLIET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. PROPERLY DISPOSE OF CONTAMINATED LEATHER ARTICLES, INCLUDING SHOES, THAT CANNOT BE DECONTAMINATED.

STORE IN A COOL, DRY PLACE WITH ADEQUATE VENTILATION. KEEP AWAY FROM OPEN FLAMES AND HIGH TEMPERATURES.

SECTION XIII TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION: NOT HAZARDOUS BY D.O.T. REGULATIONS

D.O.T. PROPER SHIPPING NAME:

OTHER REQUIREMENTS:

http://www.islandoilsupply.com/shell/msds/060052.txt

SECTION XIV | OTHER REGULATORY CONTROLS

THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES.

PROTECTION OF STRATOSPHERIC OZONE (PURSUANT TO SECTION 611 OF THE CLEAN AIR ACT AMENDMENTS OF 1990): PER 40 CFR PART 82, THIS PRODUCT DOES NOT CONTAIN NOR WAS IT DIRECTLY MANUFACTURED WITH ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ATTACHED ENVIRONMENTAL DATA SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

SECTION XV | STATE REGULATORY INFORMATION

THE FOLLOWING CHEMICALS ARE SPECIFICALLY LISTED BY INDIVIDUAL STATES; OTHER PRODUCT SPECIFIC HEALTH AND SAFETY DATA IN OTHER SECTIONS OF THE MSDS MAY ALSO BE APPLICABLE FOR STATE REQUIREMENTS. FOR DETAILS ON YOUR REGULATORY REQUIREMENTS YOU SHOULD CONTACT THE APPROPRIATE AGENCY IN YOUR STATE.

STATE LISTED COMPONENT	CAS NUMBER	PERCENT	STATE CODE

ZINC COMPOUND NONE 1-2 NJ, PA

CA = CALIFORNIA HAZ. SUBST. LIST; CA65C, CA65R, CA65C/R = CALIFORNIA SAFE DRINKING WATER AND TOXICS ENFORCEMENT ACT OF 1986 OR PROPOSITION 65 LIST; CT = CONNECTICUT TOXIC. SUBST. LIST; FL = FLORIDA SUBST. LIST; IL = ILLINOIS TOX. SUBST. LIST; LA = LOUISIANA HAZ. SUBST. LIST; MA = MASSACHUSETTS SUBST. LIST; ME = MAINE HAZ. SUBST. LIST; MN = MINNESOTA HAZ. SUBST. LIST; NJ = NEW JERSEY HAZ. SUBST. LIST; PA = PENNSYLVANIA HAZ. SUBST. LIST; RI = RHODE ISLAND HAZ. SUBST. LIST.

SECTION XVI

SPECIAL NOTES

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PRODUCT NAME CHANGED; FORMERLY (SHELL RIMULA(R) X MULTIGRADE DIESEL ENGINE OIL 15W/40). THIS MSDS HAS BEEN REVISED IN SECTIONS I, II-A, II-B, III, V, VII, IX, XIII, XV AND EDS SECTIONS I, II AND IV.

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THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

WE ARE PROVIDING OUR MOST RECENT MATERIAL SAFETY DATA SHEET AND/OR ENVIRONMENTAL DATA SHEET. IF YOU WISH TO RECEIVE UPDATES TO THIS INFORMATION, PLEASE CALL SHELL'S GENERAL MSDS ASSISTANCE LINE (713-241-4819) TO ENSURE THAT YOU ARE ADDED TO SHELL'S REGULAR MSDS DISTRIBUTION SYSTEM.

