# **Operator's and Maintenance Manual**

QJ341+ StageV





# **MARNING**





### **IGNORING INSTRUCTIONS HAZARD!**

To avoid death or injury you MUST read, understand and follow operator's and maintenance manuals before installing, inspecting, operating, servicing, testing, cleaning, transporting, storing, dismantling or disposing of the product or a part or accessory of the product. Keep this publication for future reference.



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1 Sandvik Remote Monitoring and Data Collection



### 1.1 Introduction

As a purchaser, owner or user of mobile crushing/screening equipment manufactured by Sandvik ("Equipment") please note the following:

### 1.2 Data collection device installed

The Equipment is equipped with a service remote monitoring device ("Remote Service Device") in order to, inter alia, collect information from the Equipment in order to monitor the performance, reliability and to track the Equipment's operational efficiency ("Information").

### 1.3 Remote Service Device warranty

The Sandvik Mining and Rock Technology Standard Equipment Warranty ("Equipment Warranty") shall apply for the Remote Service Device. The warranty period for a new Remote Service Device is 12 months from the start of the usage of the Remote Service Device or 18 months after shipment from Sandvik arrived at the first purchaser, whichever comes first. The latest version of Sandvik Mining and Rock Technology Standard Spare Parts Warranty ("Spare Parts Warranty") applies for retro fitted Remote Service Devices. You are responsible for replacement or repairs of the Remote Service Device which is not covered by the Warranty.

### 1.4 User Rights for Remote Service Device

Subject to the conclusion of a separate service Agreement, and subject to terms and limitations set forth in such agreement, Sandvik may grant you a non-exclusive, non-transferrable, non-sublicensable, time-limited and revocable right to the data collected by the Remote Service Device solely for your internal business purposes.

## 1.5 Consent to collect, store and process Data

To allow Sandvik to supply the Service, you hereby consent and agree that Sandvik may collect, store and process standard industry information and data relating to the activity and condition of the Equipment, including but not limited to location, engine, percussion and/or transmission hours ("Input Data"). All rights, title and interest in or to Input Data will be retained by you.

You recognize that a limited amount of personal or operator data may be transferred to Sandvik in the Input Data. To the extent consent is required under all applicable data privacy laws or other data protection laws, you grant consent, and represent and warrant to Sandvik that you will adhere to all relevant applicable data privacy laws or other data protection laws and in addition have at all relevant times the necessary consents from any and all operators which are maintaining or using the Equipment. Sandvik will adhere to applicable data protection laws as well as to its internal data protection governance framework.

You agree and acknowledge that Sandvik may use the Input Data for optimizing the schedule of its services and parts deliveries and for improving its customer support and/or for any internal purposes, including but not limited to product development, business and marketing analyses and improvement of its products' performance and availability ("Purpose").



The Input Data will be stored in a secured-storage managed by Sandvik. Sandvik may disclose the Input Data to its affiliates or other members within the Sandvik Group and to third parties providing services to the Sandvik Group, in each case only for the Purpose.

For use of the Service it might be necessary to collect the Data manually or to use your local (wifi) network, for which you shall provide (IT) support and afford Sandvik all necessary access to the (mining) site and (local) networks to enable Sandvik to successfully collect the Input Data. However, your daily activities on the site shall not be hindered by Sandvik.

### 1.6 Proprietary Rights

All rights, title (if any) and interest in or to any data which is provided to you through Sandvik's data analytics solution through use of the Service (the "Output Data") will be retained by you for your internal business purpose.

Sandvik reserves the right to anonymize and aggregate the Input Data and any Output Data into a new set of data ("Sandvik Data"). All rights title and interest to such anonymized and aggregated Sandvik Data will be retained by Sandvik. Sandvik may freely and without any limitations whatsoever use, host, transmit, display, modify, sub-license, sell, process, analyze and reproduce Sandvik Data in order to, for example, improve its services (and Sandvik's other products and services), develop new services and/or permit Sandvik's hosting partner and other subcontractors to do so. Sandvik is not obliged to share any Sandvik Data with you or any third party.

### 1.7 Obligation to inform

You shall inform Sandvik in writing if the Equipment is sold, leased or borrowed to a third party. Such written notification shall include at least: i) the name of the third party; ii) the serial number of the Equipment; iii) the date of transfer to the third Party; and iv) whether the Equipment is sold, leased, or borrowed to the third party.

# 1.8 Opt-out

In the event you wish to withdraw your consent to Sandvik to collect, store and process standard industry information and data relating to the activity and condition of the Equipment, please request Sandvik in writing to stop collecting and processing the data related to a specific Equipment unit. A separate notice is needed per each unit and shall state at least: i) the serial number of the Equipment; and ii) the end date of your consent.

# 1.9 Confidentiality

Without the written permission of the other party neither you nor Sandvik is permitted to use, disclose or permit the disclosure of confidential information (including the Input Data) for any other reason than performing the Purpose. However, this does not prohibit the disclosure of confidential information if the disclosure is required by law, the listing rules of any recognised stock exchange (if applicable), a court, arbitrator or administrative tribunal in the course of proceedings before it, him or her.



### 1.10 Data security

All transmitted data is encrypted and secured by Sandvik at the highest possible manner in order to restrict any unwanted third party access. However, parties recognize that the Service is also dependent on you and potentially third parties services (telecom providers, etc.) including for, but not limited to, the transfer of the data. Therefore, Sandvik is not responsible or cannot be held liable for any data breach outside its direct sphere of influence. In any case, Sandvik is not liable for any breaks in the wire or wireless data connection provided by any third party service provider or for the extent of their coverage area. The extent of the coverage areas can be checked with your nearest Sandvik representative. You are obliged to inform Sandvik promptly of any known problem in the functionality or performance of the Remote Service Device and Sandvik may assist accordingly.

### 1.11 Reports

You are aware and acknowledge that the Reports are based on data remotely sent to Sandvik and that the Reports are therefore indicative in nature. Sandvik cannot guarantee that the Reports completely reflect the factual condition of the Equipment.

## 1.12 Liability

Notwithstanding anything to the contrary in this document, Sandvik's liability shall in no event include direct or indirect/consequential losses or costs and the total liability shall be capped at 50% of the value of the Equipment value.

### 1.13 Contact

Please contact Sandvik for further information on Sandvik's collection, storage and processing of data.



# 2 Safety



### 2.1 Safety first

Make sure that you know all of the task related hazards before you start to operate or maintain the machine.







#### **IGNORING INSTRUCTIONS HAZARD**

To prevent death or serious injury you must read, understand and obey the machine's Operation and Maintenance instructions. Inspect the machine before use to make sure it is safe to operate. Scheduled maintenance is necessary to keep the machine safe to use. If maintenance is not done, machine performance will decrease.

Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.

### 2.1.1 Signal words

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

<u> </u>		
	DANGER	
	The signal word, "DANGER", indicates a hazardous situation which, if not avoided, will result in death or severe injury.	

# **MARNING**

### **WARNING**

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



#### NOTICE

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

When you see a signal word in this manual, it is applicable to your safety. Carefully read and understand the text that follows the signal word.

### 2.1.2 Safety Symbols

Obey all safety symbols, labels and instructions at all times.

- Keep safety instructions and safety labels clean and in view at all times.
- Make sure safety instructions and safety labels attached to the equipment are always complete and can be read
- Replace safety instructions and safety labels that cannot be read or are missing before operating the equipment.



Make sure that replacement parts include safety instructions and labels.

### Symbol descriptions



#### Hazard

The black symbol inside a yellow triangle with a black border describes the hazard.



#### **Prohibition**

The black symbol inside a red ring with a diagonal red bar describes the action that should not be taken.



### **Mandatory action**

The white symbol inside a blue circle describes the action that must be taken to avoid a hazardous situation.

### 2.1.3 General hazard symbol



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

When you see this symbol, be alert; <u>your safety is involved</u>. Carefully read and understand the message that follows, and inform other users.

### 2.1.4 Hazard symbols

Hazard symbols are used to indicate the type of the hazard and the potential consequences. Hazard symbols are indicated by a yellow triangle with black symbols and black frames. All personnel working on or near the machine must understand and comply with information given in all hazard symbols.

#### Mechanical hazard symbols



Falling load hazard



Crushing hazard



Flying material hazard



Crushing hazard - feet



Crushing hazard - hands



Cutting hazard



### Mechanical hazard symbols



**Entanglement hazard** 



Entanglement hazard



Entanglement hazard



Entanglement hazard - rotating drill



Slipping hazard



Tripping hazard



Falling hazard



Skin injection hazard



High pressure injection hazard



Hanging load hazard



Run over hazard



Sideways tipping hazard



Forward/backward tipping hazard



Sideways tipping hazard, from level position



Sideways tipping hazard



Forward/backward tipping hazard



Sideways tipping hazard, from level position



Falling objects hazard



Remote controlled machinery hazard



### **Electrical hazard symbols**



Electrical hazard



Dangerous electrical voltage



Electrical shock / Electrocution hazard



Overland line hazard

### Thermal hazard symbols



Hot surface hazard



Hot coolant splashing hazard

### Noise hazard symbols



Noise hazard

### Radiation hazard symbols



Laser hazard



Radioactive hazard



### Material/substance hazard symbols



**Explosion hazard** 



Fire hazard



Hazardous/poisonous material hazard



Chemical burn hazard



**Dust hazard** 



Environment pollution hazard



Battery hazard

### **Ergonomic hazard symbols**



Lifting hazard

### 2.1.5 Prohibited action symbols

Prohibited action symbols indicate actions which are prohibited in order to avoid a hazard. Prohibited actions are indicated by a red circle with a red diagonal line across the circle. The action which is prohibited will always be in black. All personnel working on or near the machine must understand and comply with information given in all prohibited action symbols.



No climbing



No smoking



No open flames



Do not touch



Limit or restrict access



Do not weld





Do not remove safety guard



Do not modify



General prohibited action symbol



Do not test for leak with hands

### 2.1.6 Mandatory action symbols

Mandatory action symbols specify actions to be taken to avoid a hazard. Mandatory actions are indicated by white symbols on a blue background. All personnel working on or near the machine must understand and comply with information given in all mandatory action symbols.



Wear protective gloves



Wear eye-protector



Wear safety helmet



Wear safety harness



Wear hearing protectors



Wear safety footwear



Wear protective clothing



Wear high visibility clothing



Wear respirator



Disconnect from power source



Switch off and lockout equipment



Read the manual or instructions





Use cardboard for locating leaks in hoses



Use two-point belt



Use three-point belt



Read service and repair manual



Keep safe distance



Use walkways



Two persons for handling



General mandatory action symbol

### 2.1.7 Minimum required personal protective equipment (PPE)

# WARNING



### **ENTANGLEMENT HAZARD**

Ensure all clothing, long hair, jewelry, body parts and personal equipment e.g. cap lamp cord, is close fitting and secured in order to avoid entanglement in machinery during operations and maintenance.

Always wear the required PPE for the work site. In addition, the following PPE is required or recommended:

# DANGER



#### **NOISE HAZARD!**

Noise level emitted by the machine exceeds 80dB(A). Continuous exposure to noise will cause hearing impairment.



Always wear approved hearing protection.

The following (EN or ANSI approved PPE) is necessary for personnel that do work on the machine, or work less than 5m (17ft) from the machine:



- Hard hat
- · High visibility vest
- Steel cap boots
- · Eye protection
- Industrial gloves
- Hearing protection
- Respirator
- Close fitting protective clothing

Throughout the manual tasks where more PPE items are necessary will be shown.

### 2.1.8 Operation with guards removed

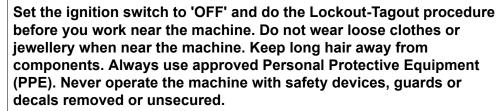
# **A** DANGER



#### **ENTANGLEMENT HAZARD**

Working near a machine in operation could cause death or serious injury.









### 2.2 Safety essentials



Read and understand this manual and the related documentation. If you are not sure, speak to a person who knows. Do not risk death or injury. Training must be given to make sure that safe working procedures are obeyed. Only competent persons who have read and understood the manual can commission and start this machine. Always obey the procedures given in the instructions to operate and maintain the machine.





Always isolate the machine before you remove the guards or covers or do maintenance.



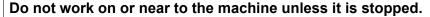
### 2.2.1 Essential safety concerns

# **A** DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.





Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.



Personnel must never be on the machine while it operates or moves because of ejected materials, silica dust, moving equipment, noise and other hazards.

# **A** DANGER



### **IGNORING INSTRUCTIONS HAZARD**

Not using minimum approve PPE (personal protective equipment) could result in death or serious injury.

Always wear approved PPE.

Always use (EN or ANSI approved) minimum Personal Protective Equipment (PPE).

# **A** DANGER



### **WORKING ALONE HAZARD**

Working alone increases your risk of death or serious injury. Never work alone.



#### 2.2.2 Intended use

This Sandvik machine was designed and assembled to process different materials, read Product overview for more specific information. Do not use the machine for something not identified in that section, without first speaking to Sandvik. If you do, it is use of the machine that was not approved (not the intended use).

The intended use includes obeying the instructions in the manual. Sandvik will not be liable for damage as a result of use that is not approved. To prevent or decrease the risk of death or serious injury, only use the machine for its intended purpose.

The machine must only be used:

- If personnel obey all safety, operation and maintenance procedures
- After the manual has been read and understood.
- When there are no defects and it is safe to operate
- For its intended use

#### Instructions for use

# **MARNING**



# IGNORING INSTRUCTIONS HAZARD

To prevent death or serious injury you must read, understand and obey the machine's Operation and Maintenance instructions. Inspect the machine before use to make sure it is safe to operate. Scheduled maintenance is necessary to keep the machine safe to use. If maintenance is not done, machine performance will decrease.



Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.

This machine has been assembled for a specific function. It must not be used for other functions without first speaking to the Sandvik technical department.

Do not operate until the manual and all instructions supplied with the machine are read and understood.



### Operator requirements

# **⚠ WARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



#### 2.2.3 Prohibited use

The following uses are not approved for this machine:

- Use that does not agree with the instructions in section Intended use.
- Use of the machine for functions which are not approved in the manual.
- Use of the machine without necessary training by an approved person
- Use of the machine without using approved personal protective equipment (PPE).
- Use of the machine while persons who are not approved are in the exclusion zone
- Use of the machine with safety guards removed.
- · Use of the machine with defective safety guards
- Use of the machine in an area with explosive gas or dust
- Use of the machine in an area with unsatisfactory airflow if not outdoors.
- Use of the machine with a known defect

#### **Related information**

Intended use (Page 27)

Minimum required personal protective equipment (PPE) (Page 24)

Flammable / explosive gas or dust

# DANGER



#### **EXPLOSIVE ATMOSPHERE HAZARD**

Failure to limit explosive gas or dust will result in death or serious injury.

You must limit coal or other flammable dust which is explosive.



### Unauthorised parts or modifications

## **⚠ WARNING**



**UNAUTHORISED MODIFICATIONS HAZARD** 

Use of non-standard parts could cause death or serious injury.

Only use parts specified in the Sandvik spare parts book.

Mixing fuels can cause damage to the engine

Only use fuel from approved storage and supply equipment

Operation with guards removed

# **A** DANGER



#### **ENTANGLEMENT HAZARD**

Working near a machine in operation could cause death or serious injury.



Set the ignition switch to 'OFF' and do the Lockout-Tagout procedure before you work near the machine. Do not wear loose clothes or jewellery when near the machine. Keep long hair away from components. Always use approved Personal Protective Equipment (PPE). Never operate the machine with safety devices, guards or decals removed or unsecured.





# 2.3 Organizational safety measures

### 2.3.1 Understand and use the manual



You must read and understand the information in this manual.

You must use the instructions given in this manual before operations or maintenance start.





### 2.3.2 Operator training



Training must be given before personnel operate the machine or do maintenance.

If necessary get clarification from your supervisor or a Sandvik representative, before trying to operate or maintain the machine. If you do not, it will invalidate the manufacturer's warranties.

Work on the electrical system must only be done by a qualified electrician or by personnel supervised by a qualified electrician. The work must agree with electrical engineering regulations. You must fully understand the electrical system before doing work on it - read to the electrical schematic diagrams.

Work on the hydraulic system must only be done by authorised personnel. You must fully understand the hydraulic system before doing work on it - read to the hydraulic schematic diagrams.







#### 2.3.3 Risk assessment

# WARNING





#### **IGNORING INSTRUCTIONS HAZARD**

To prevent death or serious injury you must read, understand and obey the machine's Operation and Maintenance instructions. Inspect the machine before use to make sure it is safe to operate. Scheduled maintenance is necessary to keep the machine safe to use. If maintenance is not done, machine performance will decrease.

Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.









Before starting work or maintenance on the machine, a site related risk assessment must be completed to make sure you and others are safe.

Understand the service procedure before you start work.

Keep the work area clean and dry.

Never lubricate, clean or service an operating machine.

Do not perform maintenance on a machine until its temperature is cool enough to safely work on.

Make sure all parts are in functioning condition and installed correctly. Replace worn and broken parts when it is safe to do so.

Remove unwanted grease, oil and material from the machine.

Use only correct tools to perform maintenance.

Never make any changes or add anything to the machine which can have an unwanted effect on safety.

Disconnect the battery ground cable, programmable logic controller (PLC), PLC display screen, engine control module (ECM), remote control and clutch controller before welding on the machine.

If clothing, tools or a body part become entangled in a component of the machine:

- · Push an emergency stop button immediately
- Operate controls to release pressure
- · Stop the engine and do the lockout-tagout procedure

If the machine has unusual movement or makes an unusual noise, stop it and do the lockout-tagout procedure immediately. Report the incident to a supervisor.







### 2.4 Equipment safety

#### 2.4.1 Make the machine safe for maintenance



When doing maintenance, the machine must first be made safe.

- Stop the engine and remove the key
- · Set the isolation switch to "OFF"
- · Do the lockout-tagout procedure
- Attach hazard sign(s) to the machine in applicable positions to tell all personnel of possible dangers.



#### Related information

Operating an emergency stop (Page 57)

Attaching a single tag (Page 63)

Attaching a gang tag (Page 64)

Operating an emergency stop (Page 57)

### 2.4.2 Machine tracking





### **MOVING MACHINE HAZARD**

Personnel on the machine or in exclusion zones when the machine is moving are at risk of death or serious injury.

Do not move the machine when persons are standing on the machine or in exclusion zones (20m / 66ft).

# **⚠ WARNING**



#### RADIO INTERFERENCE HAZARD

It is possible that the radio frequency on the radio remote control could operate other machines.

When this is the case, use the wired remote control.



# **MARNING**



#### **TIPPING HAZARD**

Never move the machine on gradients more than 10° left to right or between 8-20° front to back (read Transport & Commissioning for machine-specific gradients).



Both tracks must be in contact with hard, level ground.

Do a full site inspection before starting to move the machine.

It is necessary, when tracking, that the operator has an all around view of the operation. Another person must help the operator to see if this is not possible.

Track the machine on hard ground only. Be more careful in slippery conditions.

### 2.4.3 Transportation

# **⚠ WARNING**

### TRANSPORT HAZARD



Do not transport the machine before you have read and understood the safety instructions. If necessary, get clarification from your supervisor or a Sandvik representative.

Be careful when transporting the machine as a collision with bystanders could cause death or serious injury. Always obey local and national laws. Make sure that you have all the necessary transportation permissions.

Use an approved vehicle that can move the weight of the machine. If an approved vehicle is not used, damage can be caused to the machine or vehicle.

# ⚠ WARNING



#### **SLIPPING HAZARD!**

Slipping due to dirty access ways, steps and working platforms on the machine could cause death or injury.

Keep all access ways, steps and working platforms clean of oil, grease, debris, snow and ice.





Do not transport loose parts with the machine, as these parts could fall and cause death or serious injury. All loose parts must be kept away from the machine for correct transport.







Make sure that the machine is in the transport position before transportation.

Make sure the machine is stopped with the lockout-tagout procedure done while on an approved transport vehicle.

To transport the machine safely, make sure:

- All personnel are at a safe distance from the machine, tracks and auxiliary equipment
- The machine is free of material, remove if necessary
- Before moving machine off a transport vehicle all temporary sealing and transport straps and chains are removed
- After moving machine on to transport vehicle all temporary transport straps and chains are installed.
- · All guards are in position and secure.

Note: Making sure the machine is safely attached to the transport vehicle is the responsibility of the transport vehicle driver.

- Do not attach by the tracks, this will damage the tracks and can cause the machine to move off the transport vehicle
- Always use available lashing/tie down points
- Always measure the traveling height, width and weight before starting the journey

### 2.4.4 Standard operation









Use the machine only for its intended use, and only if all guards, safety devices, emergency stop buttons, sound-proofed components and exhausts are in position and can operate.

Make sure local barriers are assembled to stop persons not approved for access to the machine or work areas.

Attach a hazard sign(s) to the machine in applicable positions to tell all persons of possible dangers.

Before starting the engine make sure it is safe to start it.

Do the necessary checks to make sure the machine is only used when it is in a safe condition.





#### 2.4.5 **Blockage or malfunction**



If there is a material blockage, malfunction or a problem with an operation, stop the machine and do the lockout procedure. Correct the problem or speak to a Sandvik representative for help if necessary.



#### 2.4.6 **Adjustments**





Adjustments must only be done by trained personnel.

All adjustments to the hydraulic system must only be done by trained Sandvik service engineers.



#### 2.4.7 Maintenance



Before starting maintenance work make sure the machine is positioned on stable, level ground and is safe from accidental or unwanted movement.

Obey adjustment, maintenance and service intervals given in this manual, unless:

- Failure of components makes immediate action necessary
- Bad conditions make more frequent servicing necessary

Use Original Equipment Manufacturer's (OEM) recommended replacement parts only.

Make sure only correctly trained personnel complete these tasks.



#### Climbing and falling



Prevent access to the machine and the area around it by putting up safety barriers to decrease the risk from mechanical dangers, falling lifted loads and ejected materials.



Falling from or on to this machine could result in death or serious injury.





When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform.

Never climb on a moving machine or use components as a climbing aid.

Make sure there is no debris around the machine that could cause persons to trip.

Make sure there is no dirt, oil, snow or ice on handles, steps, handrails, platforms, landing areas and ladders.

When doing work above head height, always use safety-approved ladders and maintenance platforms.







#### Automotive batteries





Automotive batteries contain sulphuric acid, an electrolyte which can cause burns and explosive gases when charged.

Only recharge batteries in an area with good airflow.

Do not short circuit batteries as this could cause a spark and explosion.

Make sure there is no smoking when maintaining batteries.

Work safely and always wear approved PPE to prevent sulphuric acid touching skin, eyes or clothing, see **Personal protective equipment** (**PPE**).









Always isolate and disconnect the battery cables before doing welding on the machine.

To remove a battery, always disconnect the negative cable first. To install a battery always connect the negative cable last.

#### **Related information**

Minimum required personal protective equipment (PPE) (Page 24)

## 2.5 Specific dangers

### 2.5.1 Unguarded areas

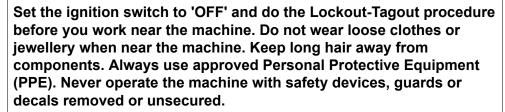
# **A** DANGER



## **ENTANGLEMENT HAZARD**

Working near a machine in operation could cause death or serious injury.















Before operation all safety devices, control devices, decals and guards must be attached.

To prevent death or serious injury never operate the machine without safety devices, decals or guards correctly in place.

Always report defective guards, safety devices, decals or control devices to a supervisor.