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BE SAFE. READ OUR PRODUCT SHELL OIL COMPANY SAFETY INFORMATION...AND PRODUCT SAFETY AND COMPLIANCE PASS IT ON. (PRODUCT P. O. BOX 4320 LIABILITY LAW REQUIRES IT) HOUSTON, TX. 77210 \_\_\_\_\_ \* ENVIRONMENTAL DATA SHEET 60052 - 01 \* EDS: 60052 - 01 10/28/94 PRODUCT NAME: RIMULA(R) X MULTIGRADE OIL 15W/40 PRODUCT CODE: 54916 MANUFACTURER'S NAME AND ADDRESS SHELL OIL COMPANY P.O. BOX 4320 HOUSTON, TX 77210 TELEPHONE NUMBERS: 24 HOUR EMERGENCY ASSISTANCE SHELL: 713-473-9461 CHEMTREC: 800-424-9300 FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL 713-241-2252 \_\_\_\_\_ PRODUCT COMPOSITION SECTION I \_\_\_\_\_ NO. COMPOSITION CAS PERCENT RIMULA X MULTIGRADE DIESEL ENGINE O MIXTURE Ρ 100 IL 15W/40 SOLVENT REFINED, SOLVENT DEWAXED, H 64742-54-7 0-70 1

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	YDROTREATED HEAVY PARAFFINIC		QJ2	41
•	DISTILLATE			
2	SOLVENT DEWAXED HEAVY PARAFFINIC DI	64742-65-0	0-70	
	STILLATE			
3	HYDROTREATED RESIDUAL OIL	64742-57-0	5-10	
4	ADDITIVE PACKAGE	MIXTURE	20-25	

4A ZINC DIALKYL DITHIOPHOSPHATE

SECTION II		SARA TITLI	E III INFORMATION	
NO. EHS RQ* : (*1)	EHS TPQ* (*2) =========		313 CATEGORY (*4)	311/312 CATEGORY (*5)

YES ZINC COMPOUND 4A \*1 = REPORTABLE QUANTITY OF EXTREMELY HAZARDOUS SUBSTANCE, SEC 302 \*2 = THRESHOLD PLANNING QUANTITY, EXTREMELY HAZARDOUS SUBSTANCE, SEC 302 \*3 = TOXIC CHEMICAL, SEC 313 \*4 = CATEGORY AS REQUIRED BY SEC 313 (40 CFR 372.42), MUST BE USED ON TOXIC RELEASE INVENTORY FORM \*5 = HAZARD CATEGORY FOR SARA SEC. 311/312 REPORTING HEALTH: H-1 = IMMEDIATE (ACUTE) HEALTH HAZARD H-2 = DELAYED (CHRONIC) HEALTH HAZARD PHYSICAL: P-3 = FIRE HAZARD P-4 = SUDDEN RELEASE OF PRESSURE HAZARD P-5 = REACTIVE HAZARD\_\_\_\_\_ SECTION III ENVIRONMENTAL RELEASE INFORMATION \_\_\_\_\_

THIS PRODUCT IS COVERED BY EPA'S COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) PETROLEUM EXCLUSION. THEREFORE RELEASES TO AIR, LAND, OR WATER ARE NOT REPORTABLE UNDER CERCLA ("SUPERFUND"). HOWEVER UNDER SECTION 311 OF EPA'S CLEAN WATER ACT (CWA), THIS PRODUCT IS CONSIDERED AN OIL. AS SUCH , SPILLS INTO OR LEADING TO SURFACE WATERS THAT CAUSE A SHEEN MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802. http://www.islandoilsupply.com/shell/msds/060052.txt

THIS PRESENT AT 10% OR MORE MAY ALSO BE SUBJECT TO THIS RULE.

SECTION IV | RCRA INFORMATION

IF THIS PRODUCT BECOMES A WASTE, IT WOULD NOT BE A HAZARDOUS WASTE BY RCRA CRITERIA (40 CFR 261). PLACE IN AN APPROPRIATE DISPOSAL FACILITY IN COMPLIANCE WITH LOCAL REGULATIONS.

\_\_\_\_\_

WE ARE PROVIDING OUR MOST RECENT MATERIAL SAFETY DATA SHEET AND/OR ENVIRONMENTAL DATA SHEET. IF YOU WISH TO RECEIVE UPDATES TO THIS INFORMATION, PLEASE CALL SHELL'S GENERAL MSDS ASSISTANCE LINE (713-241-4819) TO ENSURE THAT YOU ARE ADDED TO SHELL'S REGULAR MSDS DISTRIBUTION SYSTEM.

\_\_\_\_\_\_

SHELL OIL COMPANY P.O. BOX 4320 HOUSTON, TX 77210

FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL (713) 241-2252

FOR EMERGENCY ASSISTANCE PLEASE CALL SHELL: (713) 473-9461 CHEMTREC: (800) 424-9300

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# TELLUS(R) OIL 68 12/06/94 65211 SHELL MATERIAL SAFETY DATA SHEET BE SAFE. READ OUR PRODUCT SAFETY INFORMATION ... AND PASS IT ON. PRODUCT LIABILITY LAW REQUIRES IT! \* MATERIAL SAFETY DATA SHEET 60270 - 11 \* TELLUS(R) OIL 68 SH MSDS: 60270 - 11 T 12/06/94 MANUFACTURER'S NAME AND ADDRESS SHELL OIL COMPANY **PRODUCT SAFETY & COMPLIANCE** P.O. BOX 4320 HOUSTON, TX 77210 **TELEPHONE NUMBERS:** 24 HOUR EMERGENCY ASSISTANCE SHELL: 713-473-9461 CHEMTREC: 800-424-9300 GENERAL MSDS ASSISTANCE SHELL: 713-241-4819 SECTION I NAME \_\_\_\_\_ PRODUCT: TELLUS(R) OIL 68 CHEM NAME: MIXTURE (SEE SECTION II-A) ACUTE HEALTH HAZARD: 1 CHEM FAMILY: PETROLEUM HYDROCARBON; HYDRAULIC OIL FIRE HAZARD: 1 SHELL CODE: 65211 REACTIVITY: 0 \_\_\_\_\_ \_\_\_\_\_ SECTION II-A PRODUCT/INGREDIENT \_\_\_\_\_ NO. COMPOSITION CAS PERCENT Ρ TELLUS OIL 68 1 HYDROTREATED HEAVY PARAFFINIC 64742-54-7 98-99 DISTILLATE MIXTURE 2 MINOR ADDITIVES 1-2 NFPA HAZARD RATING: HEALTH 0 FIRE 1 REACTIVITY 0 \_\_\_\_\_ SECTION II-B ACUTE TOXICITY DATA \_\_\_\_\_

ACUTE DERMAL LD50

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ACUTE INHALATION LC50

NO. ACUTE ORAL LD50

\_\_\_\_<u>0</u>,241

P NOT AVAILABLE NOT AVAILABLE NOT AVAILABLE 1 >5.0 G/KG, RAT\* >5.0 G/KG, RABBIT\* NOT AVAILABLE \* BASED ON API STUDIES.

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THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

HEALTH INFORMATION

## EYE CONTACT:

SECTION III

BASED ON COMPONENT INFORMATION, PRODUCT IS PRESUMED TO BE PRACTICALLY NON-IRRITATING TO THE EYES.

# SKIN CONTACT:

BASED ON COMPONENT INFORMATION, PRODUCT IS PRESUMED TO BE PRACTICALLY NON-IRRITATING TO THE SKIN. PROLONGED AND REPEATED CONTACT MAY RESULT IN SKIN DISORDERS SUCH AS DERMATITIS. OIL ACNE OR FOLLICULITIS. ACCIDENTAL RELEASE UNDER HIGH PRESSURE APPLICATIONS MAY RESULT IN INJECTION OF OIL INTO THE SKIN CAUSING LOCAL NECROSIS.

# INHALATION:

THE INHALATION OF VAPORS (GENERATED AT HIGH TEMPERATURES ONLY) OR OIL MIST MAY CAUSE A MILD IRRITATION OF THE MUCOUS MEMBRANES OF THE UPPER RESPIRATORY TRACT.

# INGESTION:

BASED ON COMPONENT INFORMATION, PRODUCT IS NO MORE THAN SLIGHTLY TOXIC IF SWALLOWED.

SIGNS AND SYMPTOMS:

IRRITATION AS NOTED ABOVE. NECROSIS MAY BE EVIDENCED BY DELAYED ONSET OF PAIN AND TISSUE DAMAGE A FEW HOURS FOLLOWING HIGH PRESSURE INJECTION.