Use barriers to prevent access to areas with no guards installed.

#### 2.5.2 Fire

Complete a site specific risk assessment to find fire hazards. Record the necessary procedures to prevent or decrease the risks.

Obey local and national laws or regulations about fire safety training as found in the risk assessment.

If you provide fire extinguishing equipment for the operator, make sure it is easily accessible.

### Fire and explosion

# **⚠ WARNING**



#### FIRE AND EXPLOSION HAZARD!

Explosion hazard can exist in addition to the fire hazard.



Ignition sources like smoking, open flames, welding work and sparks together with combustible materials, can cause explosions and fire. If not avoided, could cause death or severe injury.

Ignition sources are prohibited in the vicinity of the machine ready for operation or in operation.



During maintenance, appropriate fire prevention and protection measures must be followed. This includes but is not limited to trained personnel, proper fire extinguishing equipment and agents.



Always conduct a proper risk assessment before doing any maintenance or repairs that require ignition sources like welding or flame cutting.



#### **WARNING! FIRE HAZARD!**

Fire could lead to death or severe injury.

Reconnect the automatic fire suppression system before taking the machine into use.

#### 2.5.3 Electrical energy

Always keep a safe distance from overhead electric cables. Electricity can travel between objects. If overhead cables are near the machine, a risk



assessment must be completed before personnel operate the machine. Make sure you obey local and national laws or regulations.

# DANGER



#### **ELECTROCUTION HAZARD**

Overhead electric cables that touch the machine will cause injury or death.



If the machine touches an energised cable, you must: Evacuate the area. Tell all personnel not to go near to or touch the machine. Report the incident and make sure the cable is de-energised.



Before starting work, the machine must be isolated. Examine parts to make sure they are de-energised. Insulate and shortcircuit parts adjacent to the de-energised parts.

Electrical components must be examined regularly. Loose connections and cables with damage must be repaired or replaced by authorised personnel.

Use only approved fuses with the correct amp rating. Turn off the machine immediately if there is a fault with the electrical system.

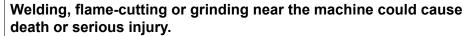
This machine has a negative earth installed. Always obey correct polarity.



#### 2.5.4 Welding

# WARNING

#### **WELDING HAZARD**





Before welding, flame-cutting or grinding clean the machine and the area around it to remove flammable materials. Make sure there is good air flow in the area. Disconnect the battery, ground cable, programmable logic controller (PLC), PLC display screen, engine control module (ECM), remote control and clutch controller before welding on the machine. If necessary, read the engine manuafacturer's manual.



## 2.5.5 Lifting





Always obey lifting instructions in this manual and OEM manuals.

Complete a risk assessment and obey all necessary safety procedures.

Never let untrained persons remove or replace parts of the machine.





The removal of large or heavy components without sufficient lifting equipment is not permitted and could cause death or serious injury.



To prevent or decrease the risk of accidents, parts and assemblies must be moved by OEM approved lifting equipment.

Never work or stand under components that are off the ground.









## 2.5.6 Cleaning



Before you start to clean the machine you must make sure it is isolated.

After cleaning, examine all fuel, lubricant and hydraulic fluid hoses for leaks, loose connections, wear marks or damage. Defective hoses must be replaced and loose connections tightened.

Do not point power washers near or into control boxes or electrical devices.



#### 2.5.7 Surrounding structures



This machine must only be operated in a position away from permanent structures to prevent the risk of persons falling on to the machine.

All temporary maintenance platforms assembled around the machine must be removed before the machine operates.

#### 2.5.8 Noise and vibration





## **NOISE HAZARD!**

Noise level emitted by the machine exceeds 80dB(A). Continuous exposure to noise will cause hearing impairment.



Always wear approved hearing protection.

Use ear protection if you are less than 20m (66ft) from the machine when the engine is started or parts of the machine operate.

Personnel must never hold on to the machine when it operates or moves.







#### 2.5.9 Dust and fumes

# **A** DANGER



#### **DUST HAZARD!**

Breathing dust will cause death or severe injury.

Always wear approved respirator!



Make sure the dust suppression system in your equipment is working properly.

Breathing or inhaling harmful silica dust, produced by processing rock, will cause death or serious injury, such as the lung diseases pneumoconiosis or silicosis.

Diesel Engine Exhaust Emissions (DEEE), including Diesel Particulate Matter (DPM), is considered to be carcinogenic in the European Union (EU).



Make sure approved breathing equipment is used throughout all procedure. All necessary precautions must be followed to prevent or decrease the risk of breathing dust.

Do not clean dust with compressed air.

Dust waste must only be discarded by authorised personnel. When discarding dust waste, you must use water to moisten the dust and put it in a sealed container with a mark to show that it must be discarded correctly.

### Ventilation

Always operate internal combustion engines outdoors or in an area with good airflow.

If, during maintenance, the machine must be operated in a closed space, make sure good airflow is supplied.

All necessary precautions must be followed to decrease the risk of breathing Diesel Engine Exhaust Emissions (DEEE) including Diesel Particulate Matter (DPM).

Obey all local and national safety laws or regulations. Speak to your local safety authority for more information.



Pressurized fluid and gas

# **A DANGER**



#### PRESSURIZED FLUID HAZARD

Pressurized hydraulic fluid can go through skin, which will result in death or serious injury. Fluid under the skin must be surgically removed or gangrene will occur. Get medical aid immediately.



Always use a piece of cardboard for leakage checks. Do not use your hand. Only authorized personnel can work on the hydraulic system. Complete a risk assessment and obey all necessary safety procedures.

# **⚠ WARNING**



#### POTENTIAL ENERGY HAZARD

Potential energy can be contained in hydraulic and compressed air systems when not in operation.



Always release pressure from hydraulic and compressed air systems before doing maintenance or adjustment. Only use components approved by the manuafacturer. Hydraulic and compressed air hoses must be installed correctly. Make sure no connections are interchanged. The hoses must be good quality, the correct length and have correct fittings. Always clean hydraulic components during hydraulic servicing. Obey all procedures to prevent leaks or a spill.

# 2.6 Environmental safety

Do regular servicing of the machine to prevent unwanted engine emissions.

# WARNING



### POISON AND CONTAMINATION HAZARD

Fuels, fluids and lubricants used in this machine can contain chemicals which could cause death or serious injury.



Discard these correctly to prevent environmental damage. Obey local and national laws or regulations. Make sure the correct procedures from material safety data sheets (MSDS) are used when personnel move, store and use hazardous materials. Do not put waste on to the ground, down a drainpipe or into a source of water. Always use containers that do not leak when you drain fluid

#### 2.6.1 Discarding machine or parts

You must only discard this machine through an authorised scrap yard. You must obey local and national laws or regulations when you discard parts.

You must discard unwanted batteries through a local recycling scheme. Batteries must not be discarded in waste which can go to a landfill site.



#### 2.6.2 Hazardous materials

You must clean fuel spillage immediately to prevent contamination. Obey local and national laws or regulations.

Only use fluids and lubricants approved in the maintenance instructions or OEM manuals.

Read and understand the instructions and information in the Hazardous substances section of the manual.

#### 2.6.3 Diesel emissions

# **A** DANGER



### **DIESEL EMISSION HAZARD!**

Prolonged exposure to diesel emissions will increase the risk of death or severe health effects.



Only operate and maintain the equipment according to all applicable instructions, procedures, laws and regulations.

Always wear approved personal protective equipment and utilize effective controls.

International Agency for Research on Cancer has classified diesel exhaust as a carcinogen to humans. Diesel exhaust includes gases, vapors and particles made up primarily of carbon, ash, metallic abrasion particles, sulfates and silicates. In addition to severe long term health effects, diesel emissions cause short term effects such as eye and respiratory irritation.

All mines and construction sites with diesel powered equipment must have documented diesel emission control plans and monitoring programs to ensure that human exposure is reduced as low as practicable. Risks must be assessed and control measures implemented according to the hierarchy of controls. All areas where people may be exposed must be considered; work force and incidental exposure included.

All mines and construction sites with diesel powered equipment must follow and comply with all applicable legislation and industry requirements relating to controlling and limiting worker exposure to diesel emissions. Locally applicable information is available from various sources, including but not limited to legislation, standards, guidelines, rules, safety bulletins, strategies, best practices, instructions and position papers.



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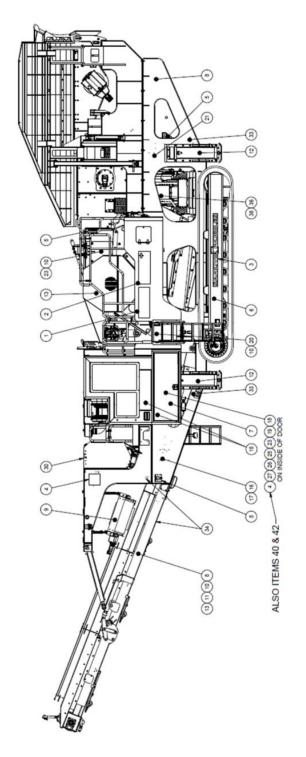
3 Safety QJ341+

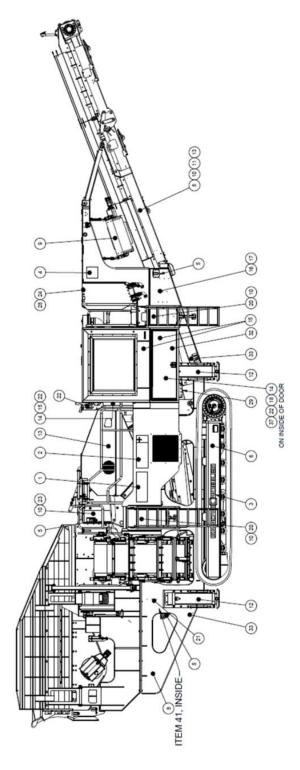


# 3.1 Safety and operational decals

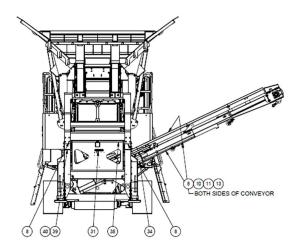
# 3.1.1 QJ341+ decal locations

DE7247 Rev H









### **Related information**

<u>Doing a check that all safety decals are present and are not damaged</u> (Page 237)

### 3.1.2 QJ341+ decal kit list

Kit: DE7247 Rev. H

Item	Part No.	Image
2	DE7248	QJ341+
3	DE7152	Sandvik Mobiles
4	10-55-0403	Track machine
5	DE0027	STOP STOP
6	DE1007	
7	DE1043	BATTERY ISOLATION SWITCH
8	DE8012	PALLING MATERIAL HAZARD Six of serious injury or death KEEP AWAY from machine during operation OD NOT wash near material discharge areas



Item	Part No.	Image
9	DE8015	MAGNETIC HAZARD Risk of death Magnetic field produced will have serious adverse effects on heart pacemakers KEEP AWAY FROM MAGNET
10	DE8003	CRUSHING HAZARD Putting limbs near moving Parts will cause death or serious injury Do not touch moving parts
11	DE8008	ENTANGLEMENT HAZARD Touching the conveyor will cause death or serious injury the conveyor in indo without guards installed
12	DE8006	CRUSHING HAZARD Putting limbs below jacking legs will cause death or serious injury Keep limbs away from jacking legs while they are being lowered or retracted
13	DE8011	ENTANGLEMENT HAZARD Risk of serious injury or death ALL GUARDING must be fitted before machine is started
14	DE8016	SKIN INJECTION HAZARD Fluid under pressure can penetrate the skin causing serious injury Seek medical help or Gangrene can set in DO NOT use your hand to check for leaks
15	DE8014	DANGER IMPACT HAZARD Risk of serious injury Spring loaded door Keep head and face arway from door DO NOT allow door to be opened unrestrained
16	DE8021	LOSE OR ILL-FITTING LOSE OR ILL-FITTING LOTHING ANG ETC AUGHT IN RUNNING MACHINERY Always wear correctly fitting, approved Personal Protective Equipment.
17	DE8023	WARNING NOISE HAZARD Risk of hearinge loss or degradation over long periods of time EXCEEDS 90dB(A) Use approved hearing protection



Item	Part No.	Image
18	DE8018	WARNING LOCKOUT PROCEDURE 1. Switch off engine 2. Remove the ignition key on person during lockout Posalion appropriate (n. c. i tagout) 5. NEVER work alone
19	DE8055	WARNING READ AND UNDERSTAND THE MANUAL AND DECALS BEFOR operating or doing maintenance on this weather IF IN DOUBT ASK  WARNING DOCKOUT PROCEDURE 1. Shallow if the page 1.
		2. Resource the spotton key in .  3. Keep the spotton key on .  5. Keep the spotton key on .  6. Keep the spotton key on .  6. Keep the spotton spotton .  6. Keep the spotton .  7. Keep the spotton .  8. K
20	DE8022	FALL HAZARD FALL H
21	DE8052	A DANGER    Continue to the co
22	DE8000	A DANGER BURN HAZARD Hot surface Exhaust will become hot when machine is running. Contact may cause burn Do not touch
23	DE8007	DUST HAZARD Breathing dust will cause death or severe injury Always wear an approved respirator
24	DE0053	IMPORTANT PLEASE ENSURE HYDRAULIC OIL IS FILLED TO MIDDLE OF GAUGE WHEN COLD.
25	DE1014	CLEAN ARE FUTURE CIECKE VIPORALULO DI LEVEL CIECKE VIPORALULO DI LEVEL CIECKE VIPORALULO DI LEVEL CIECKE VIROLANES  WEEKLY CHECKS CIECKE COLORITORO DE CONVEYTRE BEITS AND OTHER MOVING PARTS CIECKE COLORITORO DE CONVEYTRE BEITS AND OTHER MOVING PARTS CIECKE COLLEVEL THE EMPRESSES OF PARTS MARKALL CLEAN ARY BOST STOLLETORS ON THE GRIZZLY SARSA AND JAM'S CIECKE TRESCISIO DE POST STORM THE MEDITS GIRLASA ALI BEARMESS (SEE OPERATIOR MARMALL) CLEAN ANY BOLD OF BOST STORM THE COLORE MAN THE RADIATION USING COMPRESSED AIR CIECKE ALI BUST AND PARELS ARE SECURE AND IN PLACE



Item	Part No.	Image
26	DE5020	IMPORTANT ONECK CONDITION OF FILTERS ON A REQULAR BASIS OHNOE ELEMENTS WHEN NOIDANGES SHOW REG REFER TO GORBET GRADES OF OIL  MANUAL FOR CORRECT GRADES OF OIL
27	DE5016	CAUTION  (PRION TO TRANSPORT)  () Feature in the stems excurring () Check the plant for lease or desagged given a part or desagged given () (assigned given part or desagged given () (report as flowed deceasery to expect the stems of the stems () (report as flowed deceasery to excurred district to respect of the stems of the stems () (report as flowed deceasery to excurred district to respect of
28	DE1075	HYDRAULIC OIL
29	DE1074	RAD SUMP HYD DIESEL
30	DE1076	LOW SULPHUR DIESEL
31	DE8115	L R S S S S S S S S S S S S S S S S S S
32	DE1072	T R P M A I W G A R N N N S C C C C C C C C C C C C C C C C
33	DE0061	LASHING POINT DOGS.
34	DE7212	DE7212



Item	Part No.	Image		
35	DE7213	DE7213		
36	DE1078	MAIN SIDE L		
37	DE0022	CHECK ENGINE OIL AND HYDRAUJIC OIL LEVELS DAILY.		
38	DE7232	DE7232		
39	885.0267-00	A DANGER Breathing dust will cause death or all cause death or approved respirator.		
40	DE0025	DANGER  DRIVE QUARDS MUST BE FITTED BEFORE UNIT IS STARTED		
41	DE7254	R E A R L D V N F O L D R R E A R S E V P P E R D O O R		



Item	Part No.	Image	
42	DE8034	Service Engineer Selection for PSVS Diagnosis  The same deep reliable to the PSVS Diagnosis  The same and the PSV diagnosis to the PSVS Diagnosis  The same and the PSV diagnosis to the PSVS Diagnosis of the PSVS Diagnosi	
Options (location)			
Tier 4 Final/ Stage 5 en- gines only (DEF tank)	DE8112	RISK OF EQUIPMENT DAMAGE Fill the tank with Diesel Exhaust Fluid (DEF) only The machine will be damaged if instructions are not obeyed	
Emergency stop pull-cord (conveyor)	12-55-0408	CONVEYOR STOP	

# 3.2 QJ341+ hazard exclusion zones



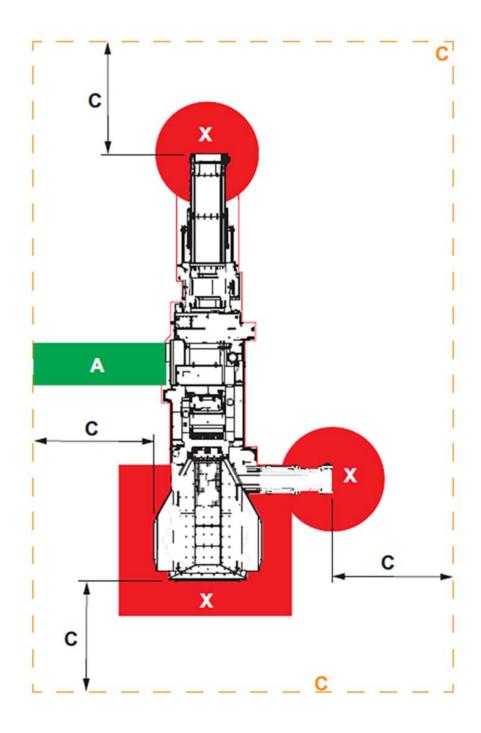


## **MOVING MACHINE HAZARD**

Personnel on the machine or in exclusion zones when the machine is moving are at risk of death or serious injury.

Do not move the machine when persons are standing on the machine or in exclusion zones (20m / 66ft).







# 3.3 QJ341+ measured noise levels

# **A** DANGER



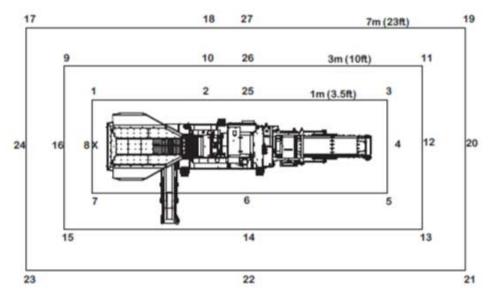
#### **NOISE HAZARD!**

Noise level emitted by the machine exceeds 80dB(A). Continuous exposure to noise will cause hearing impairment.





The noise levels are at 1m (3.5 ft) and 7m using a Casella CEL-244 (Type 2) meter. The machine was in an open area with no nearby structures and all systems running.



Ref	Machine running average noise level (Laeq) (dBA)	Ref	Machine running average noise level (Laeq) (dBA)
2	91	10	95
3	87	11	96
4	84	12	89
5	87	13	86
6	90	14	91
7	89	15	98
8	86	16	97



## 3.4 The emergency stop

#### Related information

Making sure that all emergency stops operate and reset correctly (Page 204)

## 3.4.1 Operating an emergency stop

# **⚠ WARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.

Use an emergency stop button only in an emergency. Do not use for normal stopping.



- 1. Push the emergency stop button to stop the machine
- 2. Turn the ignition switch to the off position
- 3. Isolate and lockout-tagout machine
- 4. Reset the emergency stop before starting the machine again
- 5. Make sure that you do an emergency stop test each day before operating the machine.

#### **Related information**

Making sure that all emergency stops operate and reset correctly (Page 204)

#### 3.4.2 Resetting an emergency stop



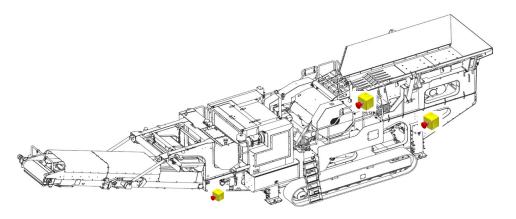
- 1. Make sure that the original cause for pushing the emergency stop is rectified
- 2. Turn the emergency stop button clockwise to reset.

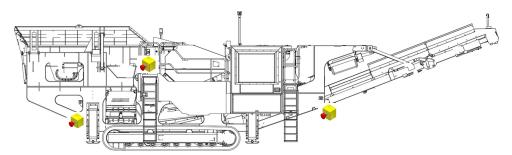


### **Related information**

Making sure that all emergency stops operate and reset correctly (Page 204)

## 3.4.3 QJ341+ emergency stop locations





### **Related information**

Making sure that all emergency stops operate and reset correctly (Page 204)



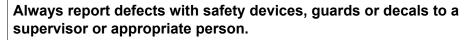
# 3.5 QJ341+ machine guard locations

# **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.

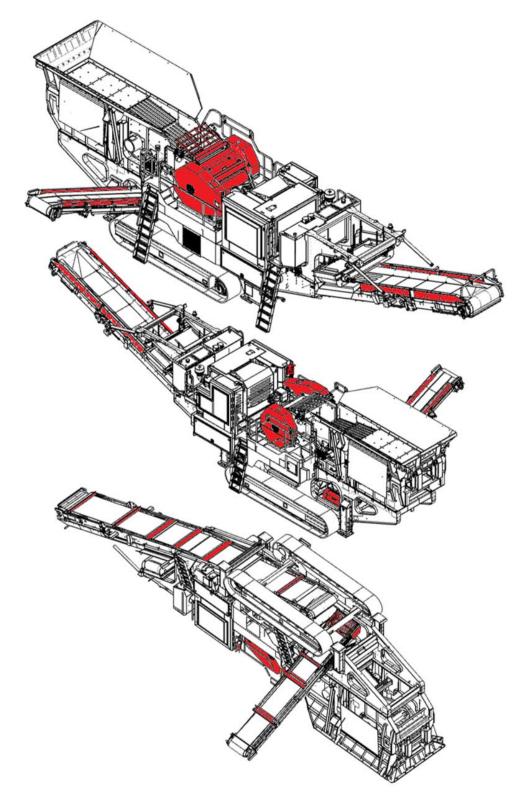












## **Related information**

Doing a check of all panels and guards (Page 199)

# 3.6 Removal of pins



# **⚠ WARNING**

#### **POTENTIAL ENERGY HAZARD**





Potential energy that is released suddenly could cause death or



systems when not in operation and after you isolate the power supply to the machine.

Always lower components to the bottom position to release potential energy from hydraulic and compressed air systems before you do maintenance or adjustment.

If this is not possible, you must attach approved lifting equipment to hold components that can fall suddenly if potential energy is released.

Only use components approved by the manufacturer.



This method applies to all subassemblies that are hydraulically actuated on the machine and have pins and clips installed for safety.

The equipment contains different subassemblies which need pins and clips to lock them in their location. These pins bear the weight of the subassembly and are a critical safety feature.

The pins must be removed before a hydraulically actuated sub-assembly can be moved to a new position. After movement, the pins must be installed in the related holes. The procedure below gives the general steps to be followed to remove and install every clip and pin.

- 1. Start the engine. Remove the lockout and tagout
- 2. Start the auxiliary hydraulic function
- 3. Use the hydraulic control lever to move the subassembly a small distance to get the weight off the pin(s)
- 4. Stop the machine. Lockout and tagout the machine
- 5. Remove the pin
- 6. Start the engine. Remove the lockout and tagout
- 7. Use the hydraulic control lever to move the subassembly to the new position
- 8. Stop the machine. Lockout and tagout the machine
- 9. Install the pin in the new position. Install the clip (if applicable)
- 10. Start the engine. Remove the lockout and tagout
- 11. Use the hydraulic control lever to move the subassembly a small distance until the weight of the subassembly rests on the pin(s)
- 12. Stop the machine. Lockout and tagout the machine.

This procedure must be followed for all hydraulically actuated subassemblies on the machine.

# 3.7 Isolating the machine (T4/S5 engines)

#### **EQUIPMENT DAMAGE HAZARD**

NOTICE

The machine will be damaged if the DEF is not drained into the tank. Do not switch off the isolator immediately after switching off the engine.

Wait 2 minutes to allow the DEF system to drain.

The machine is fitted with an isolator switch. The function of the isolator is to cut-off electrical supply from the battery. When the electrical supply has been cut-off, electrical systems, including the ignition system, cannot start.

The DEF system is powered by electrical energy. When the engine has been switched off, the battery continues to supply power to the DEF system. This power is required to drain fluid in the DEF system back into the DEF tank. A warning light may flash at the isolator switch. The isolator must not be switched off when this light flashes. The machine will be damaged if the DEF is not drained into the tank.



## 3.8 The Lockout-tagout procedure

# **⚠ WARNING**



#### **IGNORING INSTRUCTIONS HAZARD**

Not using minimum approve PPE (personal protective equipment) could result in death or serious injury.

Always wear approved PPE.

# WARNING



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.

# **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.



Always report defects with safety devices, guards or decals to a supervisor or appropriate person.



When doing maintenance, the machine must be switched off with the battery isolation switch tagged and locked to prevent accidental or unauthorised reconnection.

All persons working on or around the machine must apply a single lock with an identification tag for the duration of work.

### 3.8.1 Attaching a single tag

- 1. Make sure that the ignition key is in the (OFF) position
- 2. Remove the ignition key and keep it with you
- 3. Locate the battery isolation switch



- 4. Turn the battery isolation switch anticlockwise to the (OFF) position
- 5. Attach the tag through holes in the battery isolation switch to secure it and prevent the machine from being started



#### **Related information**

Stowing the main conveyor (Page 78)

Stowing the standard-length natural fines conveyor (Page 80)

Stowing the extended natural fines conveyor (Page 81)

Stowing the side and rear feed hopper doors (Page 83)

Stowing the hydraulic support legs (Page 85)

**Unfolding the main conveyor** (Page 137)

<u>Unfolding the standard-length natural fines conveyor</u> (Page 139)

Unfolding the extended natural fines conveyor (Page 140)

Unfolding the side and rear feed hopper doors (Page 140)

Setting up the hydraulic support legs (Page 143)

### 3.8.2 Attaching a gang tag

- 1. Make sure that the ignition key is in the (OFF) position
- 2. Remove the ignition key and keep it with you
- 3. Locate the battery isolation switch
- 4. Turn the battery isolation switch anticlockwise to the (OFF) position
- 5. Attach the gang tag through holes in the battery isolation switch and fix it with locks (one for each person working on the machine) to prevent accidental or unauthorised reconnection.









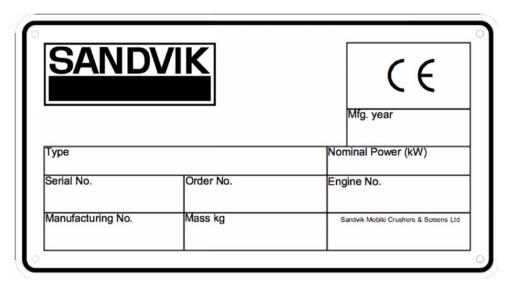
## 3.8.3 Removing a single tag

- 1. Make sure that no persons are on or near the machine
- 2. Remove the single lock and tag from the battery isolation switch

#### 3.8.4 Removing a gang tag

- 1. Make sure that no persons are on or near the machine
- 2. Remove the final lock and tag only when there are no persons on or near the machine
- 3. Each person that attaches a lock and tag is responsible for removing that lock and tag when they have finished work on the machine

## 3.9 The machine specification plate



### 3.10 About the Manual

As part of continuous improvement, Sandvik reserves the right to make revisions to this manual.

Illustrations contained within this manual may differ from your machine.

Labels added to illustrations may not be referenced in the accompanying text.



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4 Transport safety instructions



# 4.1 Machine tracking safety

## 4.1.1 Tracking the machine safely

# **A** DANGER



### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.

Do not work on or near to the machine unless it is stopped.

Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.





# **⚠ WARNING**

## TRANSPORT HAZARD



Do not transport the machine before you have read and understood the safety instructions. If necessary, get clarification from your supervisor or a Sandvik representative.

Be careful when transporting the machine as a collision with bystanders could cause death or serious injury. Always obey local and national laws. Make sure that you have all the necessary transportation permissions.

# **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.



Always report defects with safety devices, guards or decals to a supervisor or appropriate person.





# **⚠ WARNING**



#### **TIPPING HAZARD**

Never move the machine on gradients more than 10° left to right or between 8-20° front to back (read Transport & Commissioning for machine-specific gradients).



Both tracks must be in contact with hard, level ground.

- 1. Make sure all personnel are at a safe distance from the machine, tracks and auxiliary equipment
- 2. Make sure the machine is free of material
- 3. Install all temporary sealing and transport straps and chains after moving the machine onto the transport vehicle
- 4. Remove all temporary sealing and transport straps and chains before moving the machine off the transport vehicle
- 5. Install all guards and fix in position
- 6. Do a check of the travelling height before tracking the machine
- 7. Do a check of the machine specification plate for the weight of the machine
- 8. Use an observer, located at a safe distance, during tracking to warn of risks and tracking hazards

#### 4.1.2 Tracking on/off the transport vehicle

- 1. Follow safety considerations for moving the machine on the tracks
- 2. Start the engine
- 3. Use the lowest pre-set tracking speed
- 4. Once on the transport vehicle, stop the engine, do the lockout-tagout procedure
- 5. Install all temporary seals, transport straps and chains
- 6. Start the engine
- 7. Lower all hydraulic legs (if applicable) completely to ensure stability
- 8. Stop the engine, lockout-tagout the machine

#### **Related information**

Tracking the machine safely (Page 68)

### 4.1.3 Securing the machine to the transport vehicle

Making sure the machine is safely attached to the transport vehicle is the responsibility of the transport vehicle driver.

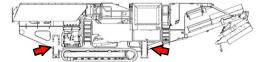


This machine is not designed to be lifted by any form of hoist, crane, lift or similar equipment. Do not attempt to lift this machine.

- 1. Use the correct lashing points to attach the machine to the transport vehicle
- 2. Do not attach to the transport vehicle by the tracks as this will damage the tracks and can cause the machine to move off the transport vehicle
- 3. Always measure the travelling height, width and weight before starting the journey

#### Tie down locations

Tie down locations are found to the front and rear of the chassis.



## 4.1.4 Site requirements

The machine is designed to operate on hard, stable and level ground able to carry the weight of the machine.

Identify an applicable site for operation by doing a full risk assessment before the machine is in place and starts to operate.

The machine weight and vibration can have an effect on the ground. Do a daily check of the ground around the tracks to make sure that it continues to be stable. Move the machine if the ground is no longer sufficiently stable.

Make sure there is sufficient ventilation for the engine exhaust before engine is started.

Before machine set-up, make sure there are no overhead powerlines or structures near the machine.

Do not set-up or operate the machine in bad weather conditions. Do not set-up the machine in low-light conditions or in darkness.

# 4.2 Machine transport procedures

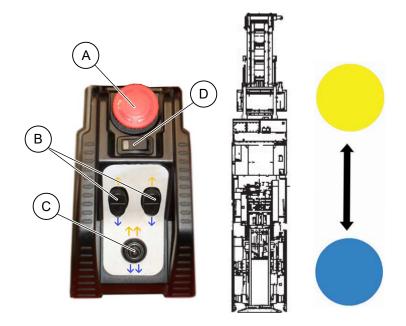
### 4.2.1 Coloured direction-of-travel indicators



The direction of travel is shown by the yellow and blue direction markers on the machine. These correspond with markers on the radio remote control and track remote control.



# 4.2.2 Wired remote/track control key features



Α	Emergency stop button
В	Single-track control levers
С	Double-track control lever
D	On/Off switch

## 4.2.3 Activating tracking operation mode



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push the track select button [2]



## 4.2.4 Selecting wired remote-control tracking mode



- 1. Make sure the wired remote control is connected and switched on
- 2. Start the engine
- 3. Navigate to the main menu
- 4. Push the track select button [2]
- 5. Push button [1] for wired remote control

#### **Related information**

Wired remote/track control key features (Page 71)

## 4.2.5 Tracking with the wired remote control



- 1. Make sure the wired remote control is connected and switched on
- 2. Make sure that the main conveyor tail section has cleared the ground before tracking (this is not a requirement for impact crushers)
- 3. Select wired remote control tracking mode
- 4. Push levers with a single arrow to control individual tracks
- 5. Push levers with a double arrow to control both tracks at the same speed and travel in a straight line
- 6. Push the emergency stop button to stop in the event of an emergency

#### **Related information**

<u>Wired remote/track control key features</u> (Page 71) <u>Selecting wired remote-control tracking mode</u> (Page 72)



#### 4.2.6 Selecting radio remote control tracking mode



- 1. Synchronize the radio remote control
- 2. Navigate to the main menu
- 3. Push the track select button [2]
- 4. Push button [2] for radio remote control

#### **Related information**

<u>Activating tracking operation mode</u> (Page 71) <u>Synchronizing the radio remote control for tracking</u> (Page 73)

#### 4.2.7 Synchronizing the radio remote control for tracking



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [2] for tracking select
- 4. Push button [2] for radio remote control
- 5. Turn the emergency stop button on the radio remote control clockwise to release
- 6. Switch the radio remote control dial to position '1'
- 7. Wait for the green light on the radio remote control unit to flash



- 8. Push the green button on the side of the radio remote control to synchronize the radio remote control with the machine
- 9. An alarm will sound, the screen icon will show green when radio remote control of machine is started

#### Related information

<u>Starting the engine</u> (Page 130)
<u>Radio remote control key features</u> (Page 110)

#### 4.2.8 Tracking with the radio remote control

# **⚠ WARNING**



#### RADIO INTERFERENCE HAZARD

It is possible that the radio frequency on the radio remote control could operate other machines.

When this is the case, use the wired remote control.

- 1. Synchronize the radio remote control
- 2. Push levers to control the tracks, each lever controls a single track
- 3. Push levers at the same time to move in a straight line
- 4. Push levers individually to turn the machine

#### Related information

Radio remote control key features (Page 110)

#### 4.2.9 Adjusting tracking speed - fixed speed engines



- 1. Navigate to the main menu
- 2. Push the track select button [2]
- 3. Push the up-arrow button to set the engine speed to working speed
- 4. Push button [3] to change from slow-tracking speed to fast-tracking speed
- 5. Push button [3] again to return to slow-tracking speed
- 6. Only use fast-tracking speed if it is safe to do so.



#### 4.2.10 Adjusting tracking speed – variable speed engines



- 1. Navigate to the main menu
- 2. Push the track select button [2]
- 3. Push the up/down arrow buttons to increase or decrease engine speed, this will increase or decrease tracking speed

#### 4.2.11 Raising the main conveyor tail before tracking



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push the track select button [2]
- 4. Push button [5] to start the auxiliary hydraulic system
- 5. Push and hold button [6] to lift the conveyor tail
- 6. Release button [6] to stop lifting the conveyor tail

#### 4.2.12 Stopping tracking mode

The track control mode must be deactivated before the crusher mode is activated or before the machine is shut down.

- 1. From within the tracking control screen; push button [1] to turn off tracking mode for the wired remote control, or, push button [2] to turn off tracking mode for the radio remote control
- 2. Push the [ESC] button to return to the main menu



#### 4.2.13 Stopping radio remote control tracking mode



- 1. From within the track control screen, push button [2] to turn off radio remote control tracking mode
- 2. Switch the handset dial to position '0'
- 3. Push the [ESC] button to return to the main menu

#### **Related information**

Radio remote control key features (Page 110)

### 4.3 Preparing the machine for transport

#### 4.3.1 Stowing the stockpile level sensor

# WARNING



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.

# **⚠ WARNING**



#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.



# WARNING





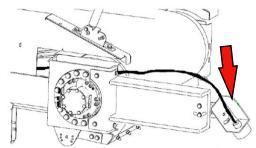
#### PERSONNEL HAZARD

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. Make sure all guards are in place and secure.

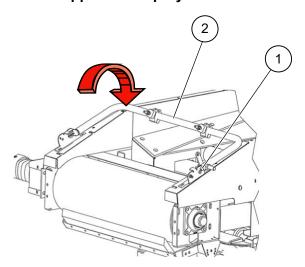
The stockpile sensor must be folded back before transportation. This will protect it and to loosen the cable for conveyor fold.

1. Loosen the fastener that secures the level sensor in position



- 2. Fold the sensor back toward the conveyor into the transport position
- 3. Tighten the fastener to secure the sensor in the transport position

#### 4.3.2 Stowing the dust suppression spray bars

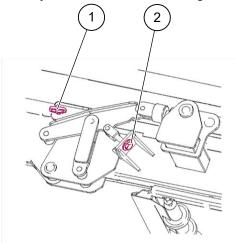


- 1. Use a suitable platform to gain access
- 2. Remove the fixings (1)
- 3. Lower the dust suppression spray bar into the transport position (2)
- 4. Install the fixings in their holes

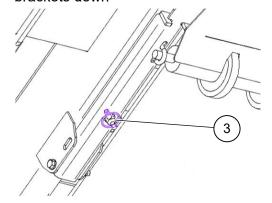


#### 4.3.3 Stowing the main conveyor

- 1. Make sure the main conveyor is fully lowered
- 2. Use a suitable platform to gain access, remove the clips and locating pins from each side of the conveyor (1)
- 3. Loosen the lock nut and bolt/lock lock/pivot pin from each side of the conveyor and move down, retighten to prevent loss during transport (2)

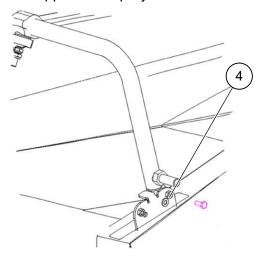


4. Use a suitable platform to gain access, remove the spring pins on each side of the two roller frames/brackets (3), move the roller frames/brackets down

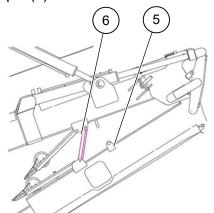




5. Use a suitable platform to gain access and loosen the bolts (4) on the dust suppression spray bar



- 6. Fold the spray bar down and retighten the bolts to attach the spray bar in position
- 7. Start the engine
- 8. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 9. Raise the main conveyor to the working position
- 10. Use the hydraulic lever to fold the upper end of the main conveyor to the transport position
- 11. Remove the clip and pin from the locking arm (5)
- 12. Move the locking arm up into the transport position, attach with clip and pin (6)



#### **Related information**

<u>Hydraulic control levers (side)</u> (Page 98) <u>Attaching a single tag</u> (Page 63)



#### 4.3.4 Stowing the standard-length natural fines conveyor

# **⚠ WARNING**

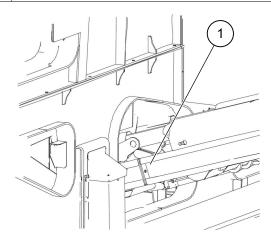


#### **OPERATING MACHINE HAZARD**

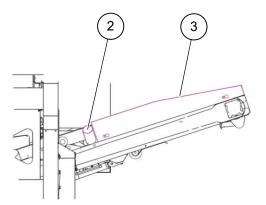
Being positioned on an operating machine could cause death or serious injury.

Do not work on or near to the machine unless it is stopped.





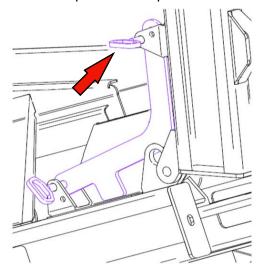
- 1. Remove the two bolts at the hinge point (1) to enable the conveyor to fold
- 2. Remove the wing rollers (2) and head drum flairs (3)



- 3. Start the engine
- 4. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 5. Use the hydraulic lever to lift the side conveyor to the transport position
- 6. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system



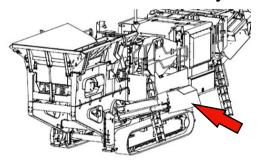
- 7. Stop the engine, lockout-tagout
- 8. Install the pin and R-clip to attach the side conveyor support in position



**Related information** 

Attaching a single tag (Page 63)

#### 4.3.5 Stowing the extended natural fines conveyor



- 1. Remove the under guards and head drum guards (if fitted)
- 2. Remove the two locking pins from each side of the conveyor
- 3. Remove the lock bolts on each side to allow the conveyor to fold
- 4. Start the engine
- 5. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 6. Use the hydraulic lever to slide the top section of the side conveyor to the transport position
- 7. Use the hydraulic lever to slide the mid-section of the side conveyor to the transport position
- 8. Use the hydraulic lever to lift the side conveyor to the transport position
- 9. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system
- 10. Stop the engine, lockout-tagout



- 11. Install two locking pins to lock the conveyor sections together for transport
- 12. Attach and tighten the ratchet to the conveyor to secure the conveyor for transport

#### Related information

<u>Hydraulic control levers (rear) extended side conveyor</u> (Page 99) <u>Attaching a single tag</u> (Page 63)

#### 4.3.6 Stowing the feed hopper with retaining straps

# **⚠ WARNING**



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.

# **⚠ WARNING**



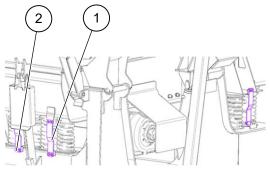
#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure the feeder is secured for transport with retaining straps.



- 1. Use a suitable platform to gain access
- 2. Attach the transport retaining straps to the rear- and side- feeder springs (1)
- 3. Attach washers, nuts and bolts (2)



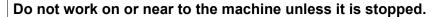
#### 4.3.7 Stowing the side and rear feed hopper doors

# **⚠ WARNING**



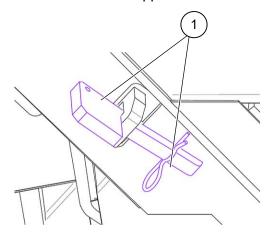


Being positioned on an operating machine could cause death or serious injury.

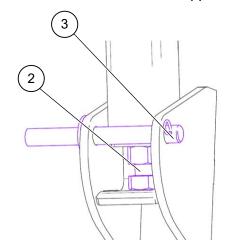




- 1. Make sure the natural fines conveyor is in the transport position
- 2. Start the engine
- 3. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 4. Use the hydraulic lever to lift the rear feed hopper door slightly
- 5. Stop the engine, lockout-tagout
- 6. Use a suitable platform to gain access
- 7. Remove the R-clips and locking wedges (1) that lock the feed hopper sides to the feed hopper ends







8. Loosen the lock nuts on the hopper side supports (2)

- 9. Turn the screws and move them away from the brackets
- 10. Tighten the lock nuts to attach in place
- 11. Use a suitable access platform, following a site-specific riskassessment, to remove the retaining clips and pins (3) and release the feed hopper side supports from the brackets
- 12. Start the engine
- 13. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 14. Lower the feed hopper end using the hydraulic lever
- 15. Lower the left feed hopper side using the hydraulic lever
- 16. Lower the right feed hopper side using the hydraulic lever
- 17. Store the locking wedges in the holes in the feed hopper end, attach with R-clips

#### **Related information**

Hydraulic control levers (rear) extended side conveyor (Page 99)

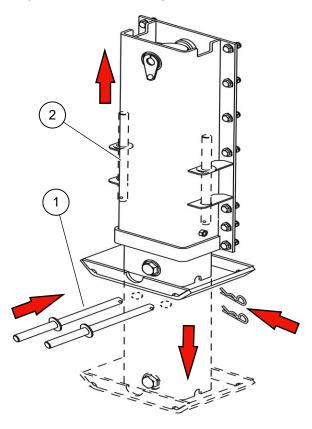
Attaching a single tag (Page 63)

Starting the engine (Page 130)

Stowing the standard-length natural fines conveyor (Page 80)



#### 4.3.8 Stowing the hydraulic support legs



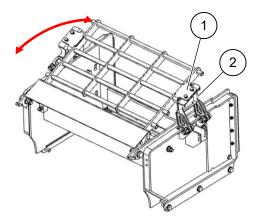
- 1. Remove the locking pins and clips from the lowered leg (1), place the pins in the storage holders (2)
- 2. Start the engine
- 3. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 4. Use the lever to lift the rear legs
- 5. Use the lever to lift the front legs
- 6. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system
- 7. Stop the engine, lockout-tagout

#### **Related information**

<u>Hydraulic control levers (side)</u> (Page 98) <u>Attaching a single tag</u> (Page 63)



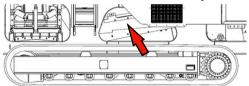
#### 4.3.9 Stowing the jaw inlet chute cover



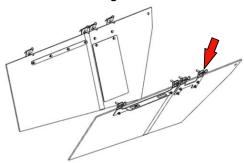
- 1. Remove the nuts and bolts (1)
- 2. Lift the inlet chute cover
- 3. Fold down the brackets (2)
- 4. Lower the inlet chute cover down into the transport position
- 5. Re-install the nuts and bolts into the threaded holes

#### 4.3.10 Stowing the jaw hanging rubbers

1. Locate the jaw hanging rubbers below the jaw. The rubbers are installed at each side of the main conveyor



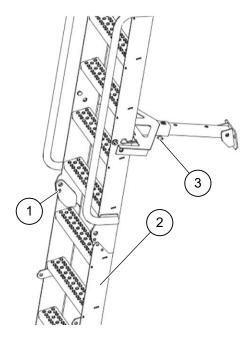
2. Remove the fixings that attach the hanging rubbers in place



- 3. Remove each hanging rubber
- 4. Install the fixings in their holes



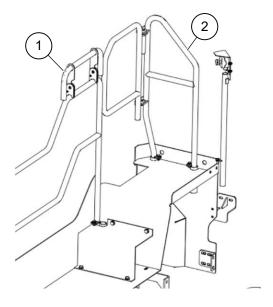
#### 4.3.11 Stowing the ladders



- 1. Remove locking pins and clips from mid-section of ladder (1)
- 2. Lift the bottom section of the ladder (2) up into the transport position
- 3. Replace locking pins and clips to attach the ladder into the transport position
- 4. Remove locking pins and clips from the ladder support (3)
- 5. Push the ladders inward to the transport position
- 6. Attach the ladders in position with locking pins and clips

### 4.3.12 Stowing the safety rails

Repeat task for left-hand side safety rails and right-hand side safety rails

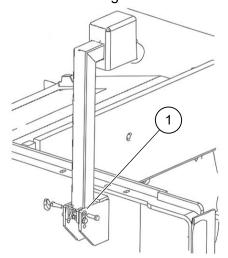




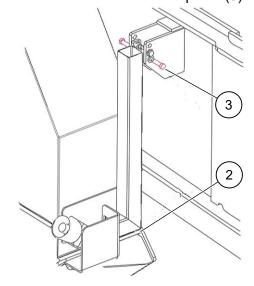
- 1. Use a suitable platform to gain access
- 2. Remove the fasteners from the floor of the end rail (2)
- 3. Remove the pins and fold the safety rail extensions (1) down into the transport position
- 4. Remove the end rail from the upper platform and stow in the lower position. Fix the rail into the transport position with fasteners. Secure the end rail to the side rail

### 4.3.13 Stowing the crusher level sensor

1. Remove the fixings that attach the level sensor in place (1)



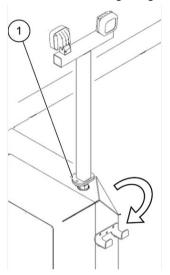
- 2. Swing the level sensor mast down into the transport position (2)
- 3. Attach the level sensor in place (3)



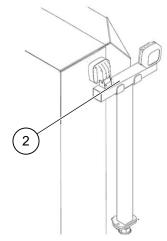


### 4.3.14 Stowing the lighting mast

1. Disconnect the lighting mast (1) from its power supply



- 2. Slide or swing the mast down
- 3. Attach the mast in the transport position (2)



#### 4.3.15 Stowing loose items

1. Remove all loose items from the machine and put in the applicable storage locations.



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# 5 Product overview



### 5.1 General descriptions

#### 5.1.1 Applications and limitations

This machine has been designed and constructed to process minerals such as stone and concrete to a pre-determined size. It must not be used for any other purpose without first contacting Sandvik.