## AGGRAVATED MEDICAL CONDITIONS:

PREEXISTING SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

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#### OTHER HEALTH EFFECTS:

THIS PRODUCT AND ITS COMPONENTS ARE NOT CLASSIFIED AS CARCINOGENS BY INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC), NATIONAL TOXICOLOGY PROGRAM (NTP) OR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

FOR A SPANISH TRANSLATION OF THIS MSDS, CALL 1-800-240-MSDS.

SECTION IV   OCCUPATIONAL EXPOSURE LIMITS						
OSHA			ACGIH	ACGIH		
NO.	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	OTHER	
==== P	*5 MG/M3	NONE	======================================	*10 MG/M3	======================================	
*OIL	MIST, MINERAL					
SECTION V   EMERGENCY AND FIRST AID PROCEDURES						

- EYE CONTACT: FLUSH EYES WITH WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION.
- SKIN CONTACT: REMOVE CONTAMINATED CLOTHING/SHOES WIPE EXCESS FROM SKIN. FLUSH SKIN WITH WATER. FOLLOW BY WASHING WITH SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. IF MATERIAL IS INJECTED UNDER THE SKIN, GET MEDICAL ATTENTION PROMPTLY TO PREVENT SERIOUS DAMAGE; DO NOT WAIT FOR SYMPTOMS TO DEVELOP.
- INHALATION: REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GET MEDICAL ATTENTION.
- INGESTION: DO NOT INDUCE VOMITING. IN GENERAL, NO TREATMENT IS NECESSARY UNLESS LARGE QUANTITIES OF PRODUCT ARE INGESTED. HOWEVER, GET MEDICAL ADVICE.
- NOTE TO PHYSICIAN: IN GENERAL, EMESIS INDUCTION IS UNNECESSARY IN HIGH VISCOSITY, LOW VOLATILITY PRODUCTS, I.E., MOST OILS AND GREASES.

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SECTION VI	SUPPLEMENTAL HEALTH INFORMATION

NONE IDENTIFIED.

SECTION VII PHYSICAL DATA BOILING POINT (DEG F): SPECIFIC GRAVITY (H20=1): VAPOR PRESSURE (MM HG): 0.8729 NOT AVAILABLE <0.1 MELTING POINT (DEG F): SOLUBILITY (IN WATER): VAPOR DENSITY (AIR=1): -5 (POUR POINT) NOT AVAILABLE NEGLIGIBLE VISCOSITY: 68 (CS @ 104 DEG F) EVAPORATION RATE (NORMAL BUTYL ACETATE = 1): NOT AVAILABLE APPEARANCE AND ODOR: CREAM WHITE LIQUID. SLIGHT HYDROCARBON ODOR. SECTION VIII FIRE AND EXPLOSION HAZARDS FLASH POINT AND METHOD:FLAMMABLE LIMITS/% VOLUME IN AIR:410 DEG F (PMCC)LOWER: N/AVUPPER: N/AV EXTINGUISHING MEDIA: USE WATER FOG, FOAM, DRY CHEMICAL OR CO2. DO NOT USE A DIRECT STREAM OF WATER. PRODUCT WILL FLOAT AND CAN BE REIGNITED ON SURFACE OF WATER.

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SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS:

MATERIALS WILL NOT BURN UNLESS PREHEATED. DO NOT ENTER CONFINED Q2A21 SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

\_\_\_\_\_ SECTION IX REACTIVITY \_\_\_\_\_

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID: AVOID HEAT, OPEN FLAMES, AND OXIDIZING MATERIALS.

## HAZARDOUS DECOMPOSITION PRODUCTS:

THERMAL DECOMPOSITION PRODUCTS ARE HIGHLY DEPENDENT ON THE COMBUSTION CONDITIONS. A COMPLEX MIXTURE OF AIRBORNE SOLID, LIQUID, PARTICULATES AND GASES WILL EVOLVE WHEN THIS MATERIAL UNDERGOES PYROLYSIS OR COMBUSTION. CARBON MONOXIDE AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED UPON COMBUSTION.