Do not operate until you have read and understood the Operation and Maintenance manual and all instructions supplied with the machine.

#### 5.1.2 Machine description

This machine is a self-contained, tracked unit built to withstand the conditions of operating in quarries and within the construction industry.

It utilizes a diesel engine to provide power to the hydraulic powerpack and generate electricity for the electrical systems. The tracks, feeders, processing unit, conveyors and all other working parts of the machine are hydraulically driven. Where possible all 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.

#### 5.1.3 Operation description

Material is loaded normally by excavator into the feed hopper. The feeder transfers the material towards the crusher.

The material moves forward toward the crusher. On machines fitted with a grizzly deck or tapered bars, smaller material will fall through the bars and is transferred either to the main conveyor or directed onto the natural fines side conveyor (if fitted). The larger material is fed to the crusher where it is processed by the crusher wear parts. The processed material leaves the crusher and falls onto the main conveyor.

The processed material is conveyed along the main conveyor belt. On machines fitted with a magnetic seperator, ferrous material is extracted and discharged to the side. The processed product continues along the conveyor where it is discharged onto stockpile or onto follow-on conveyors or feeder.

# 5.2 Machine storage instructions

#### 5.2.1 Storing the machine – short term (3 months)

- 1. Clean all the dirt, rust, grease and oil from the machine. After you clean the machine, make sure that you dry it fully.
- 2. Make sure that the anti-freeze and coolant levels are correct.
- 3. Fill the fuel and hydraulic tanks and add applicable amounts of diesel and hydraulic oil additive.
- 4. Disconnect and remove the battery.



- 5. Seal the engine air intake and exhaust with applicable protection.
- 6. Apply a layer of protective lubricant to all metal surfaces at risk of corrosion.

#### 5.2.2 Storing the machine – medium term (3 months to 2 years)

- 1. Replace the engine oil and engine oil filter.
- 2. Clean all the dirt, rust, grease and oil from the machine. After you clean the machine, make sure that you dry it fully.
- 3. Examine the exterior of the machine. Areas that have damaged paintwork must be painted to prevent corrosion. Damaged parts must be repaired or replaced.
- 4. Clean all filters and examine seals for damage or wear. Remove the air filter elements and keep safe.
- 5. For storage of up to one year, fill the fuel tank with diesel and add biocide and corrosion inhibitors. For storage of more than one year, drain the fuel tank. Use a Volatile Corrosion Inhibitor (VCI) fluid to prevent damage to the fuel tank. Manually turn the engine crankshaft while another person sprays a Volatile Corrosion Inhibitor fluid into the air intake. Put an applicable Volatile Corrosion Inhibitor fluid into the fuel line.
- 6. Use a Volatile Corrosion Inhibitor fluid to protect closed systems such as accumulators, cylinders, gear housings, transmissions, hydraulic and coolant circulating systems.
- 7. Seal the engine air intake and exhaust with applicable protection.
- 8. Apply a thick layer of multi-purpose grease to mechanisms such as balljoints, linkages, hinges and slides.
- 9. Disconnect and remove the battery.
- 10. Loosen the alternator belt and drive belt.
- 11. Apply a thin layer of silicone grease to all rubber parts and gaskets that have no protection.
- 12. Make the machine safe from rodents.
- 13. Examine the machine every 3 months for signs of corrosion or damage.

#### 5.2.3 Storing the machine – long term (2 years or more)

- 1. Do the medium-term storage procedure.
- 2. Do the procedure again each year. Replace old lubricants and fluids with new lubricants and fluids.



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6 Product overview QJ341+



# 6.1 QJ341+ technical specifications

Feed hopper	
Туре	1000 mm / 39.5 "
Width	2435 mm / 7' 11%"
Length	1840 mm / 6"
Capacity	3894 mm / 12' 9 1/4"
Rear loading height	560 cc / 34.17 cu inch

Feeder conveyor	
Width	1024 mm / 3' 41/4"
Length	2285 mm / 7' 6"

Pre-screen	
Туре	Hyd drive, 2 bearing, high amplitude
Top deck	1108 x 2020 mm / 3' 7 ½" x 6' 7 ½"
Botton deck	1108 x 1500 mm / 3' 7 ½" x 4' 11"

Main conveyor	
Belt width	1000 mm / 39.5 "
Belt length	1840 mm / 6"
Discharge height	3894 mm / 12' 9 1/4"
Motor cc	560 cc / 34.17 cu inch

Natural fines conveyor	
Belt width	650 mm / 25 ½ "
Belt length	11,100 mm / 36' 5"
Discharge height	3120 mm / 10' 3"
Motor	255 cc / 15.56 cu inch

Power unit	
Engine models	Stage 3A / Tier 3 CAT C9 Acert / Stage 3A CAT C9 Acert Fixed Speed (Europe only) Stage 4 / Tier 4 Final CAT C9.3 Acert
Engine power	261 kW / 350 hp

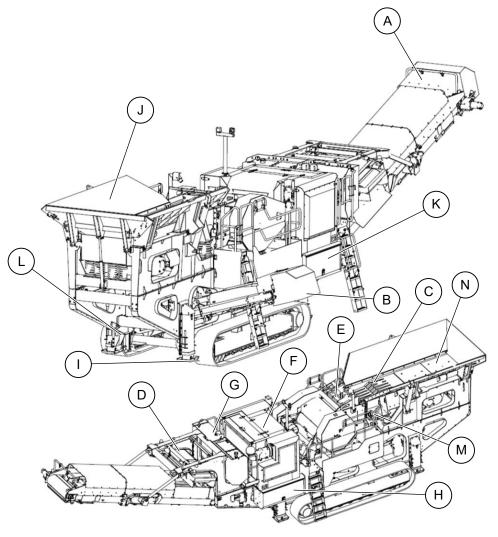
Tracks	
Length	3715 mm / 12' 2'
Track shoe width	500 mm / 19 3/4 "



Jaw Crusher	
Model	Single Toggle - C12
Feed opening	1200 mm x 750 mm / 47" x 29"
Speed	264-283 rpm
CSS range	50 - 175 mm / 2" - 7"
Drive	Hydraulic (V-Belts)

Magnetic separator	
Model	Eriez CP20 / 100 - SC2
Weight	1015 kg / 2238 lbs
Belt width	750 mm / 29 ½"
Height	Adjustable
Туре	Self-cleaning

# 6.2 QJ341+ main assembly locations

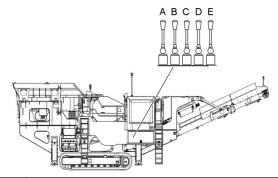




A Main conveyor		G	Fuel / hydraulic tanks
B Natural fines conveyor		Н	Electrical controls
С	Feeder	I	Tracks
D	Magnetic conveyor	J	Feed hopper
Е	Jaw Crusher	K	Hydraulic control cabinet
F	Engine power pack	L	Hydraulic control levers
М	Pre-screen	N	Primary pan feeder

# 6.3 Hydraulic controls

# 6.3.1 Hydraulic control levers (side)



Α	Jaw eject
В	Toggle release
С	Rear legs (up/down
D	Front legs (up/down)
Е	Main conveyor (fold/unfold)

### **Related information**

Stowing the main conveyor (Page 78)

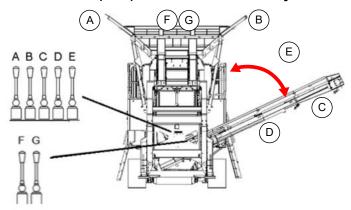
**Unfolding the main conveyor** (Page 137)

Setting up the hydraulic support legs (Page 143)

Stowing the hydraulic support legs (Page 85)



### 6.3.2 Hydraulic control levers (rear) extended side conveyor



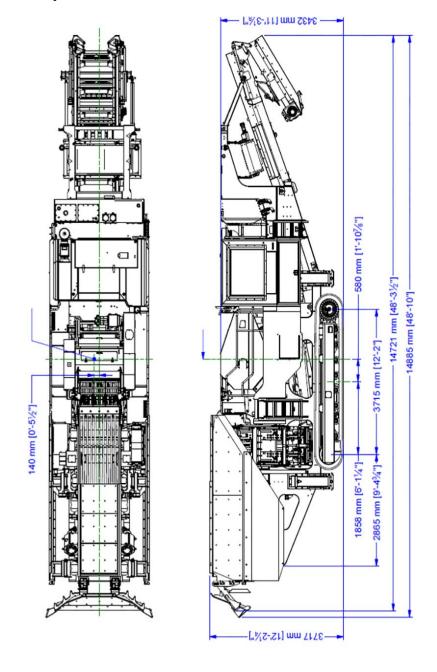
Α	Feed hopper door (left) raise/lower
В	Feed hopper door (right) raise/lower
С	Side conveyor (end) extend/retract
D	Side conveyor (middle) extend/retract
E	Side conveyor fold
F	Feed hopper door (raise/lower)
G	Feed hopper door (fold/unfold)

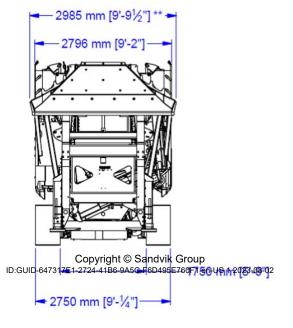
#### **Related information**

Stowing the extended natural fines conveyor (Page 81)
Stowing the side and rear feed hopper doors (Page 83)
Unfolding the extended natural fines conveyor (Page 140)
Unfolding the side and rear feed hopper doors (Page 140)



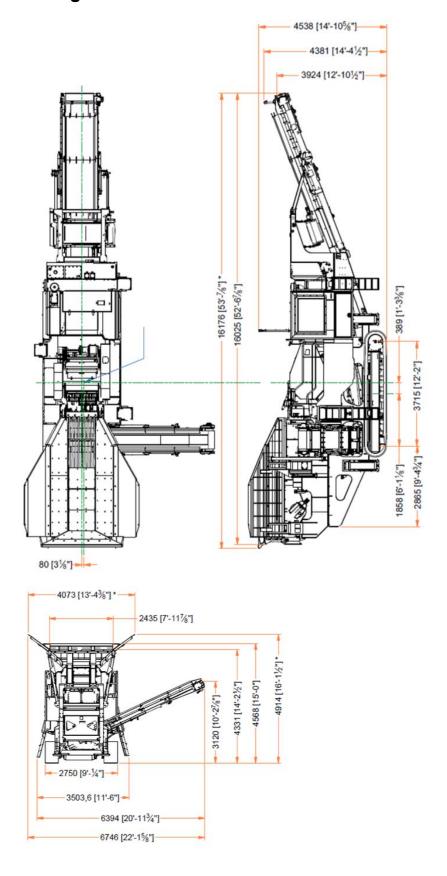
# 6.4 QJ341+ transport dimensions







# 6.5 QJ341+ working dimensions





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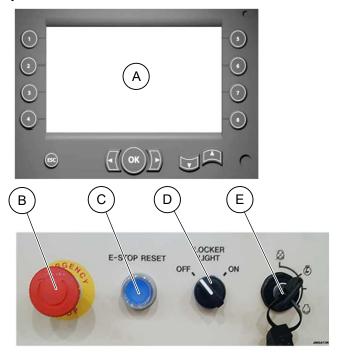


# 7 Operations



# 7.1 Machine operation controls

# 7.1.1 The control panel



Α	Display and soft keys
В	Emergency stop
С	Reset emergency stop
D	Light switch
Е	Engine ignition key



#### Display screen overview

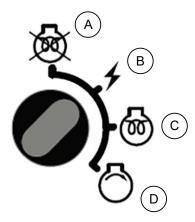


- A Button [1]
- B Button [2]
- C Button [3]
- D Button [4]
- E Escape/return button [ESC]
- F Scroll left button [Left Arrow]
- G OK/accept button [OK]
- H Scroll right button [Right Arrow]
- Scroll down/decrease arrow button [Down Arrow]
- J Scroll up/increase arrow button [Up Arrow]
- K Button [5]
- L Button [6]
- M Button [7]
- N Button [8]

Navigate through the menus using the soft keys.



# The ignition switch



Α	Engine off
В	Electrical power on, run
С	Engine heater
D	Engine start/crank

# 7.1.2 The main menu display screen



Once the engine is running, the main menu screen will show.

Α	Select crusher operation	
В	Select track operation	
С	Information / fault log	
D	Enable auxiliary hydraulic systems (set up)	



Е	Engine information	
F	Maintenance technician mode	

#### Icon highlighting







Display screen icons are highlighted to identify the operating state of a component or function

- Grey when not operating
- Green when operating
- Flashing amber prior to starting and when shutting down

#### The operation-mode display screen



Pushing the crusher operation button on the main menu display screen will show the crushing mode display screen.

Α	Manual operation
В	Automatic operation
С	Back to main menu
D	CSS adjust
Е	Jaw reverse
F	Radio control activation
G	Engine speed adjust



#### The manual operation display screen



Pushing manual operation on the mode display screen will show the manual operation screen.

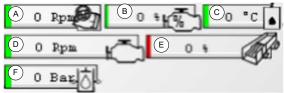
Α	Start the main conveyor
В	Start the crusher (engage the clutch)
С	Select engine speed control
D	Return to main menu
Е	Start the feeder
F	Start the natural fines side conveyor

#### The automatic operation display screen



Α	Stop button
В	Feeder on/off
С	Natural fines side conveyor on/off
D	Scroll to next page

### The general information display





А	Crusher speed
В	Engine load
С	Hydraulic oil temperature
D	Engine speed
Е	Feeder speed
F	Toggle pressure

### Setting date, time and language options



- 1. Navigate to the main menu display screen
- 2. Push and hold the [ESC] button until the 'Language, date and time display screen' is shown
- 3. Push button [3] to select required language
- 4. Push and hold button [8] until the hour unit on the left turns red
- 5. Push button [up arrow] or [down arrow] to adjust the hour setting
- 6. Push button [right arrow] to highlight minutes, seconds, day, month, year
- 7. Push button [up arrow] or [down arrow] to adjust the highlighted value
- 8. Push button [left arrow] to move back if required
- 9. Push button [right arrow] until no red buttons are displayed
- 10. Push button [ESC] to return to the main menu display screen

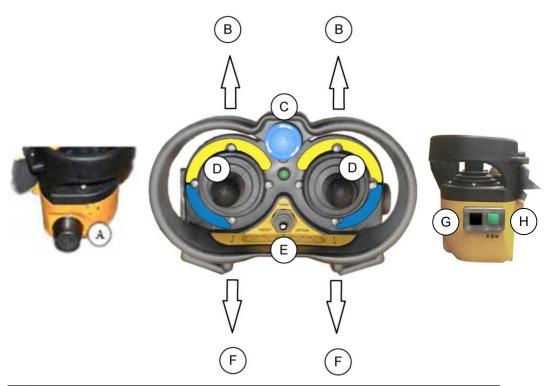
### Viewing engine parameters





- 1. Push an engine icon from any screen (see button [5] icon above) to display page 1 of the engine parameter screens
- 2. Push button [right arrow] for the next screen page
- 3. Push button [left arrow] for the previous screen page
- 4. Push [ESC] to return to the original screen page

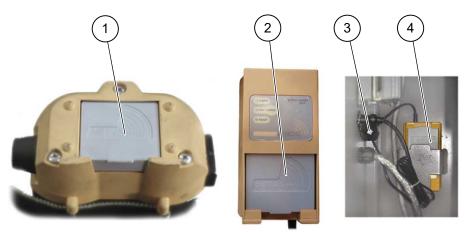
### 7.1.3 Radio remote control key features



Α	Radio remote control dial on/off
В	Forward-direction (yellow)
С	Emergency stop button
D	Lever forward/back, single track control
Е	Mode option select/toggle (track control/feeder control/aux. control)
F	Backward-direction (blue)
G	Set AUX function while in crushing mode (black button)
Н	Synchronize radio remote control (green button)



### Charging the radio remote control



- 1. Open the control panel door
- 2. Remove the charging unit from the holder
- 3. Remove the battery from the remote-control unit (1)
- 4. Install the battery into the charging unit (2)
- 5. Connect the charging unit plug into the socket (3)
- 6. Put the charging unit into the holder (4)
- 7. Push 'charge' to charge the battery
- 8. Make sure the charge light is illuminated
- 9. Push 'fast charge' for quicker battery charging
- 10. Make sure that the charging unit remains in the holder for the duration of the charge
- 11. The green Ready light will show when charging is complete

#### **Related information**

<u>Radio remote control key features</u> (Page 110) <u>Starting the engine</u> (Page 130)

### Synchronizing the radio remote control for machine adjustments

- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button (1) to select machine crushing operation
- 4. Push button (1) for manual mode
- 5. Push the right arrow button to move to the next screen
- 6. Push button (4) for radio remote control, the icon will show yellow
- 7. Turn the emergency stop button clockwise to release
- 8. Switch the handset dial to position '1'
- 9. Wait for the green light on the radio remote control unit to flash



- 10. Push the green button to synchronize the radio remote control
- 11. An alarm will sound, the screen icon will show green when radio remote control of machine is started

### **Related information**

<u>Starting the engine</u> (Page 130)
<u>Radio remote control key features</u> (Page 110)

### 7.2 Machine operation procedures

### DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury



Do not work on or near to the machine unless it is stopped

Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris



### **⚠ WARNING**



### PERSONNEL HAZARD

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine



Only approved personnel must operate or maintain this machine

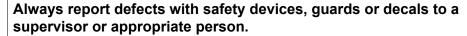


# **A** DANGER



### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.





### 7.2.1 Mode of operation

Two modes of operating the machine are (i) automatic operation mode and (ii) manual operation mode. In automatic mode, each machine function will start automatically. In manual mode, each machine function must be started manually in the correct sequence, as highlighted by the control screen.

### Selecting mode of operation



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] to select machine crushing operation
- 4. Push button [1] for manual mode, or button [2] for automatic mode



### Starting a fixed-speed controlled machine in manual mode



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] to select machine crushing operation
- 4. Push button [1] for manual mode
- 5. Push button [1] to start the main conveyor
- 6. Push button [2] to start the crusher
- 7. Push button [3] to select engine speed adjustment mode
- 8. Push and hold the [up-arrow] button to set the engine to working speed (1800 rpm)
- 9. Push button [3] to de-select engine adjustment mode
- 10. Push button [8] to start the natural fines side conveyor
- 11. Push button [5] to start the vibratory feeder

### Starting a variable-speed controlled machine in manual mode



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] to select machine crushing operation
- 4. Push button [1] for manual mode
- 5. Push button [1] to start the main conveyor
- 6. Push button [2] to start the crusher
- 7. Push button [3] to select engine speed adjustment mode



- 8. Push and hold the [up-arrow] button to set the engine to working speed (1800 rpm)
- 9. Push button [3] to de-select engine adjustment mode
- 10. Push button [8] to start the natural fines side conveyor
- 11. Push button [5] to start the vibratory feeder

### 7.2.2 Raising and lowering the main conveyor



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [4] to start the auxiliary hydraulic system
- 4. Navigate to the main menu
- 5. Push button [1] to enter the crusher screen
- 6. Push button [1] to enter the manual crusher control screen
- 7. Push the [right arrow] button to scroll to the main conveyor screen (page 3)
- 8. Push and hold button [6] to raise the main conveyor
- 9. Push and hold button [7] to lower the main conveyor

### 7.2.3 Adjusting main conveyor height with the radio remote control



- 1. Make sure the feeder is not running
- 2. Synchronize the radio remote control
- 3. Move the option switch to the right to start remote control of the main conveyor
- 4. Keep the option switch in position to adjust the main conveyor



- 5. Push the right-hand lever forward to lift the main conveyor
- 6. Push the right-hand lever backwards to lower the main conveyor
- 7. Move the option switch to the mid-position to stop remote control of the main conveyor

#### **Related information**

Radio remote control key features (Page 110)

### 7.2.4 Safety considerations for loading material into the machine

### ⚠ WARNING



#### PERSONNEL HAZARD

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



### DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.

Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.



- Use a suitable loading/lifting machine to load material into the feed hopper
- Load the feed hopper at regular intervals to ensure a steady flow and constant supply of material
- Load material from a height of no greater than 300 mm (12 inches) above the feed hopper
- Load material to the feed hopper over its full length
- Do not force material into the feed hopper
- Do not over fill the feed hopper with material
- Do not feed combustible process material into the feed hopper



- If the crusher becomes blocked, refer to instructions for safely removing a blockage
- Make sure that the crusher, main conveyor and feed conveyors are running before starting to load material
- Make sure that the crushing chamber is always full of material and choke-fed when crushing
- Do not load material that is larger than 85% of the crusher inlet opening
- Ensure a constant material flow to the chamber
- Do not feed the crusher one rock at a time
- Do not feed material with a high fines content through a crusher with a small CSS

### 7.2.5 Starting and stopping the feed conveyor with the control screen



- 1. With the crusher running, push button [5] to start the material feed
- 2. Push the feed conveyor button [5] again to stop the material feed

#### **Related information**

Starting a fixed-speed controlled machine in manual mode (Page 114)

### 7.2.6 Starting and stopping the feed conveyor using the radio remote control

- 1. Start the engine
- 2. Synchronize the radio remote control
- 3. Push the black button on the side of the radio remote control to enable auxiliary hydraulic functions
- 4. Push the option switch to the left and hold for 2 seconds to start the feeder
- 5. Push the option switch to the left and hold for 2 seconds to stop the feeder

### 7.2.7 Adjusting feed conveyor speed with the control screen

- 1. With the feed conveyor running, push the up-arrow button [6] on the crusher operation screen to increase the feed conveyor speed.
- 2. Push the down arrow button [7] on the crusher operation screen to decrease the feed conveyor speed.



### 7.2.8 Adjusting feeder speed using the radio remote control

- 1. Start the feeder using the radio remote control
- 2. Push the left-hand control lever forward to increase feeder speed
- 3. Push the left-hand control lever backwards to decrease feeder speed

### 7.2.9 Regulating the feed conveyor by engine load



- 1. Start the machine in automatic mode
- 2. Push the [right arrow] button to display the next screen (page 2)
- 3. Push button [5] to set feed conveyor control by engine load (-+) button highlights)
- 4. Push button [6] to display the feed conveyor control by engine load adjustment screen
- 5. Push the [right arrow] button to display feed conveyor control settings screen
- 6. Push button [6] to increase the maximum engine load value
- 7. Push button [7] to decrease the maximum engine load value
- 8. Push button [2] to increase the minimum engine load value
- 9. Push button [3] to decrease the minimum engine load value
- 10. The minimum/maximum load is displayed as a percentage
- 11. The engine power indicator will change to orange when engine load controls the feed conveyor

### 7.2.10 Starting and stopping the natural fines conveyor with the control screen





- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] for crusher
- 4. Push button [1] for manual mode
- 5. Push button [1] to start the main conveyor
- 6. Push button [2] to start the crusher
- 7. Push button [8] to start the natural fines conveyor
- 8. Push button [8] to stop the natural fines conveyor

### 7.2.11 The stockpile level sensor

### **⚠ WARNING**



#### **PERSONNEL HAZARD**

If the level sensor is not correctly set, material may be ejected from the feed chute box.

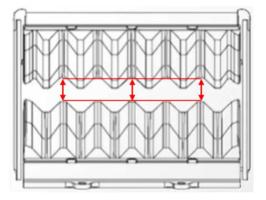
Make sure the level sensor is correctly set.



If a sensor is fitted to the end of a conveyor delivering to a stockpile it will stop the feeder and flow of material when the stockpile reaches a set distance from the end of the conveyor.

Note! Do not let the material stockpile reach the level of the conveyor as this will damage the conveyor.

### 7.2.12 Jaw Crusher closed size setting (CSS)



The jaw closed size setting (CSS) is the distance between the jaw plates at the minimum jaw opening. The jaw should stop on the open side setting (OSS) and the difference between the open- to closed size setting is approximately 30 mm (1.2 inch).



### Note! In mobile crushing applications, do not lower the CSS below 100mm

Follow the instructions in the operator manual to increase or decrease the CSS to the product size required

- Do a visual check of the material output to determine if further adjustment is required
- Do not overload the jaw crusher: never feed material that is larger than 85% of the feed opening and never feed excessive fines material into a small CSS
- High fines content in the feed material in combination with a small CSS increases the risk of damage to the crusher and is not recommended
- For best performance, keep feed material less than 75% of the size of the feed opening and greater than the CSS

### Adjusting the jaw closed size setting (CSS) using the control screen



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] for crusher
- 4. Push the right-hand arrow on the CSS icon to reduce the CSS gap
- 5. Push the left-hand arrow on the CSS icon to increase the CSS gap
- 6. Visually check material output size to make sure the CCS setting is correct

#### Adjusting the jaw closed size setting (CSS) using the radio remote control

- 1. Start the engine
- 2. Navigate to the main menu, push button [1] for crusher
- 3. Synchronise the radio remote control
- 4. Use the right lever to adjust the CSS gap
- 5. Push lever down (blue) to increase the CSS gap
- 6. Push lever upwards to decrease the CSS gap
- 7. Visually check material output size to make sure the CCS setting is correct

#### **Related information**

Synchronizing the radio remote control for machine adjustments (Page 111)



### 7.2.13 Adjusting the stockpile level sensor to regulate the feed conveyor



- 1. Start the engine
- 2. Navigate to the main menu, push button [1] for crusher
- 3. Push button [1] for manual mode
- 4. Push the [right arrow] button to navigate to operation screen 2
- 5. Push button [7] to enable the stockpile level sensor

### 7.2.14 Adjusting the crusher chamber level monitor



- 1. Start the engine
- 2. Navigate to the main menu
- 3. Push button [1] for crusher
- 4. Push button [1] for manual mode
- 5. Push the right-hand arrow button to navigate to operation screen [2]
- 6. Push button [1] to select crusher chamber level control
- 7. Push button [2] to adjust the level of material permitted in the crusher
- 8. Push button [2] to increase the permitted level
- 9. Push button [3] to decrease the permitted level



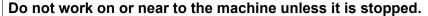
### 7.2.15 Crusher blockage

# **A** DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



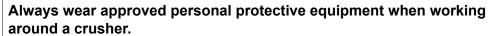
Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.



# **A** DANGER

### **BLOCKED CRUSHER HAZARD**







Do not work around a crusher unless all energy sources have been isolated and locked out. Remember rock or uncrushable material in a blocked crusher can contain a large amount of stored energy.

Never stand inside the crusher.

Never use explosives to unblock a crusher.

Do not restart the crusher with safety guards removed.

If the crusher has stalled, open the closed size setting (CSS) to the maximum width before clearing a blockage. If a crusher is blocked and has stopped, do not attempt to re-start the crusher with material inside. Follow the safety procedure immediately.

- Make sure the crusher is turned off and has stopped
- · Make sure the conveyors are off and have no material on them
- Do the lockout-tagout procedure
- Make sure all material is removed before starting the crusher again

#### **Related information**

The Lockout-tagout procedure (Page 63)



### Opening the jaw to clear a blockage

- 1. In the event of jaw crusher blockage, follow the safety procedure
- 2. Open jaw to the maximum CSS width
- 3. Remove the blockage with suitable tools

#### **Related information**

Crusher blockage (Page 122)

### Reversing the jaw from the control screen to clear a blockage



In the event of jaw crusher blockage, follow the safety procedure

- 1. Open the jaw to the maximum CSS width
- 2. Navigate to the main menu
- 3. Push button [1] for crusher
- 4. Push button [5] to reverse the crusher, the icon will show green then flash yellow until the crusher stops
- 5. Push button [5] to reverse the crusher again until the blockage is released
- 6. Shut down the machine
- 7. Push button [5] to return to normal crusher operation

### Reversing the jaw with the radio remote control to clear a blockage



In the event of jaw crusher blockage, follow the safety procedure

- 1. Open the jaw to the maximum CSS width
- 2. Navigate to the main menu



- 3. Push button [1] for crusher
- 4. Push button [1] for manual mode
- 5. Push the right-hand arrow button to navigate to operation screen 2
- 6. Push button [3] to select 'crusher jog' mode
- 7. Synchronize the radio remote control
- 8. Push the left-hand control lever down to reverse the jaw crusher
- 9. Repeat the procedure until the crusher is unblocked
- 10. Push button [3] to return to normal crusher operation

### Jogging the jaw crusher from the control screen to clear a blockage



In the event of jaw crusher blockage, follow the safety procedure

- 1. Open the jaw to the maximum CSS width
- 2. Stop the crusher but leave the engine running
- 3. Navigate to the main menu
- 4. Push button [1] for crusher
- 5. Push button [1] for manual mode
- 6. Push the right-hand arrow button to navigate to operation screen 2
- 7. Push button [3] to select 'crusher jog' mode
- 8. Push left or right arrows to jog the crusher in the required direction
- 9. Repeat the procedure to unblock the crusher
- 10. Push button [3] to deselect 'crusher jog' mode

### Jogging the jaw crusher using the radio remote control to clear a blockage



In the event of jaw crusher blockage, follow the safety procedure, then:



- Synchronise the radio remote control
- 2. Push the black button to start the auxiliary function
- 3. Move the left lever forwards or backwards to jog the jaw crusher in the required direction
- 4. Push the green button for 3 seconds to return to normal crusher operation mode

#### **Related information**

Synchronizing the radio remote control for machine adjustments (Page 111)

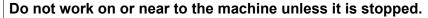
### Manually clearing a crusher blockage

# **A** DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.





Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.





In the event of a crusher blockage, follow the safety procedure. Clearing a crusher blockage manually should be the last resort. Always attempt to clear a blockage using machine controls.

- 1. Stop the engine
- 2. Lockout-tagout the machine
- 3. Do a check that all required personal protective equipment is being worn
- 4. Locate the cause of the crusher blockage
- 5. Do a visual inspection to determine if there is stored energy in the blockage. Do a risk assessment to identify the risks with removing the blockage manually



- 6. Use suitable hand tools to unblock the crusher. Do not use powered tools or equipment
- 7. Remove all tools and debris before the machine is started

### **Related information**

Crusher blockage (Page 122)



# 8 Commissioning & shutdown



### 8.1 Safety considerations for machine start

### **⚠ WARNING**



### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



## **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.



Always report defects with safety devices, guards or decals to a supervisor or appropriate person.





### **A** DANGER



### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.

Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.





### **A** DANGER



### FLYING MATERIAL HAZARD, MAGNET HAZARD

Material will exit from height from all conveyors and ferrous material will exit from the magnet chute which may cause injury or death.

Strong magnetic field on the magnet conveyor. Do not go near it if you have a pacemaker as this may cause death.

### **⚠ WARNING**

#### TRANSPORT HAZARD



Do not transport the machine before you have read and understood the safety instructions. If necessary, get clarification from your supervisor or a Sandvik representative.

Be careful when transporting the machine as a collision with bystanders could cause death or serious injury. Always obey local and national laws. Make sure that you have all the necessary transportation permissions.

### 8.2 Site requirements

The machine is designed to operate on hard, stable and level ground able to carry the weight of the machine.

Identify an applicable site for operation by doing a full risk assessment before the machine is in place and starts to operate.

The machine weight and vibration can have an effect on the ground. Do a daily check of the ground around the tracks to make sure that it continues to be stable. Move the machine if the ground is no longer sufficiently stable.

Make sure there is sufficient ventilation for the engine exhaust before engine is started.

Before machine set-up, make sure there are no overhead powerlines or structures near the machine.

Do not set-up or operate the machine in bad weather conditions. Do not set-up the machine in low-light conditions or in darkness.

### 8.3 Initial checks and preparation

- · Read and understand the Operation and Maintenance manual
- Remove all transport straps, chains and temporary seals
- Make sure that there are no signs of damage
- Make sure that there are no missing guards or malfunctioning guards
- Make sure that there are no oil/fluid leaks from the machine or hydraulic hoses
- Make sure that no personnel are within the exclusion zone



- Make sure that the crusher chamber (if applicable), screenbox (if applicable), feeder and conveyor belts are free of material
- Make sure that skirting rubbers and belt scrapers are in place
- · Complete the daily maintenance procedure
- Complete all pre-start checks outlined in the Engine Operation and Maintenance manual
- Remove tools and other equipment from the operational area
- · Do the lockout-tagout procedure

### 8.4 Starting the engine

### **⚠ WARNING**



### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.



Only approved personnel must operate or maintain this machine.

### **MARNING**



### **TIPPING HAZARD**

Never move the machine on gradients more than 10° left to right or between 8-20° front to back (read Transport & Commissioning for machine-specific gradients).



Both tracks must be in contact with hard, level ground.

### **⚠ WARNING**



### **SLIPPING HAZARD**

Working on slippery surfaces on the machine could cause death or serious injury.

Remove ice or snow from the machine before operating or moving.



## DANGER



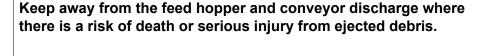




Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.





Run all systems at idle speed for 15 minutes when starting the machine in temperatures of 0°C or below. This enables hydraulic fluid to reach sufficient working temperature.

Do not feed material into the machine during this time

Do not change engine speed during this time

- Reset all emergency stops
- 2. Turn the battery isolation switch to the on position
- 3. Turn the engine stop button clockwise to release
- 4. Turn the ignition key clockwise to the second position
- 5. Push the blue emergency stop reset button
- 6. Turn the ignition key clockwise to the fourth position and hold
- 7. Warning lights will flash, pre-start alarm will sound, the engine will start after a few seconds
- 8. Turn the ignition key to the second position
- 9. The engine will run at idle speed
- 10. The main menu screen will show on the display screen

### **Related information**

Resetting an emergency stop (Page 57) The ignition switch (Page 106) Radio remote control key features (Page 110)

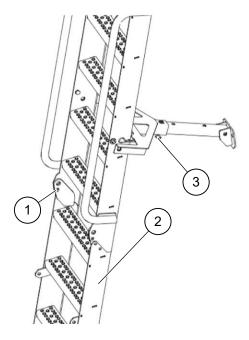


### 8.4.1 Engine speed options – fixed and variable speed engines

- Some engine powerpacks have fully variable engine speeds, from idle through to maximum.
- Some powerpacks with Caterpillar engines have two fixed engine speeds, restricted to idle and working speed only. For these fixed-speed engines, the working speed can only be selected and used once per engine start and run sequence. If the engine is changed to idle speed after being run at working speed, it must be re-started.

### 8.5 Machine setup procedures

### 8.5.1 Unfolding the ladders



- 1. Remove locking pins and clips from the ladder support (3)
- 2. Pull ladders out into the working position
- 3. Attach the ladders in position with locking pins and clips (3)
- 4. Remove locking pins and clips from mid-section of ladder (1)
- 5. Lower the bottom part of the ladder into the working position (2)
- 6. Replace locking pins and clips to attach the ladder into the working position



### 8.5.2 Setting up the lighting mast

### **⚠ WARNING**



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.

Do not work on or near to the machine unless it is stopped.



### **MARNING**



#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

### **MARNING**



### **PERSONNEL HAZARD**

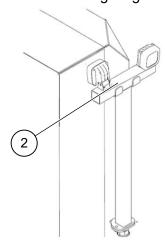
Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.



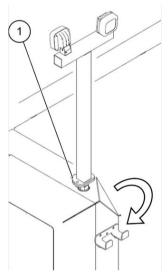
Stop machine, isolate, remove ignition key and tag out, before continuing. Make sure all guards are in place and secure.



1. Remove the lighting mast from the transport position (2)



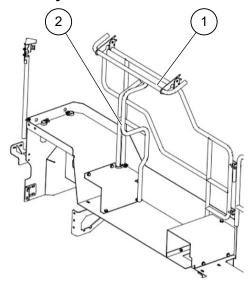
- 2. Slide or swing the mast up
- 3. Attach the mast in the working position (1), connect to the power supply



4. Repeat this procedure for the other lighting mast (if applicable)



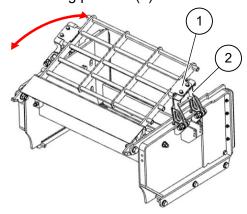
### 8.5.3 Setting up the safety rails



- 1. Use a suitable access platform, as defined by a site-specific risk assessment, to fold up the top safety rail (1) and secure.
- 2. Unfasten the end safety rail (2) and secure in place on the top platform. Bolt it to the floor using the fasteners.
- 3. Repeat this procedure for the safety rail on the other side of the machine.

### 8.5.4 Setting up the jaw inlet chute grid

- 1. Remove the nuts and bolts from the threaded holes in the brackets
- 2. Do a 2 person lift to lift the jaw inlet chute grid up
- 3. Fold the two grid supporting side brackets (2) up into the working position
- 4. Use two people to lower the inlet chute grid down onto the brackets into the working position (1)

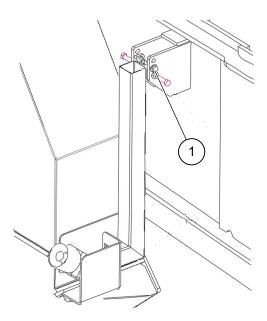


5. Re-install the nuts and bolts into the threaded holes to secure the grid in the working position

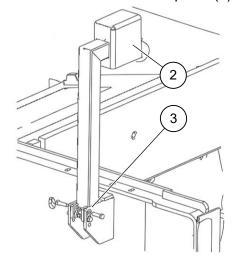


### 8.5.5 Setting up the crusher level sensor

1. Remove the fixings that attach the level sensor in place (1)



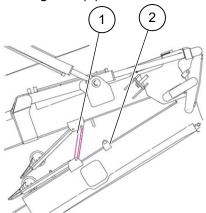
- 2. Swing the level sensor mast up into the working position (2)
- 3. Attach the level sensor in place (3)



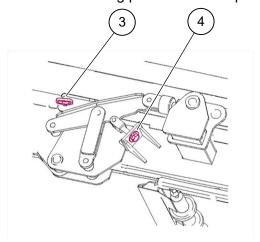


### 8.5.6 Unfolding the main conveyor

1. Use a suitable platform to gain access, remove the clip and pin from the locking arm (1)



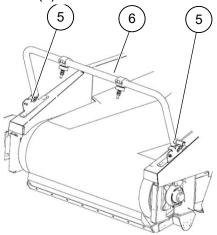
- 2. Move the locking arm down into the working position, attach with clip and pin (2)
- 3. Start the engine
- 4. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 5. Make sure the main conveyor is fully raised with sufficient ground clearance for the upper section to be unfolded
- 6. Use the hydraulic lever to fold the upper section of the main conveyor to the working position
- 7. Lower the main conveyor
- 8. Stop the engine, lockout-tagout
- 9. Install the locating pins and their clips in each side of the conveyor (3)



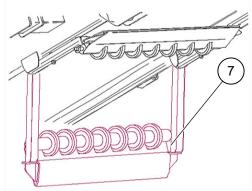
- 10. Install the bolts into the slots and attach by tightening the nut (4)
- 11. Loosen the locking pins and bolts that attach the dust suppression bar, remove the pins and bolts



12. Lift the spray bar (6) upwards, replace and tighten the locking pins and bolts (5)



13. Move the roller frames/brackets (7) into the working position and attach the spring pins



14. Lift the main conveyor

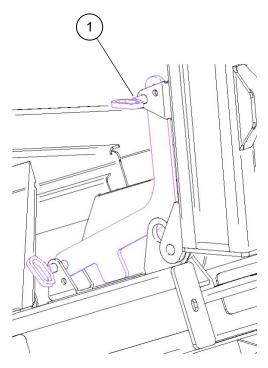
### **Related information**

<u>Hydraulic control levers (side)</u> (Page 98) <u>Attaching a single tag</u> (Page 63)

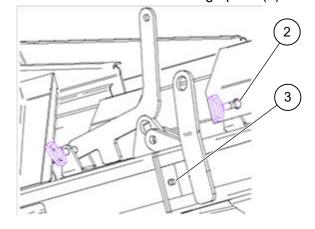


### 8.5.7 Unfolding the standard-length natural fines conveyor

1. Remove the pin and clip (1) that attaches the side conveyor in position



- 2. Start the engine
- 3. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 4. Use the hydraulic lever to lower the side conveyor to the working position
- 5. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system
- 6. Stop the engine, lockout-tagout
- 7. Install the pin and clip (2) to attach the side conveyor in position
- 8. Install the two bolts at the hinge point (3)





- 9. Install the head drum flairs
- 10. Install the wing rollers

#### Related information

Attaching a single tag (Page 63)

### 8.5.8 Unfolding the extended natural fines conveyor

- 1. Remove the transport straps
- 2. Disconnect the ratchet from the conveyor to release the conveyor for operation
- 3. Start the engine
- 4. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 5. Use the hydraulic lever to lower the side conveyor to the operation position
- 6. Use the hydraulic lever to slide the mid-section of the side conveyor out to the operation position
- 7. Use the hydraulic lever to slide the top section of the side conveyor out to the operation position
- 8. Stop the engine, lockout-tagout
- 9. Install the lock bolts on each side to lock the natural fines conveyor in the operation position
- 10. Install the two locking pins on each side of the conveyor
- 11. Install the under guards and head drum guards (if applicable)

### **Related information**

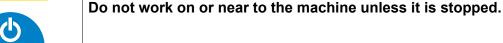
<u>Hydraulic control levers (rear) extended side conveyor</u> (Page 99) <u>Attaching a single tag</u> (Page 63)

### 8.5.9 Unfolding the side and rear feed hopper doors

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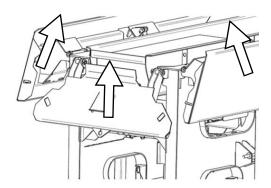
### OPERATING MACHINE HAZARD

Being positioned on an operating machine could cause death or serious injury.

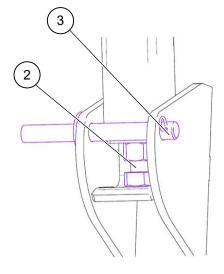


WARNING





- 1. Remove the locking wedges and R-clips from their storage positions in the feed hopper end
- 2. Start the engine
- 3. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 4. Lift the left feed hopper side using the hydraulic lever
- 5. Lift the right feed hopper side using the hydraulic lever
- 6. Lift the feed hopper end using the hydraulic lever
- 7. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system
- 8. Stop the engine, lockout-tagout
- 9. Use a suitable platform, following a site-specific risk-assessment, to gain access and install the locking wedges and R-clips to lock the feed hopper sides to the feed hopper end
- 10. Push each feed hopper side support into its bracket





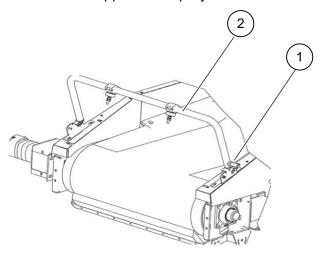
- 11. Turn the screws and tighten the lock nut (2) to attach the supports in place
- 12. Install the pins and retaining clips (3) to attach the feed hopper side supports in the brackets

#### **Related information**

<u>Hydraulic control levers (rear) extended side conveyor</u> (Page 99) <u>Attaching a single tag</u> (Page 63)

### 8.5.10 Setting up the dust suppression spray bars

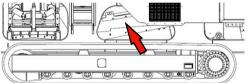
- 1. Use a suitable platform to gain access
- 2. Remove the fixings from the holes that attach the spray bar to the conveyor
- 3. Lift the dust suppression spray bar into the working position (2)



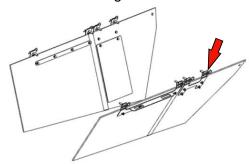
4. Install the fixings in their holes (1) to secure the spray bar

### 8.5.11 Setting up the jaw hanging rubbers

1. Install the jaw hanging rubbers below the jaw. The rubbers are installed to each side of the main conveyor



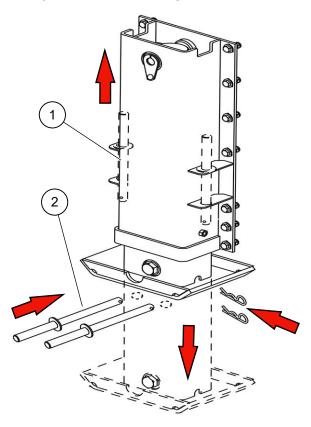
2. Remove the fixings from the holes





- 3. Install the jaw hanging rubbers
- 4. Install the fixings in their holes

### 8.5.12 Setting up the hydraulic support legs



- 1. Remove the locking pins and clips, place in the storage holders (1)
- 2. Start the engine
- 3. On the main menu screen, push button [4] to activate the auxiliary hydraulic system
- 4. Lower the rear legs using the lever
- 5. Lower the front legs using the lever
- 6. Install the pins into the lower leg and fix in place with the clips (2)
- 7. On the main menu screen, push button [4] to de-activate the auxiliary hydraulic system
- 8. Stop the engine, lockout-tagout

### **Related information**

<u>Hydraulic control levers (side)</u> (Page 98) <u>Attaching a single tag</u> (Page 63)

# 8.6 Setting up the feed transfer chute for main conveyor or natural fines conveyor stockpile



### **⚠ WARNING**



### PERSONNEL HAZARD

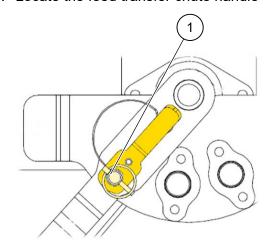
Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.



Stop machine, isolate, remove ignition key and tag out, before continuing. Make sure all guards are in place and secure.

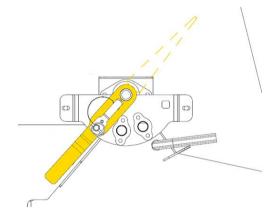
Natural fines material travels down the feed transfer chute. The diverter plate directs this material to the required stockpile, dependent upon on the position of the transfer chute handle.