SECTION X | EMPLOYEE PROTECTION

## RESPIRATORY PROTECTION:

IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS AND PARTICULATES.

#### PROTECTIVE CLOTHING:

WEAR CHEMICAL RESISTANT GLOVES AND OTHER PROTECTIVE CLOTHING AS REQUIRED TO MINIMIZE SKIN CONTACT. NO SPECIAL EYE PROTECTION IS ROUTINELY NECESSARY. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY NITRILE GLOVES.

ADDITIONAL PROTECTIVE MEASURES:

# **0J241**

SECTION XI	ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES:

MAY BURN ALTHOUGH NOT READILY IGNITABLE. USE CAUTIOUS JUDGMENT WHEN CLEANING UP LARGE SPILLS. \*\*\* LARGE SPILLS \*\*\* WEAR RESPIRATOR AND PROTECTIVE CLOTHING AS APPROPRIATE. SHUT OFF SOURCE OF LEAK IF SAFE TO DO SO. DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND OR OTHER SUITABLE MATERIAL; DISPOSE OF PROPERLY. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE. \*\*\* SMALL SPILLS \*\*\* TAKE UP WITH AN ABSORBENT MATERIAL AND DISPOSE OF PROPERLY.

SECTION XII | SPECIAL PRECAUTIONS

MINIMIZE SKIN CONTACT. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. PROPERLY DISPOSE OF CONTAMINATED LEATHER ARTICLES, INCLUDING SHOES, THAT CANNOT BE DECONTAMINATED. STORE IN A COOL, DRY PLACE WITH ADEQUATE VENTILATION. KEEP AWAY FROM OPEN FLAMES AND HIGH TEMPERATURES.

SECTION XIII | TRANSPORTATION REQUIREMENTS DEPARTMENT OF TRANSPORTATION CLASSIFICATION: NOT HAZARDOUS BY D.O.T. REGULATIONS D.O.T. PROPER SHIPPING NAME: OTHER REQUIREMENTS: SECTION XIV | OTHER REGULATORY CONTROLS THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL

SUBSTANCES

PROTECTION OF STRATOSPHERIC OZONE (PURSUANT TO SECTION 611 OF THE **Q2A1** AIR ACT AMENDMENTS OF 1990): PER 40 CFR PART 82, THIS PRODUCT DOES NOT CONTAIN NOR WAS IT DIRECTLY MANUFACTURED WITH ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ATTACHED ENVIRONMENTAL DATA SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

SECTION	XV	STATE	REGULATORY	INFORMATION	

BASED ON INFORMATION AVAILABLE TO SHELL, THIS PRODUCT DOES NOT CONTAIN ANY CHEMICAL SUBSTANCE REGULATED BY A SPECIFIC STATE LIST.

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SECTION XVI | SPECIAL NOTES

THIS MSDS HAS BEEN REVISED IN SECTIONS II-A, II-B, VII, VIII, XIII, AND EDS SECTIONS I AND IV. A SPANISH TRANSLATION OF THIS MSDS MAY BE OBTAINED BY CALLING 1-800-240-MSDS.

THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

WE ARE PROVIDING OUR MOST RECENT MATERIAL SAFETY DATA SHEET AND/OR ENVIRONMENTAL DATA SHEET. IF YOU WISH TO RECEIVE UPDATES TO THIS INFORMATION, PLEASE CALL SHELL'S GENERAL MSDS ASSISTANCE LINE (713-241-4819) TO ENSURE THAT YOU ARE ADDED TO SHELL'S REGULAR MSDS DISTRIBUTION SYSTEM.