1. Locate the feed transfer chute handle



- 2. Remove the locking bolt (1) and pin from the handle
- 3. Move the handle to the required position
- 4. Replace the locking bolt (1) and pin to attach the handle in position

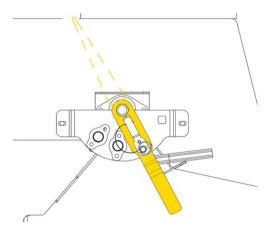
### 8.6.1 Moving the feed transfer chute to natural fines conveyor stockpile





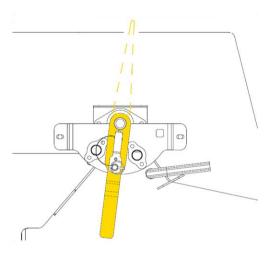
- 1. Open the side door to access the transfer chute handle
- 2. Move the transfer chute handle fully to the left to direct all the natural fines material to the natural fines conveyor and into a separate stockpile. This is the normal operating position.

#### 8.6.2 Moving the feed transfer chute to main-conveyor stockpile



- 1. Open the side door to access the transfer chute handle
- 2. Move the transfer chute handle fully to the right to direct the natural fines material onto main conveyor to be stockpiled with the crushed material.

## 8.6.3 Moving the feed transfer chute to natural fines conveyor and main conveyor stockpile



- 1. Open the side door to access the transfer chute handle
- 2. Move the transfer chute handle to the central position to direct half of the natural fines material to the natural fines conveyor and half to the main conveyor



## 8.7 Safety considerations for machine shut down

## **MARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



## **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.



Always report defects with safety devices, guards or decals to a supervisor or appropriate person.





## **A** DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.

Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.





#### 8.7.1 Shutting down a machine in manual mode

- 1. Stop supplying material to the machine and wait for all material to be released from crusher and conveyor belts
- 2. Push button [5] to stop the material feed, wait for the material feed to stop completely
- 3. Push button [8] to stop the natural fines side conveyor
- 4. Push button [3] to select the engine speed control system
- 5. If a machine with fixed-speed engine is to be moved or operated, leave the engine running at working speed
- 6. If a machine with fixed-speed engine is to be shut down completely, push and hold the down-arrow button to reduce the engine speed to idle
- 7. Release the down-arrow button when the engine has reached idle speed
- 8. A fixed-speed engine cannot be set to working speed again unless the engine is restarted (a reminder will be displayed)
- 9. Push button [2] to shut down the crusher
- 10. Allow the crusher to stop completely
- 11. Push button [1] to stop the main conveyor
- 12. Allow the engine to run for approximately 5 minutes
- 13. Turn the ignition key off to stop the engine

#### 8.7.2 Shutting down the machine in automatic mode



- 1. Stop supplying material to the machine and wait for it to be released from the crusher and all conveyor belts
- 2. Navigate to the automatic mode screen
- 3. Push the stop button, highlighted by a blue stop icon
- 4. The machine components will stop in a pre-determined order
- 5. Wait for the crusher to stop running
- 6. Stop the engine, lockout-tagout



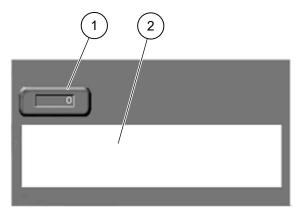
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# 9 Troubleshooting



### 9.1 The fault code display



If a common fault occurs, the fault code and a description are reported on the control screen

The screen shows a fault number (1) and a fault description/cause (2). Refer to the relevant fault lists for further information.

## 9.2 Viewing and deleting fault events



Historical fault events are shown in the order of their occurrence. A maximum of 27 events are shown before the oldest events are overwritten by new events.

- 1. Navigate to the main menu
- 2. Push button [3] to show the fault event log
- 3. Push the [up arrow] and [down arrow] buttons to show the fault event
- 4. Push the [OK] button to clear the fault event from the fault event log (once the cause of the fault has been resolved).
- 5. If the cause of the fault has not been rectified the warning will reappear and another entry is recorded in the fault event log

#### 9.3 QJ-series blue fault codes

Fault code	001
Description	Main Conveyor Speed Low



Criteria	Main conveyor speed is less than 'Main Conveyor Speed Warning' Set Point
Action	Feeder stopped
Troubleshooting	Ensure belt speed is above the set point
	Ensure speed wheel signal is being received by controller, investigate speed wheel circuit
Fault code	002
Description	Side Conveyor Speed Low
Criteria	Side conveyor speed is less than 'Side Conveyor Speed Warning' Set Point
Action	Feeder Stopped
	Ensure belt speed is above the set point
Troubleshooting	Ensure speed wheel signal is being received by controller, investigate speed wheel circuit
Fault code	005
Description	Engine Over Cranked
Criteria	Engine starter has been engaged for more than 30 seconds without engine starting
Action	Start Disabled
Troubleshooting	Investigate Engine Start Issues
Troubleshooting	Reset power to enable start
Fault code	006
Description	Main Conveyor Pull Stop
Criteria	Main conveyor pull stop signal is low
Action	Main conveyor and feeder stopped
Troublesheeting	Ensure pull stop is reset
Troubleshooting	Investigate pull stop circuit, ensure input to controller is high
Fault code	010
Description	Hydraulic Oil Temperature Warning
Criteria	Hydraulic oil temperature is above the warning level
Action	Feeder Stopped
Troubleshooting	Ensure Oil Temperature is lower than the warning level
	Investigate oil temperature circuit, check sensor impedance, check 5-volt supply to sensor
Fault code	012
Description	Track Radio Joy Stick Fault
Fault Criteria	Joystick fault message received from radio receiver
L	· ·



Action	Prevents radio tracking / Radio functions
Troubleshooting	Ensure radio transmitter battery is charged,
Troubleshooting	Ensure radio transmitter is in serviceable condition
Fault code	013
Description	Radio Unavailable
Criteria	No valid CAN messages received from radio receiver
Action	Prevents radio tracking / Radio functions
Troubleshooting	Ensure receiver is powered and connected Investigate CAN connection
Fault code	014
Description	No Radio Signal
Criteria	Low radio signal message received from radio receiver
Action	Prevents radio tracking / Radio functions
	Ensure radio battery is charged
Troubleshooting	Ensure handset is live – indicated by flashing green LED
	Ensure antenna is connected and in good condition
Fault code	015
Description	Wired Remote Control Fault
Criteria	Forward / Reverse signals from tracking handset out of range
Action	Prevents manual tracking
Troubleshooting	Ensure signals are correct
	Investigate tracking handset circuit
Fault code	018
Description	Side Conveyor Pull Stop
Criteria	Side conveyor pull stop input is low
Action	Feeder stopped / Conveyor stopped
Troubleshooting	Ensure pull stop is reset Ensure pull stop input is high Investigate pull stop circuit
Fault code	020
Description	DEF Level Low
Fault Criteria	DEF level is below the 'DEF Level Warning' set point
Action	Feeder stopped once, Restart is allowed
	reeder stopped office, restart is allowed
Troubleshooting	Ensure DEF level is above the minimum level
Troubleshooting Fault code	



Criteria	Toggle charge output has remained on for an extended period
Action	None - read only
Troubleshooting	Investigate toggle charging circuit
Fault code	022
Description	Warning High Load
Criteria	Crusher drive pressure is above 'Drive pressure warning' set point for 'Drive pressure warning time' set point
Action	Feeder stopped
Troubleshooting	Ensure drive pressure remains below the set point Investigate the crusher pressure transducer circuit
Fault code	023
Description	Fuel Level Low
Criteria	Fuel level is less than the 'Fuel level warning' set point
Action	Feeder stopped
Troublochooting	Ensure fuel level is above the set point
Troubleshooting	Investigate the fuel level sensor circuit
Fault code	024
Description	High Soot Load
Criteria	DPF soot load is above the 'Soot load warning' set point
Action	Feeder stopped
Troubleshooting	Ensure soot load is below the warning level, Investigate other active engine alarms that may prevent re- generation, Consult CAT
Fault code	025
Description	Clutch Oil Temperature High
Criteria	Clutch tank temperature is greater than 'Clutch Oil Temperature Warning' set- point (Direct Drive Only)
Action	Feeder Stopped
	Ensure temperature is below the limit,
Troubleshooting	Check sensor impedance
	Check sensor circuit
Fault code	026
Description	Air filter Restriction
Criteria	Engine air filter restriction switch is closed
Action	Feeder Stopped



Troubleshooting	Ensure air filter restriction switch is reset
Fault code	027
Description	Greaser Fault
Criteria	Auto lubrication fault input is high
Action	Feeder Stopped
Troubleshooting	Ensure auto lubrication fault is reset
Troubleshooting	Investigate auto lubrication system / circuit
Fault code	028
Description	Low Crusher Speed
Criteria	Crusher speed is below 'Crusher Minimum Speed' set point
Action	Feeder stopped
Troubleshooting	Ensure crusher speed remains above warning level
Troubleshooting	Investigate crusher speed sensor circuit
Fault code	029
Description	Main Conveyor Output Fault
Criteria	Main conveyor solenoid output is shorted to ground
Action	None
Troubleshooting	Investigate main conveyor solenoid circuit
Fault code	030
Description	Crusher Forward Output Fault
Criteria	Crusher forward output is shorted to ground
Action	None
Troubleshooting	Investigate crusher forwards output circuit
Fault code	031
Description	Crusher Reverse Output Fault
Criteria	Crusher reverse output is shorted to ground
Action	None
Troubleshooting	Investigate crusher reverse output circuit
Fault code	032
Description	Side Conveyor Output Fault
Criteria	Side Conveyor output is shorted to ground
Action	Non
Troubleshooting	Investigate side conveyor output circuit
Fault code	033



Criteria	Clutch oil pressure is less than 'clutch oil pressure warning value'
Action	Auto Stop
Troubleshooting	Investigate clutch
Fault code	034
Description	Fuel Level Sender Unavailable
Criteria	Fuel level sensor input out of range
Action	None
Troubleshooting	Investigate fuel level sender circuit, Ensure impedance is between 10 & 180 ohms
Fault code	035
Description	Tail Conveyor Material Level High
Criteria	Main conveyor level sensor signal is below the desired level
Action	Feeder stopped
Troubleshooting	Ensure level of material is below set point, Investigate main conveyor level sensor circuit
Fault code	036
Description	H1 Pump Detected – Set Defaults
Criteria	H1 Pump Has Been Detected
Action	None
Troubleshooting	Factory Default Should Be Reset
Fault code	037
Description	Fixed Speed Engine Detected – Set Defaults
Criteria	Fixed Speed Engine Has Been Detected
Action	None
Troubleshooting	Factory Default Should Be Reset
Fault code	038
Description	IO Node Detected – Set Defaults
Criteria	IO Node Has Been Detected
Action	None
Troubleshooting	Factory Default Should Be Reset
Fault code	039
Description	Clutch Detected – Set Defaults
Criteria	Clutch Has Been Detected



Action	None
Troubleshooting	Factory Default Should Be Reset

## 9.4 QJ-Series red fault codes

Fault Code	101
Fault Description	Machine stop pressed
Fault Criteria	Emergency stop input is low
Action	All outputs are switched off immediately
Troubleshooting	Ensure all emergency stops are released. Troubleshoot emergency stop circuit.
Fault Code	102
Fault Description	Radio stop pressed
Fault Criteria	'Radio stop pressed' message received from radio receiver
Action	Automatic shutdown in machine mode. Engine ECU power off in tracking mode
Troubleshooting	Ensure radio transmitter is powered on and stop button released
Fault Code	103
Fault Description	Hydraulic Oil Level Low
Fault Criteria	Hydraulic oil level input is low
Action	Automatic shutdown in machine mode, Engine ECU power off. Delayed engine shutdown in tracking mode
Troubleshooting	Ensure oil level is above minimum.  Ensure oil level switch is closed, investigate oil level switch circuit
Fault Code	104
Fault Description	Hydraulic Oil Temperature Critical
Fault Criteria	Hydraulic oil level input is low
Action	Automatic shutdown in machine mode. Engine ECU power off. Delayed engine shutdown in tracking mode
	Ensure oil level is above minimum.
Troubleshooting	Ensure oil level switch is closed, investigate oil level switch circuit
Fault Code	105
Fault Description	Low Toggle Pressure
Fault Criteria	Toggle pressure signal is less than 'toggle pressure warning' set point while crushing



Automatic shutdown in machine mode
Ensure pressure is above minimum
Investigate pressure transducer circuit, ensure voltage signal is in range
106
Low Toggle Pressure
Toggle pressure signal is less than 'toggle pressure warning' set point while crushing
Automatic shutdown in machine mode
Investigate pressure transducer circuit, ensure voltage signal is in range
107
Pump Pressure Critical
Main pump pressure signal is greater than 'Drive Pressure Critical' for 'Drive Pressure Critical Time' set point
Automatic shutdown in machine mode
Ensure pressure is below maximum
Investigate pressure transducer circuit. Ensure voltage signal is in range
108
Main Conveyor Speed Critical
Main Conveyor Speed Critical  Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds
Main conveyor speed input less than 'Main Conveyor Criti-
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller,
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point  Ensure speed wheel signal is being received by controller, investigate speed wheel circuit
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point  Ensure speed wheel signal is being received by controller, investigate speed wheel circuit  109
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller, investigate speed wheel circuit  109  Crusher Speed Critical  Crusher speed signal has dropped below 'Crusher Speed
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller, investigate speed wheel circuit  109  Crusher Speed Critical  Crusher speed signal has dropped below 'Crusher Speed Critical' set point whilst crushing
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller, investigate speed wheel circuit  109  Crusher Speed Critical  Crusher speed signal has dropped below 'Crusher Speed Critical' set point whilst crushing  Automatic shutdown in machine mode
Main conveyor speed input less than 'Main Conveyor Critical Speed' for 4 seconds  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller, investigate speed wheel circuit  109  Crusher Speed Critical  Crusher speed signal has dropped below 'Crusher Speed Critical' set point whilst crushing  Automatic shutdown in machine mode  Ensure belt speed is above the set point Ensure speed wheel signal is being received by controller,



Fault Criteria	Input from toggle pressure transducer is greater than 5.4 volts or less than 0.5 volts
Action	Automatic shutdown in machine mode
Troubleshooting	Investigate pressure transducer circuit, ensure voltage signal is in range
Fault Code	111
Fault Description	Fuel Level Critical
Fault Criteria	Fuel level signal is below 'Fuel Level Shutdown' set point
Action	Automatic shutdown in machine mode
Troubleshooting	Ensure fuel level is above the set point Ensure fuel level signal is being received by the controller, investigate fuel level circuit, ensure sensor impedance is be- tween 10 & 180 Ohms
Fault Code	112
Fault Description	Manual Handset E-Stop Pressed
Fault Criteria	Track handset E-stop signal is low
Action	All outputs are switched off immediately
Troubleshooting	Ensure emergency stop button is released Ensure manual handset e-stop signal is being received by the controller, investigate manual handset circuit
Fault Code	113
Fault Description	Side Conveyor Speed Critical
Fault Criteria	Side conveyor speed input less than 'Side Conveyor Critical Speed' for 4 seconds
Action	Feeder Stop / Conveyor Stop
Troubleshooting	Ensure belt speed is above the set point  Ensure speed wheel signal is being received by controller, Investigate speed wheel circuit
Fault Code	114
Fault Description	System Communication Fault
Fault Criteria	Main screen is not receiving valid messages from the controller
Action	None
Troubleshooting	Ensure controller is powered up, investigate communication CAN lines
Fault Code	115
Fault Description	Coolant Level Low (only applicable to Volvo Engines)
Fault Criteria	Coolant level sensor output voltage is high (5 volts)



A - 4:	Auto Oton / IVIII Funding
Action	Auto Stop / Kill Engine
Troubleshooting	Check Coolant Level,
	Check Sensor is correctly connected, investigate sensor / wiring
	Note: Sensor is open collector type, will switch to 0 volts
	when healthy
Fault Code	116
Fault Description	Oil Temperature Sensor Unavailable
Fault Criteria	Input from hydraulic temperature is greater than 65525 Ohms or less than 38 Ohms
Action	Automatic shutdown in machine mode
Troubleshooting	Investigate oil temperature circuit, check sensor impedance, check 5-volt supply to sensor
Fault Code	117
Fault Description	Clutch oil temperature critical
Fault Criteria	Clutch oil tank temperature is greater than 'clutch tank temperature critical' set-point (Direct Drive Only)
Action	Auto Shutdown
	Ensure oil temperature is below maximum,
Troubleshooting	Investigate oil temperature circuit, check sensor impedance, check 5-volt supply to sensor
Fault Code	118
Fault Description	Soot Load Critical
Fault Criteria	DPF Soot load is greater than 'Critical Soot Load Parameter'
Action	Auto shutdown
	Ensure DPF soot level is below the critical set point, investi-
Troubleshooting	gate other active engine alarms that may prevent regeneration
	Consult CAT
Fault Code	119
Fault Description	NV Checksum Fail
Fault Criteria	MC88 NV Memory is invalid
Action	Reset Default Parameters
Troubleshooting	Note: May occur after software update, this is normal. Otherwise, contact Technical Support
Fault Code	120
Fault Description	DEF level critical
	I .



Fault Criteria	DEF level is less than 'DEF Level Shutdown' Set point (Models with DEF tanks only)
Action	Automatic Shutdown + Engine Stop. Restart / Machine Tracking is Allowed
Troubleshooting	Ensure level is above minimum
Fault Code	121
Fault Description	Engine Speed Critical
Fault Criteria	Engine speed is bellow 'Engine Speed Warning' set point
Action	Feeder Off
Troubleshooting	Investigate engine, ensure speed stays above the set point
Fault Code	122
Fault Description	Left Track Valve Fault
Fault Criteria	Error feedback input from left track valve is high
Action	Engine ECU power off
Troubleshooting	Investigate track valve and track valve circuit
Fault Code	123
Fault Description	Right Track Valve Fault
Fault Criteria	Error feedback input from right track valve is high
Action	Engine ECU power off
Troubleshooting	Investigate track valve and track valve circuit
Fault Code	124
Fault Description	Clutch Temperature Sensor Fault
Fault Criteria	Input from clutch tank temperature is greater than 65525 Ohms or less than 38 Ohms (Direct Drive Only)
Action	Automatic shutdown in machine mode
Troubleshooting	Investigate oil temperature circuit, check sensor impedance, check 5-volt supply to sensor
Fault Code	125
Fault Description	Clutch Oil Level Low
Fault Criteria	Clutch tank oil level input is low (Direct Drive Only)
Action	Automatic shutdown in machine mode, Engine ECU power off
	Ensure oil level is above minimum.
Troubleshooting	Ensure oil level switch is closed, investigate oil level switch circuit
Fault Code	126



	I
Fault Description	Clutch Coil Fault (LED)
Fault Criteria	Clutch coil fault LED on (Direct Drive Only)
Action	Auto stop
Troubleshooting	Investigate clutch coil
Fault Code	127
Fault Description	Clutch Overload (LED) (Direct Drive Only)
Fault Criteria	Clutch Overload fault LED on
Action	Auto stop
Troubleshooting	Investigate clutch
Fault Code	128
Fault Description	Clutch Temperature Fault (LED)
Fault Criteria	Clutch Oil Temperature lamp is on (Direct Drive Only)
Action	Auto Stop
Troubleshooting	Investigate Clutch Oil Temperature system
Fault Code	129
Fault Description	Clutch Filter Fault (LED)
Fault Criteria	Clutch Filter fault LED on (Direct Drive Only)
Action	Auto stop
Troubleshooting	Investigate clutch
Fault Code	130
Fault Description	Clutch J1939 Fault (LED)
Fault Criteria	Clutch J1939 fault LED on (Direct Drive Only)
Action	Auto Stop
Troubleshooting	Investigate clutch
Fault Code	131
Fault Description	Clutch Overspeed Fault (LED)
Fault Criteria	Clutch Over speed fault LED on (Direct Drive Only)
Action	Auto stop
Troubleshooting	Investigate clutch, ensure engine speed is within limits specified by manufacturer
Fault Code	132
Fault Description	Clutch Lockout (LED)
Fault Criteria	Clutch Lock LED is on (Direct Drive Only)
Action	Auto stop
L	· · · · · · · · · · · · · · · · · · ·



Troubleshooting	Investigate Clutch
Fault Code	133
Fault Description	Clutch offline
Fault Criteria	No communication with clutch controller (Direct Drive Only)
Action	ECU off
Troubleshooting	Investigate CAN Connections
Fault Code	134
Fault Description	Clutch Pressure Critical
Fault Criteria	Clutch Pressure is less than 'Clutch Pressure Critical' set- point (Direct Drive Only)
Action	Auto stop / ECU off
Troubleshooting	Investigate clutch pressure.
Fault Code	135
Fault Description	Clutch Failed to Disengage
Fault Criteria	Clutch fails to Disengage when commanded. (Direct Drive Only)
Action	ECU Off
Troubleshooting	Consult factory
Fault Code	136
Fault Description	Clutch Failed to Engage
Fault Criteria	Clutch failed to Engage when commanded or stopped without warning (Direct Drive Only)
Action	Auto stop
Troubleshooting	Consult factory
Fault Code	137
Fault Description	Pump Pilot Pressure Low
Fault Criteria	Crusher pump pilot pressure is less than 'Pump Pilot Pressure Min' set-point (Direct Drive Only)
Action	Auto stop
Troubleshooting	Investigate crusher pilot pressure system
Fault Code	138
Fault Description	IO Node Off Line
Fault Criteria	Main controller has lost communication with the IO Node
Action	Auto stop
Troubleshooting	Investigate IO Node



Fault Code	139
Fault Description	Pump Detect Fault
Fault Criteria	H1 Pump Detect input has been removed
Action	Auto stop
Troubleshooting	Investigate H1 Pump Detect Input / Pump Selection



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## 10 Maintenance schedules



## 10.1 Safety Requirements (Machinery)

## **⚠ WARNING**



#### **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 starting maintenance procedures. Make sure all guards are in place and secure.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.

## **▲** DANGER



#### **IGNORING INSTRUCTIONS HAZARD**

Not using minimum approve PPE (personal protective equipment) could result in death or serious injury.

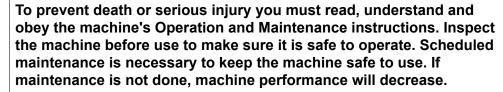


Always wear approved PPE.

## **⚠ WARNING**



#### **IGNORING INSTRUCTIONS HAZARD**





Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.



## **⚠ WARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



## **⚠ WARNING**



#### **UNAUTHORISED MODIFICATIONS HAZARD**

Use of non-standard parts could cause death or serious injury.
Only use parts specified in the Sandvik spare parts book.



- The safety instructions that follow are applicable to all machinery service and maintenance tasks. Other safety instructions, specified for some maintenance tasks, will be given in the tasks' instructions.
- Maintenance is necessary for (i) personnel safety, (ii) best machine performance, (iii) prevention of mechanical failures.
- Complete and log maintenance tasks at the necessary intervals to meet a condition of warranty. Unusual wear or component failure will occur if maintenance tasks have not been completed.
- For maintenance tasks and schedules that are related to Original Equipment Manufacturers, read the Original Equipment Manufacturer information supplied separately.
- Maintenance intervals must be decreased for machines that operate in very high or very low temperature environments, for long shifts (>10 hours/day) or in environments with unusual conditions.
- Only use lubricants, fluids, filters and parts recommended by the
  Original Equipment Manufacturer (OEM). Use of parts not approved by
  the OEM could result in faster wear or damage to the machine
  components. Read the engine manual that accompanies this manual for
  associated fuel specification. Use of the incorrect specification of fuel
  will cause damage to the engine.
- · Do not use grease that contains Molybdenum.



- Work on the electrical system must only be done by a qualified electrician or by personnel supervised by a qualified electrician. The work must obey local and national electrical engineering regulations.
   Make sure personnel fully understand the electrical system before doing work on it - read the electrical schematic diagrams.
- Work on the hydraulic system must only be done by authorised personnel. Make sure personnel fully understand the hydraulic system before doing work on it - read the hydraulic schematic diagrams.
- Discard unwanted batteries through a local re-cycling scheme. Batteries must not be discarded in waste which can go to a landfill site.
- Mechanical and electrical systems can contain stored energy. The
  hydraulic system, such as piping, accumulators, valves and actuators,
  can contained pressurised fluids. Electrical devices, such as capacitors,
  can contain stored electrical charge. Make sure to discharge any stored
  energy before starting work on a mechanical or electrical system.
- Always do a site-specific risk assessment before doing a listed maintenance procedure. Site-specific risk assessments must be done before doing all maintenance procedures and the risks should be assessed for the procedure with consideration of the personnel doing the task, the environment in which the task is to be done and the equipment which is required to do the task.

#### **Related information**

Fluids and lubricants table (QJ341+) (Page 261)

## 10.2 Instructions for reading maintenance cards

The maintenance cards show what maintenance procedures are to be performed at what intervals. In addition to the procedures listed in the maintenance card of a certain hour interval, also the maintenance procedures of all relevant shorter intervals must be performed at the same time.

#### Maintenance cards:

- every 10 hours (Daily)
- every 50 hours (Weekly)
- every 250 hours (Monthly)
- every 500 hours (3 Monthly)
- every 1000 hours (6 Monthly)
- every 2000 hours (12 Monthly)
- every 3000 hours (18 Monthly)
- every 4000 hours (24 Monthly)
- every 5000 hours (30 Monthly)
- every 6000 hours (36 Monthly)
- every 8000 hours (48 Monthly)
- every 10000 hours (60 Monthly)



For example, when performing the scheduled maintenance procedures after 1000 operating hours from the 1000-hour card, also the procedures listed in the daily, 50-hour, 250-hour and 500-hour cards must be performed at the same time. But when performing the scheduled maintenance procedures after for example 1500 operating hours, it is only necessary to perform the procedures listed in daily, 50-, 250-, 500- and 1500-hour cards. This is because 1500 is not divisible by 1000 and thus the procedures listed in the 1000-hour card must not be done at this point.

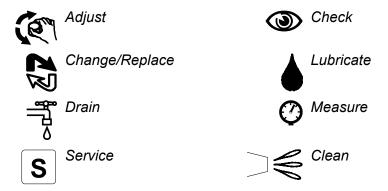
The maintenance intervals continue for the whole service life of the machine. For example the procedures listed in the 2000-hour card are to be performed after 2000, 4000, 6000, 8000 operating hours and so on.

1 2 3		4	)	5	6	
) joiesel hour	S\— E	VERY	′ 150⁄ú	HOURS		
MAINTENANCE PROCEDURE	\				NOTES	6
Grease the moving suction head cylinder	•	198				
Grease the cut-off cylinder and butterfly valve	•	199				
Check the condition of the coarse separator's rubber lining	<b>③</b>	198				
Check the condition of the suction head rubbers	<b>③</b>	198				

When completed: Date Approved			Diesel hours
	1	Maintenance card heading	Hour type and amount
	2	Maintenance procedure column	Maintenance procedure to be performed
	3	Symbol column	Symbol representing the maintenance procedure
	4	Page number column	Maintenance manual page for additional information on the maintenance procedure
	5	Check column	Enter a cross here when the maintenance procedure is completed
	6	Notes column	Enter any notes on the maintenance procedure here



#### Maintenance card symbol descriptions



#### 10.3 First 50-80 hour maintenance

Always do a site specific risk assessment before doing all maintenance procedures.

Make sure that this schedule is done in the first 50-80 hours running of the machine (minimum requirement).

Completing and logging Maintenance at the required intervals is a condition of warranty, failure to complete maintenance tasks causes premature wear and component failure. This will not be covered under warranty.

Make sure that the machine is locked-out and tagged-out before starting any maintenance procedure.

Date/ hours	Task	Reference
	Change all hydraulic oil filters.	See maintenance procedures
	Check the crusher drive belt tension and inspect the belts.	See maintenance procedures
	Check the engine.	Read OEM docu- mentation

#### 10.4 Periodic maintenance

#### 10.4.1 Every 10 hours

Operation hours - 10 HOURS						
Maintenance procedure				Notes		
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>3</b>			See the instructions for reading maintenance cards.		
PLANT MAINTENANCE PROCEDURES						
Do a check of the hydraulic oil level	(D)	188				
Do a check for oil leaks from the track gearbox	<b>3</b>	194				



Operation hours - 10 HOURS							
Maintenance procedure				Notes			
Do a check of the diesel fuel level	3	197					
Fill the diesel fuel tank	S	198					
Clean around the diesel fuel tank air vent		198					
Do a check of all panels and guards	<b>3</b>	199					
Do a check that rollers and drums move freely	<b>3</b>	201					
Do a check that all sirens and beacons operate	<b>3</b>	203					
Make sure that all emergency stops operate	<b>③</b>	204					
Do a visual inspection of the machine	<b>3</b>	204					
Do a visual inspection of all hoses	<b>3</b>	205					
Do a visual inspection of all driven equipment	<b>③</b>	205					
Do a check on the autolube grease reservoir (if fitted)	<b>3</b>	205					
Grease the bearings	•	206					
Do a check of the feeder gearbox oil level	<b>3</b>	207					
Do a visual inspection of the grizzly bars	<b>3</b>	210					
Do a check the crusher chamber is free of blockages	<b>3</b>	221					
Do a check of the tension in the screen meshes (pre-screen)	(a)	225					
Do a check on the wear and condition of the screen meshes	<b>3</b>	226					
ENGINE MAINTENANCE PROCEDURES							
Do a check of the engine coolant level	<b>3</b>	267					
Do a check of the engine oil level	<b>3</b>	271					
Drain the diesel fuel-water separator		273					
Do a check of the DEF level	3	275					
Do a check of the EATS warnings	<b>3</b>	275					
Do a check of the DPF regeneration warning light	<b>③</b>	276					



Operation hours - 10 HOURS								
Maintenance procedure				Notes				
Do a check of the service indicators on the air filter	<b>③</b>	277						
Do a check of the air pre-cleaner	<b>③</b>	278						
When completed:								
ate								
Approved								



## 10.4.2 Every 50 hours

Operation hours - 50 HOURS						
Maintenance procedure				Notes		
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.		
PLANT MAINTENANCE PROCEDURES						
Do a check of the hydraulic oil cooler	<b>3</b>	193				
Do a check of the oil level in the track gearbox	<b>③</b>	195				
Do a check of the track tension	(a)	195				
Move the tracks to prevent seizure	S	197				
Adjust the belt scraper	(T)	199				
Do a check of the conveyor belt sealing rubbers	<b>3</b>	201				
Do a visual inspection of the conveyor	<b>3</b>	201				
Do a check of the conveyor belt tension	<b>3</b>	202				
Do a check of the springs (feeder)	<b>3</b>	209				
Do a check of the feeder wear plates	<b>3</b>	209				
Do a visual inspection of the toggle plate	<b>③</b>	211				
Do a check of the toggle plate hydraulic cylinders for damage, wear or dirt	(M)	212				
Do a visual inspection of the toggle hydraulic cylinder bearings	<b>③</b>	212				
Do a visual inspection of the crusher chamber	<b>③</b>	215				
Do a check of the wear on the crusher jaws	0	220				
Do a check of the crusher wear plate liners	<b>3</b>	221				
Do a check of the crusher box beam fixing bolts	<b>③</b>	221				
Do a check of the bolts that secure the wear plates	<b>3</b>	221				
Do a check of the springs	<b>③</b>	223				
Do a check of the pre-screen capping rubbers	<b>③</b>	224				



Operation hours - 50 HOURS							
Maintenance procedure				Notes			
Do a check of the torque on the grizzly bar bolts	(M)	227					
Do a visual inspection of the pre-screen/ grizzly bolts	(3)	227					
Do a visual inspection of the diverter chute	<b>3</b>	228					
ENGINE MAINTENANCE PROCEDURES							
Do a check of the engine radiator	<b>③</b>	281					
Clean the engine radiator	S	281					
When completed:							
Date Operation hours							
Approved							



## 10.4.3 Every 250 hours

Operation hours - 250 HOURS							
Maintenance procedure				Notes			
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.			
<b>ENGINE MAINTENANCE PROCEDURES</b>							
Get a sample of engine coolant for analysis	<b>3</b>	269					
Get a sample of engine oil for analysis	<b>③</b>	271					
Do a check of the terminal connections on the battery	<b>3</b>	285					
When completed:							
Date Operation hours							
Approved							



## 10.4.4 Every 500 hours

Operation hours - 500 HOURS					
Maintenance procedure				Notes	
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.	
PLANT MAINTENANCE PROCEDURES					
Change the hydraulic oil tank return filters		189			
Replace the hydraulic oil tank air vent element		192			
Drain sediment and water from the tanks		206			
Replace the high-pressure oil filter	N	221			
Replace the charge oil filter	<b>1</b>	222			
ENGINE MAINTENANCE PROCEDURES					
Replace the engine oil	<b>1</b>	272			
Replace the engine oil filter	2	272			
Replace the fuel filter	N	274			
Adjust the tension in the alternator drive belt	(E)	276			
Do a visual inspection of the grounding stud	<b>3</b>	277			
Replace the engine air filters	<b>ZZ</b>	279			
Do a check the electrolyte level in the battery	<b>③</b>	282			
When completed:  Date					



## 10.4.5 Every 1000 hours

Operation hours - 1000 HOURS					
Maintenance procedure				Notes	
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.	
PLANT MAINTENANCE PROCEDURES					
Replace the oil in the track gearbox	<b>1</b> 8	193			
Do a check of the conveyor drive coupling	9	200			
Replace the feeder gearbox oil	<b>1</b> 8	208			
Replace the toggle clamp hydraulic cylinder bearings		213			
<b>ENGINE MAINTENANCE PROCEDURES</b>					
Do a visual inspection of the water pump for leaks or damage	9	278			
When completed: Date					



## 10.4.6 Every 1000 hours

Operation hours - 1500 HOURS					
Maintenance procedure			<b>Y</b>	Notes	
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.	
PLANT MAINTENANCE PROCEDURES					
Change the hydraulic oil	N	190			
Replace the hydraulic tank suction strainers		191			
<b>ENGINE MAINTENANCE PROCEDURES</b>					
Replace the engine crankcase breather		278			
When completed: Date Operation hours					
Approved					



## 10.4.7 Every 2000 hours

Operation hours - 2000 HOURS					
Maintenance procedure				Notes	
Perform the maintenance procedures of all relevant shorter intervals at the same time.	<b>③</b>			See the instructions for reading maintenance cards.	
ENGINE MAINTENANCE PROCEDURES					
Changing the engine coolant		270			
Do a check of the starter motor	<b>③</b>	278			
When completed:  Date					



# 10.5 Increasing the frequency of maintenance under severe operating conditions

- These maintenance instructions are given for typical operations of up to 8 hours per day, 5 days per week (40 hours per week). Periodic maintenace can be completed within the shift or outside the shift by qualified and experienced personnel with an exception for vibrating component bearings which require a Sandvik approved technician. Typical operating conditions are considered to be in the range -10 to +50 degrees Celsius ambient.
- 2. Severe operating conditions require more frequent maintenance to both the machine and the engine.
- 3. Severe operating conditions (also known as adverse conditions) include: frequent stopping and starting of the machine, leaving the engine idle for long periods of time, extremes of environmental temperatures, operating the machine for long shifts (in excess of 10 hours per day), operating the machine for long hours each week (in excess of 50 hours per week), and, operating the machine in corrosive environments.
- 4. Read the engine manual that accompanies the machine for information on engine service requirements under severe operating conditions.
- 5. Contact your local Sandvik representative for further information on machine service requirements under severe operating conditions.

#### **Related information**

**Greasing the bearings** (Page 206)



## 11 Maintenance instructions



### 11.1 Safety Requirements (Machinery)

## **⚠ WARNING**



#### **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 starting maintenance procedures. Make sure all guards are in place and secure.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.

## DANGER



#### **IGNORING INSTRUCTIONS HAZARD**

Not using minimum approve PPE (personal protective equipment) could result in death or serious injury.

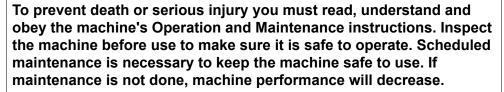


Always wear approved PPE.

## **⚠ WARNING**



#### **IGNORING INSTRUCTIONS HAZARD**





Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.



## **MARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



## **⚠ WARNING**



#### **UNAUTHORISED MODIFICATIONS HAZARD**

Use of non-standard parts could cause death or serious injury.
Only use parts specified in the Sandvik spare parts book.



- The safety instructions that follow are applicable to all machinery service and maintenance tasks. Other safety instructions, specified for some maintenance tasks, will be given in the tasks' instructions.
- Maintenance is necessary for (i) personnel safety, (ii) best machine performance, (iii) prevention of mechanical failures.
- Complete and log maintenance tasks at the necessary intervals to meet a condition of warranty. Unusual wear or component failure will occur if maintenance tasks have not been completed.
- For maintenance tasks and schedules that are related to Original Equipment Manufacturers, read the Original Equipment Manufacturer information supplied separately.
- Maintenance intervals must be decreased for machines that operate in very high or very low temperature environments, for long shifts (>10 hours/day) or in environments with unusual conditions.
- Only use lubricants, fluids, filters and parts recommended by the
  Original Equipment Manufacturer (OEM). Use of parts not approved by
  the OEM could result in faster wear or damage to the machine
  components. Read the engine manual that accompanies this manual for
  associated fuel specification. Use of the incorrect specification of fuel
  will cause damage to the engine.
- · Do not use grease that contains Molybdenum.



- Work on the electrical system must only be done by a qualified electrician or by personnel supervised by a qualified electrician. The work must obey local and national electrical engineering regulations.
   Make sure personnel fully understand the electrical system before doing work on it - read the electrical schematic diagrams.
- Work on the hydraulic system must only be done by authorised personnel. Make sure personnel fully understand the hydraulic system before doing work on it - read the hydraulic schematic diagrams.
- Discard unwanted batteries through a local re-cycling scheme. Batteries must not be discarded in waste which can go to a landfill site.
- Mechanical and electrical systems can contain stored energy. The
  hydraulic system, such as piping, accumulators, valves and actuators,
  can contained pressurised fluids. Electrical devices, such as capacitors,
  can contain stored electrical charge. Make sure to discharge any stored
  energy before starting work on a mechanical or electrical system.
- Always do a site-specific risk assessment before doing a listed maintenance procedure. Site-specific risk assessments must be done before doing all maintenance procedures and the risks should be assessed for the procedure with consideration of the personnel doing the task, the environment in which the task is to be done and the equipment which is required to do the task.

#### **Related information**

Fluids and lubricants table (QJ341+) (Page 261)

### 11.2 Reference Information

- For information related to the recommended lubricants and fluids for use in the machine, read the Fluids and Lubricants chart that is included in the documentation pack.
- For the hydraulic and electrical diagrams applicable to this machine, read the Hydraulic Schematics and Electrical Schematics that is included in the documentation pack.
- For maintenance procedures and schedules that are related to components made by Original Equipment Manufacturers, read the Original Equipment Manufacturer information supplied in the documentation pack.



#### 11.3 Hazardous substances

## **A** DANGER



#### **EXPLOSIVE ATMOSPHERE HAZARD**

Failure to limit explosive gas or dust will result in death or serious injury.

You must limit coal or other flammable dust which is explosive.



## **⚠ WARNING**



#### POISON AND CONTAMINATION HAZARD

Fuels, fluids and lubricants used in this machine can contain chemicals which could cause death or serious injury.



Discard these correctly to prevent environmental damage. Obey local and national laws or regulations. Make sure the correct procedures from material safety data sheets (MSDS) are used when personnel move, store and use hazardous materials. Do not put waste on to the ground, down a drainpipe or into a source of water. Always use containers that do not leak when you drain fluid

## **A** DANGER



#### PRESSURIZED FLUID HAZARD

Pressurized hydraulic fluid can go through skin, which will result in death or serious injury. Fluid under the skin mustbe surgically removed or gangrene will occur. Get medical aid immediately.



Always use a piece of cardboard for leakage checks. Do not use your hand. Only authorized personnel can work on the hydraulic system. Complete a risk assessment and obey all necessary safety procedures.

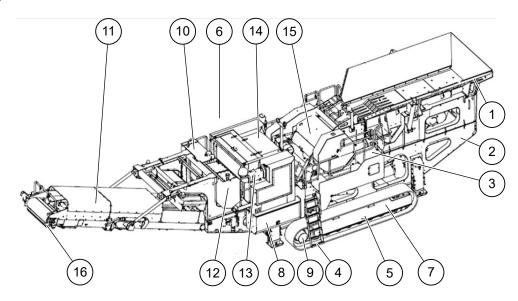
 Listed substances, which are used in the machine, are hazardous to health. Read the Material Safety Data Sheets (MSDS) for more information.



#### 11.4 Maintenance schedules

- Do the Preventive Maintenance (PM) to make sure that the machine operates correctly and without unnecessary faults. Make sure that the maintenance tasks are done at the times given on the maintenance cards.
- The engine located inside the Powerpack must be maintained with the information given in this manual's Engine chapter and with the information described in the Original Equipment Manufacturer's engine Operator's Manual. The OEM engine Operator's Manual is found within the documentation pack. Read this documentation and undertake the maintenance tasks given by the OEM.
- OEM Maintenance Manuals for other OEM products can be found within the documentation pack. Read this documentation and undertake the maintenance tasks given by the OEM.
- Always do a site-specific risk assessment before doing a maintenance task
- Read the Safety Requirements before doing maintenance tasks. Make sure that all machine operators and maintenance personnel follow the instructions in the Safety Requirements and in the maintenance tasks.
- Do maintenance tasks when the machine is locked out and tagged. Do
  not work on the machine or do maintenance tasks when the machine or
  engine is switched on. Maintenance observations that require the
  machine to be switched on are described by specific tasks.

# 11.5 Identifying the main locations for maintenance procedures (QJ341)

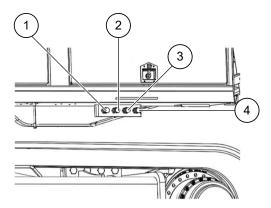


- 1 Feeder
- 2 Chassis
- 3 Maintenance platform
- 4 Access ladder



- 5 Track tension access port
- 6 Hydraulic cabinet
- 7 Track assembly
- 8 Control cabinet
- 9 Track gearbox
- 10 Hydraulic tank
- 11 Main conveyor dust cover
- 12 Diesel tank
- 13 Air cleaner
- 14 Powerpack
- 15 Jaw crusher
- 16 Belt scraper

## 11.6 Locating the fluid drain points



Look along the side of the machine for the fluid drain valves.

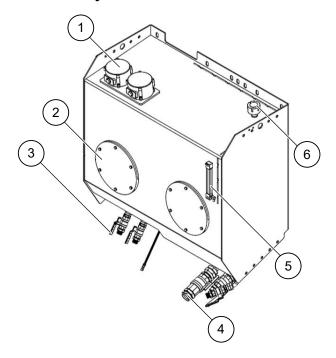
#### 11.6.1 Identifying the fluid drain points

- 1. Engine cooling system
- 2. Engine oil sump
- 3. Hydraulic system
- 4. Fuel system



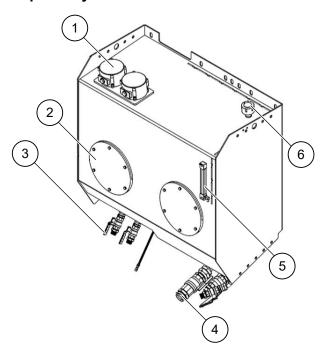
## 11.7 Plant maintenance procedures

## 11.7.1 Doing a check of the hydraulic oil level



1. Look at the tank gauge (5) to do a check of the hydraulic oil level in the tank

## 11.7.2 Getting a sample of hydraulic oil

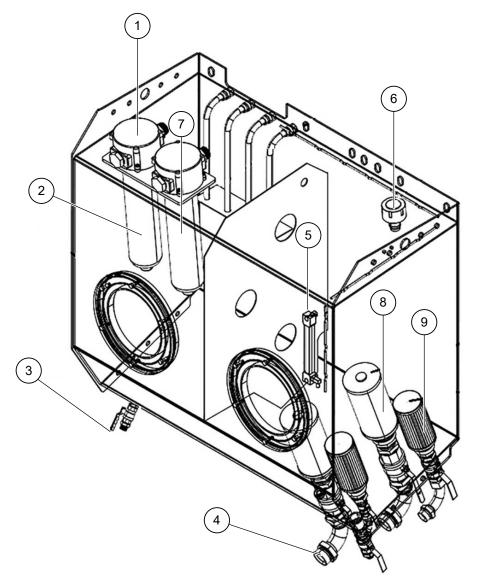


- 1. Start the engine and operate the engine for a few minutes.
- 2. Stop the engine. Lockout and tagout the machine.
- 3. Remove the air vent (6).



- 4. Use a clean length of tubing to pump a sample of hydraulic oil into a labelled sample container.
- 5. Replace the air vent.
- 6. Wipe up all spills.
- 7. Discard the contaminated materials to local environmental regulations.

#### 11.7.3 Changing the hydraulic oil tank return filters

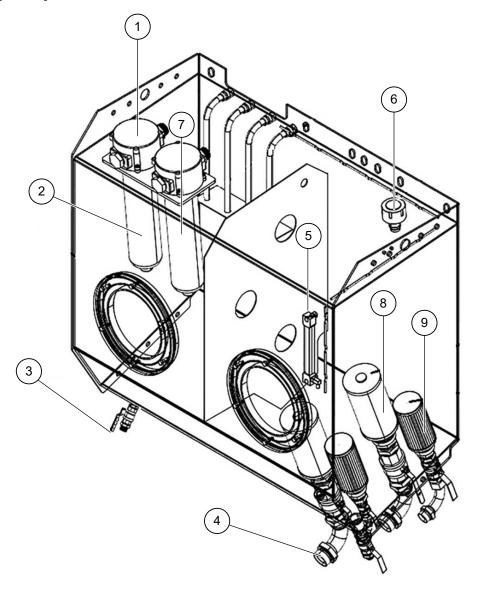


- 1 Return filter cap
- 2 Return filter housing
- 3 Valve
- 4 Outlet pipe
- 5 Tank gauge
- 6 Air vent
- 7 Return filter (inside)



- 8 Large suction filter
- 9 Small suction filter
- 1. Use an applicable container to collect the oil. Make sure the container has sufficient volume to hold all the oil.
- 2. Clean the top of the hydraulic oil tank around the return filter housings (1).
- 3. Remove the return filter housing covers (1).
- 4. Remove the filter elements. Allow oil to drain into the container.
- 5. Clean the inside of the filter cover and the inside of the filter housing.
- 6. Install new filter elements.
- 7. Install the filter housing covers.
- 8. Discard the contaminated materials to local environmental regulations.