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BE SAFE. READ OUR PRODUCT SAFETY INFORMATION...AND PASS IT ON. (PRODUCT SHELL OIL COMPANY PRODUCT SAFETY AND COMPLIANCE P. O. BOX 4320

http://www.islandoilsupply.com/shell/msds/060270.txt LIABILIT **QJ241** REQUIRES IT) HOUSTON, TX. 77210 \* ENVIRONMENTAL DATA SHEET 60270 – 05 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* EDS: 60270 - 05 T 12/06/94 PRODUCT NAME: TELLUS(R) OIL 68 PRODUCT CODE: 65211 MANUFACTURER'S NAME AND ADDRESS SHELL OIL COMPANY P.O. BOX 4320 HOUSTON, TX 77210 TELEPHONE NUMBERS: 24 HOUR EMERGENCY ASSISTANCE SHELL: 713-473-9461 CHEMTREC: 800-424-9300 FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL 713-241-2252 \_\_\_\_\_ SECTION I PRODUCT COMPOSITION \_\_\_\_\_\_ NO. COMPOSITION CAS PERCENT Ρ TELLUS OIL 68 MIXTURE 100 64742-54-7 98-99 1 HYDROTREATED HEAVY PARAFFINIC DISTI LLATE 2 MIXTURE 1-2 MINOR ADDITIVES SECTION II SARA TITLE III INFORMATION \_\_\_\_\_ NO. EHS RQ\* EHS TPQ\* SEC-313 313 CATEGORY 311/312 CATEGORY (\*2) (\*3) (\*5) (\*1) (\*4) \_\_\_\_\_\_ BASED ON THE DATA AVAILABLE TO SHELL, THIS PRODUCT IS NOT REGULATED BY SARA, TITLE III.

\*1 = REPORTABLE QUANTITY OF EXTREMELY HAZARDOUS SUBSTANCE, SEC 302QJ241 \*2 = THRESHOLD PLANNING QUANTITY, EXTREMELY HAZARDOUS SUBSTANCE, SEC 302 \*3 = TOXIC CHEMICAL, SEC 313 \*4 = CATEGORY AS REQUIRED BY SEC 313 (40 CFR 372.42), MUST BE USED ON TOXIC RELEASE INVENTORY FORM \*5 = HAZARD CATEGORY FOR SARA SEC. 311/312 REPORTING HEALTH: H-1 = IMMEDIATE (ACUTE) HEALTH HAZARD H-2 = DELAYED (CHRONIC) HEALTH HAZARD PHYSICAL: P-3 = FIRE HAZARD P-4 = SUDDEN RELEASE OF PRESSURE HAZARD P-5 = REACTIVE HAZARD\_\_\_\_\_ SECTION III ENVIRONMENTAL RELEASE INFORMATION \_\_\_\_\_

THIS PRODUCT IS COVERED BY EPA'S COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) PETROLEUM EXCLUSION. THEREFORE RELEASES TO AIR, LAND, OR WATER ARE NOT REPORTABLE UNDER CERCLA ("SUPERFUND"). HOWEVER UNDER SECTION 311 OF EPA'S CLEAN WATER ACT (CWA), THIS PRODUCT IS CONSIDERED AN OIL. AS SUCH , SPILLS INTO OR LEADING TO SURFACE WATERS THAT CAUSE A SHEEN MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.

THIS PRODUCT IS AN OIL UNDER 49 CFR (DOT) PART 130. IF SHIPPED BY RAIL OR HIGHWAY IN A TANK WITH A CAPACITY OF 3,500 GALLONS OR MORE, IT IS SUBJECT TO THE REQUIREMENTS OF PART 130. MIXTURE SOLUTIONS IN WHICH THIS PRODUCT IS PRESENT AT 10% OR MORE MAY ALSO BE SUBJECT TO THIS RULE.

SECTION IV | RCRA INFORMATION

IF THIS PRODUCT BECOMES A WASTE, IT WOULD NOT BE A HAZARDOUS WASTE BY RCRA CRITERIA (40 CFR 261). PLACE IN AN APPROPRIATE DISPOSAL FACILITY IN COMPLIANCE WITH LOCAL REGULATIONS.

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SHELL OIL COMPANY P.O. BOX 4320 HOUSTON, TX 77210

FOR ADDI**NGAL** INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL (713) 241-2252

## FOR EMERGENCY ASSISTANCE PLEASE CALL

SHELL:	(713)	473-9461
CHEMTREC:	(800)	424-9300

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