#### 11.7.4 Changing the hydraulic oil





- 1. Make sure that all hydraulic rams are retracted prior to doing this procedure. This will prevent the tank being filled with returned oil.
- 2. Use an applicable container to collect the oil. Make sure the container has sufficient volume to hold all the oil.
- 3. Put a funnel under the drain port and use a hose to connect the funnel to the container.
- 4. Make sure the area around the port is clean.
- 5. Slowly open the port.
- 6. Allow all oil to flush through to the container.
- 7. Close the port.
- 8. Remove the hydraulic oil tank access covers (2).
- 9. Clean any remaining sediment from the inside of the tank.
- 10. Remove the contaminated hydraulic suction filters (9) inside the tank.
- 11. Install new hydraulic suction filters.
- 12. Install the hydraulic oil tank access covers.
- 13. Identify the correct specification of hydraulic oil.
- 14. Remove the filler cap.
- 15. Clean the filler cap strainer.
- 16. Fill hydraulic oil to the top of the hydraulic oil gauge.
- 17. Replace the filler cap.
- 18. Wipe up all spills.
- 19. Discard the contaminated materials to local environmental regulations.

#### **Related information**

Replacing the hydraulic tank suction strainers (Page 191)

#### 11.7.5 Replacing the hydraulic tank suction strainers

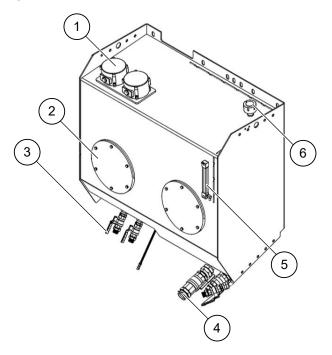
- 1. Drain the tank of all hydraulic oil.
- Remove the circular tank access covers.
- 3. Remove the suction strainers (filters) from inside the bottom of the tank.
- 4. Install the new suction strainers.
- Replace the covers.
- 6. Complete any other scheduled maintenance tasks which require an empty hydraulic tank (cleaning, sediment removal, filter change).
- 7. Refill the tank with hydraulic oil before the machine is started.
- 8. Dispose of the contaminated materials according to local environmental regulations.

#### **Related information**

Changing the hydraulic oil (Page 190)

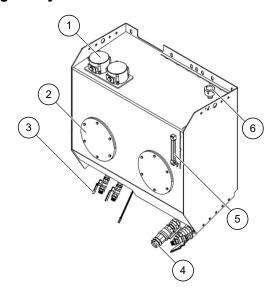


### 11.7.6 Filling the hydraulic oil tank



- 1. Make sure that all hydraulic rams are retracted prior to doing this procedure. This will prevent the tank being filled with returned oil.
- 2. Identify the correct specification of hydraulic oil.
- 3. Remove the filter housing cover and filter (1).
- 4. Fill hydraulic oil to the top of the hydraulic oil gauge (5).
- 5. Replace the filter and filter housing cover.
- 6. Wipe up all spills.
- 7. Discard the contaminated materials to local environmental regulations.

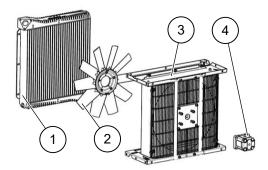
#### 11.7.7 Replacing the hydraulic oil tank air vent element





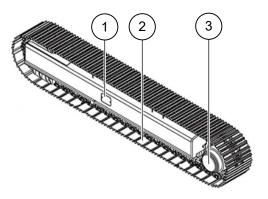
- 1. Use an applicable cleaning cloth to clean around the air vent (6).
- 2. Remove the air vent element.
- 3. Install the new air vent element.

#### 11.7.8 Doing a check of the hydraulic oil cooler



- Do a visual inspection of the hydraulic oil cooler (1) for dirt, loose material, damage or an accumulation of material on the inlet matrix.
- 2. Use a pressure cleaner to clean the inlet matrix.
- 3. Do a check that the fan (2) is not damaged.
- 4. Do a check that there are no oil leaks from the hydraulic motor (4)

#### 11.7.9 Track maintenance locations



- 1. Locate the main assemblies on the track for maintenance. The track tensioner (1), track shoe (2) and track gearbox (3) are illustrated.
- 2. Make sure that the track assemblies are clean. Dust and debris will cause contamination of the track mechanisms if they are exposed to the environment.

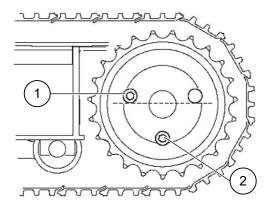
#### **Related information**

Information and datasheets (Page 287)

#### 11.7.10 Replacing the oil in the track gearbox

The interval at which the oil is changed can be increased if regular sampling and testing of the oil proves that the oil continues to perform acceptably.





- 1. Start the engine.
- 2. Move the machine on the tracks to turn the gearbox to the correct position. The correct position has the fill plug to the left (1) and the drain plug to the bottom (2).
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Clean around the fill plug before it is opened to prevent oil contamination.
- 5. Put an applicable container under the drain port. Make sure the area around the port is clean.
- 6. Remove the fill plug.
- 7. Slowly open the drain port.
- 8. Allow all oil to flush through to the container.
- 9. Close the drain port.
- 10. Fill the gearbox to the correct level using the recommended specification of oil.
- 11. When full, insert and tighten the fill plug.
- 12. Repeat this procedure for both track gearboxes.
- 13. Discard the contaminated materials to local environmental regulations.

#### Related information

Doing a check for oil leaks from the track gearbox (Page 194)

#### 11.7.11 Doing a check for oil leaks from the track gearbox

- 1. Do a visual inspection for oil leaks from the track gearbox to the outside and inside of the tracks.
- 2. Repeat this procedure for both track gearboxes.

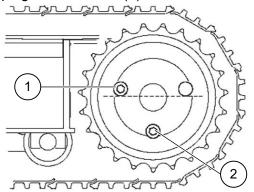
#### **Related information**

Replacing the oil in the track gearbox (Page 193)



#### 11.7.12 Doing a check of the oil level in the track gearbox

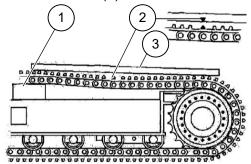
- 1. Start the engine.
- 2. Move the machine on the tracks to turn the gearbox to the correct position. The correct position has the fill plug to the left (1) and the drain plug to the bottom (2).



- 3. Stop the engine. Lockout and tagout the machine.
- 4. Clean around the fill plug before it is opened to prevent oil contamination.
- 5. Remove the fill plug.
- 6. Do a check that the oil level is level with the bottom of the fill plug thread.
- 7. If necessary, fill the gearbox to the correct level using the recommended specification of oil.
- 8. When full, insert and tighten the fill plug.
- 9. Repeat this procedure for both track gearboxes.

#### 11.7.13 Doing a check of the track tension

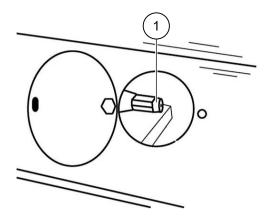
- 1. Start the engine.
- 2. Move the machine 10m (33ft) in each direction on hard, level ground to make sure the tracks have the required tension.
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Use a long, straight tool to measure tension in the track.
- 5. The dimension (2) must be between 5mm and 15mm.



6. Adjust the track tension if necessary.

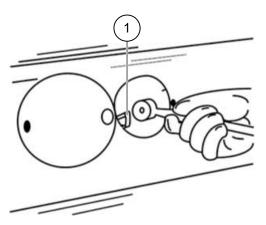


#### 11.7.14 Adjusting track tension – decrease



- 1. Access the inspection hole on the track.
- 2. Put an applicable container under the track adjuster grease nipple.
- 3. Open the track adjuster valve (1) by turning it 180 degrees counterclockwise.
- 4. Grease will slowly exit the track adjuster valve from the track tension hydraulic cylinder and the track tension will decrease.
- 5. Tighten the track adjuster valve when the track tension is correct.
- 6. Clean off the excess grease.
- 7. Discard the contaminated materials to local environmental regulations.

#### 11.7.15 Adjusting track tension – increase



- 1. Access the inspection hole on the track.
- 2. Clean the track adjuster grease nipple (1).
- 3. Make sure that the adjuster valve is tight.
- 4. Attach the correct grease gun connector to the grease gun and firmly attach the connector to the track adjuster valve.
- 5. Add grease through the adjuster valve until the track tension is between 5mm and 15mm.
- 6. Clean off the excess grease.
- 7. Discard the contaminated materials to local environmental regulations.



#### 11.7.16 Doing a check of each track shoe

- 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 must be used to measure this
- 2. Read the manual supplied with your machine for details on the wear limits for track shoes.

#### 11.7.17 Moving the tracks in each direction to prevent seizure

#### **MOVING MACHINE HAZARD**

Personnel on the machine or in exclusion zones when the machine is moving are at risk of death or serious injury.

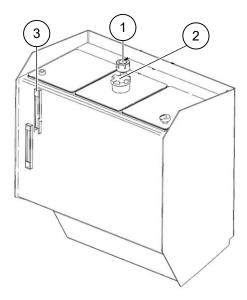


Do not move the machine when persons are standing on the machine or in exclusion zones (20m / 66ft).

A DANGER

- 1. Do a check around the machine to make sure there are no personnel or obstacles within 20 meters of the machine.
- 2. Start the engine.
- 3. Push the button to start the track mode.
- 4. Move the machine 10 meters in each direction to prevent seizure of the track components.
- 5. Stop the engine. Lockout and tagout the machine.

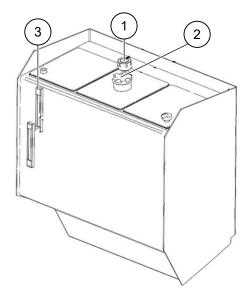
#### 11.7.18 Doing a check of the diesel fuel level



1. Look at the tank gauge (3) to do a check of the diesel level in the tank.

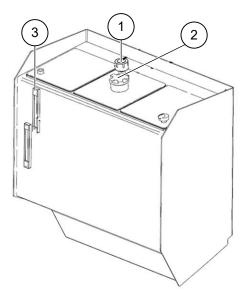


### 11.7.19 Filling the diesel fuel tank



- 1. Identify the correct specification of diesel fuel.
- 2. Unlock and remove the filler cap (2).
- 3. Fill fuel to the top of the fuel gauge (3).
- 4. Replace and lock the filler cap (2).
- 5. Wipe up all spills.

#### 11.7.20 Cleaning around the diesel fuel tank vent



1. Use an applicable cleaning cloth to clean around the diesel fuel tank vent (1).



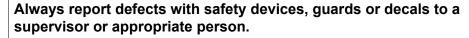
#### 11.7.21 Doing a check of all panels and guards

## **A** DANGER



#### **ENTANGLEMENT HAZARD**

To prevent death or serious injury, never operate the machine with safety devices, guards or decals removed or unsecured.



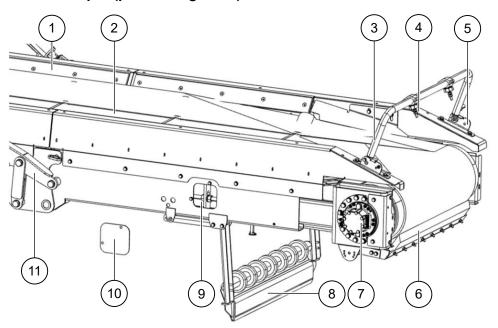


- 1. Do a check that all safety guards, protective panels and machine panels are secured and that all bolts have the correct torque.
- 2. Make sure that all safety guards are present and secure. Do not operate the machine if safety guards are loose or missing. Repair or replace them when necessary.

#### Related information

QJ341+ machine guard locations (Page 59)

#### 11.7.22 Adjusting the belt scraper (positioning bolts)



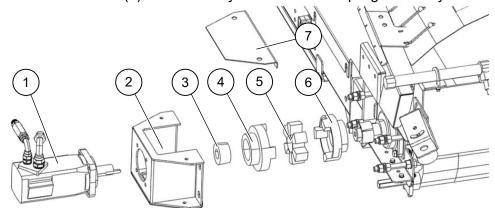
- 1 Conveyor belt liner
- 2 Conveyor belt
- 3 Spray bar
- 4 Nozzle
- 5 Spray bar adjuster
- 6 Belt scraper



- 7 Hydraulic motor
- 8 Roller guard
- 9 Conveyor head adjuster
- 10 Inspection plate
- 11 Conveyor fold mechanism
- 1. Start the engine.
- 2. Switch on the auxiliary hydraulics.
- 3. Use the hydraulic valve to lower the conveyor fully.
- 4. Stop the engine. Lockout and tagout the machine.
- 5. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the conveyor belt scraper (6).
- 6. Do a check of the belt scraper. The scraper should contact the belt. Adjust the scraper if there is a gap between the scraper and the belt.
- 7. Adjust the scraper by loosening the positioning bolts, adjusting the scraper and re-tightening the bolts.
- 8. Additional adjustment can be done by loosening the rubber clamp bolts located long the belt scraper.

#### 11.7.23 Doing a check of the conveyor drive coupling

- 1. If required, use an applicable access platform, as defined in a site-specific risk-assessment, to access the belt hydraulic drive motor.
- 2. Remove the cover (7) to view the hydraulic motor coupling assembly.

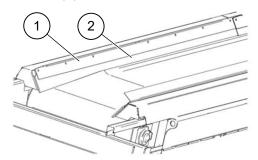


- 3. Do a check of the condition of the spider (5) coupling for wear and damage and replace if necessary.
- 4. Reinstall the cover.



#### 11.7.24 Doing a check of the conveyor belt sealing rubbers

1. Do a check on the condition and position of the conveyor belt sealing rubbers (2).



- 2. Check the sealing rubbers on all conveyors (feed conveyor, main conveyor, side conveyor(s), fines product conveyors (as applicable)).
- 3. If position requires adjustment, loosen the bolts on the clamping plate (1).
- 4. Move the sealing strip to the required position.
- 5. Tighten the bolts.

#### 11.7.25 Doing a check that rollers and drums move freely

- 1. Use a suitable access platform, as defined in a site-specific risk assessment, to do a check that rollers and drums move freely.
- 2. Do a check of the accessible rollers and drums on the conveyors on the machine.

#### 11.7.26 Doing a visual inspection of the conveyor

## **A** DANGER



#### POTENTIAL ENERGY HAZARD

Potential energy can be contained in hydraulic and compressed air systems when not in operation.





Always release pressure from hydraulic and compressed air systems before doing maintenance or adjustment. Only use components approved by the manuafacturer. Hydraulic and compressed air hoses must be installed correctly. Make sure no connections are interchanged. The hoses must be good quality, the correct length and have correct fittings. Always clean hydraulic components during hydraulic servicing. Obey all procedures to prevent leaks or a spill.

- 1. If required, use an applicable access platform, as defined in a site-specific risk-assessment, to access the conveyor.
- 2. Do a visual inspection of the conveyor belt for wear or damage. Excessive wear is visible when the top cover is worn and the canvas is visible. Repair as required.



- 3. Make sure that the conveyor, the rollers and the drums are clean. Belt tracking can be affected by dirt.
- 4. Do a visual inspection of any skirt rubbers, wear plates or guides that are fitted to the conveyor. Make sure they are all positioned correctly and replace any worn or damaged ones.
- 5. Do a visual inspection of liners (if fitted) at either side of the conveyor belt. Replace any worn or damaged liners.

#### Related information

Doing a check of the conveyor belt tension (Page 202)

#### 11.7.27 Doing a check of the conveyor belt tension

## DANGER



## **ENTANGLEMENT HAZARD**

Working near a machine in operation could cause death or serious injury.



Set the ignition switch to 'OFF' and do the Lockout-Tagout procedure before you work near the machine. Do not wear loose clothes or jewellery when near the machine. Keep long hair away from components. Always use approve Personal Protective Equipment. Never operate the machine with safety devices, guards or decals removed or unsecured.

- 1. Start the engine.
- 2. Start the conveyor.
- Observe the conveyor from a safe distance and take a note of the tension in the belt. The belt should operate in the centre of the drum. If the belt is slack or too tight on the drums, the conveyor belt tension will need to be adjusted.
- 4. Stop the engine. Lockout and tagout the machine.
- 5. Adjust the conveyor belt tension if required.

#### **Related information**

Doing a visual inspection of the conveyor (Page 201)

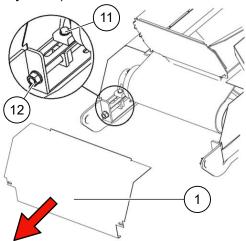
#### 11.7.28 Adjusting the conveyor belt tracking

- 1. This is a controlled process and should only be done by a suitably qualified and experienced service engineer.
- 2. Contact your Sandvik representative if a conveyor belt requires tracking.



#### 11.7.29 Adjusting the belt tension on the natural fines side conveyor

- 1. If required, use an applicable access platform, as defined in a site-specific risk-assessment, to access the conveyor belt.
- 2. Remove the guard (1) and access the belt tension mechanism (belt adjusters).



- 3. Loosen the locking nuts (11) on the bearing.
- 4. Tighten/loosen the belt evenly by adjusting the belt adjusters (12) on each side of the conveyor end.
- 5. Tighten the locking nuts when the tension is correct. Make sure that the tail drum is aligned correctly. Make sure that the conveyor belt is central to the drum. Do not tension the belt too tightly as damage to the belt drum or bearings will occur.
- 6. Install the guard to protect the belt tension mechanism.
- 7. Remove the access platform.
- 8. Do a check of the conveyor belt tension.
- 9. Stop the engine. Lockout and tagout the machine.
- 10. Repeat this procedure as required.

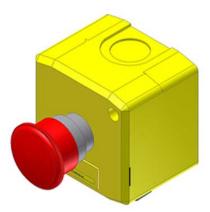
#### 11.7.30 Doing a check that all sirens and warning beacons operate

- 1. Do a check that all sirens and warning beacons operate.
- 2. Start the engine. Listen for the warning siren. Observe the warning beacon illuminate.
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Repair the sirens or beacons as necessary to restore correct operation.



#### 11.7.31 Making sure that all emergency stops operate and reset correctly

1. With the machine switched off, do a check that all emergency stop buttons depress and release correctly.



- 2. Start the engine.
- 3. Do a check that all emergency stops (including pull-stops where fitted) correctly stop the engine. Push each emergency stop in turn. Reset each emergency stop before the machine is restarted.
- 4. Stop the engine. Lockout and tagout the machine.

#### **Related information**

The emergency stop (Page 57)

Operating an emergency stop (Page 57)

Resetting an emergency stop (Page 57)

QJ341+ emergency stop locations (Page 58)

#### 11.7.32 Doing a visual inspection of the machine

- 1. Do a general visual inspection of the machine. Inspect for any damage, leakages, worn parts or worn drives. Replace or repair as necessary.
- 2. If a crack is found at any location on the machine, immediately contact your local Sandvik representative for information on corrective actions to be taken. Do not restart the machine. It would be helpful if details of the crack, including photographs, location and crack description, are sent to the local Sandvik representative.



- 3. If damage is seen on a part when the machine is in operation, the machine should only be stopped if safe to do so. Do not approach the machine if sudden failure of the part will increase the risk of injury or death to operators or bystanders. Stop the machine with the remote control (if this option is available) if the remote control is located away from the machine.
- 4. If a part fails on a machine that is in operation, the machine should only be stopped if safe to do so. Do not approach a machine in operation where parts are failing in succession and there is a risk of parts or material being ejected from the machine. Stop the machine with the remote control (if this option is available) if the remote control is located away from the machine.

#### 11.7.33 Doing a visual inspection of the hydraulic, water, lubricant, fuel and air hoses





#### PRESSURIZED FLUID HAZARD

Pressurized hydraulic fluid can go through skin, which will result in death or serious injury. Fluid under the skin must be surgically removed or gangrene will occur. Get medical aid immediately.



Always use a piece of cardboard for leakage checks. Do not use your hand. Only authorized personnel can work on the hydraulic system. Complete a risk assessment and obey all necessary safety procedures.

- With the machine off, do a visual inspection of all fluid containing systems and pipes. Make sure that there is no leakage of fluid. Check the ground and exposed machine surfaces for signs of leakage.
- 2. Start the machine and let it operate for a few minutes. Observe the machine from a safe distance to see if there are any significant leaks.
- Stop the machine. Lockout-tagout the machine. Do a visual inspection
  of all fluid containing systems and lines. Make sure that there is no new
  leakage of fluid. Do a check of the ground and exposed machine
  surfaces for signs of leakage. Replace fluid components as required.

#### 11.7.34 Doing a visual inspection of all driven equipment

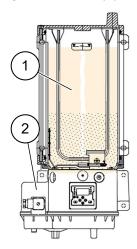
- 1. Do a visual inspection of all driven equipment, including any options fitted to the machine, for damage or wear.
- Read the operation manuals supplied with your machine for specific details on various subassemblies and installed options for details on correct operation and maintenance.

#### 11.7.35 Doing a check on the autolubrication grease reservoir (if fitted)

- 1. Read the autolubrication manual supplied with your machine for details on how to maintain, check and fill the autolubrication system.
- 2. Start the engine.



- 3. Do a check to make sure that there is sufficient grease available in the reservoir (1).
- 4. With the machine in operation, do a visual check on the autolubrication grease pump (2) to make sure that it is operating correctly.



5. Stop the engine. Lockout and tagout the machine.

#### **Related information**

Fluids and lubricants table (QJ341+) (Page 261)

#### 11.7.36 Greasing the bearings

- 1. Grease all bearings with the recommended quantity and type of grease according to the greasing schedule.
- 2. Read the related table for quantities and types of grease to use. Read the related table and illustrations for the locations at which to apply the grease.

#### Related information

Greasing table (QJ341) (Page 229)

<u>Increasing the frequency of maintenance under severe operating conditions</u> (Page 180)

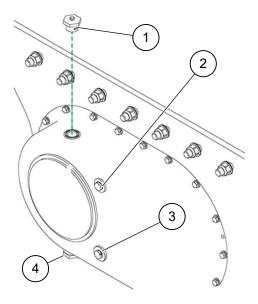
#### 11.7.37 Draining sediment from the tanks

- 1. Drain all water and sediment from the fluid tanks fitted to the machine (e.g diesel, hydraulic, clutch, lubrication).
- 2. Put an applicable container under the drain port.
- 3. Unlock and remove the filler cap.
- 4. Remove the drain bung and allow the tank to drain sediment and/or water as necessary.
- 5. Reinstall the drain bung.
- 6. Identify the correct specification of fluid.
- 7. Fill the tank.
- 8. Replace and lock the filler cap.



- 9. Wipe up all spills.
- 10. Discard the contaminated materials to local environmental regulations.

#### 11.7.38 Doing a check of the feeder gearbox oil level



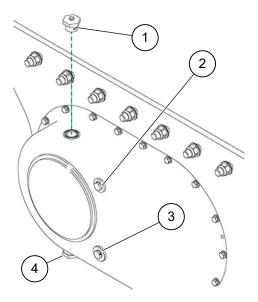
- 1. Make sure that the machine is level prior to checking the feeder gearbox oil level.
- 2. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the feeder gearbox.
- 3. Clean the area around the viewing port (3) and the area around the filler plug (1).
- 4. Do a check of the level of oil in the feeder gearbox. The oil level must reach the viewing port (3).
- 5. If required, add oil of the correct specification. Remove the filler plug and add oil to the level indicated by the viewing port.
- 6. Close the filler plug.

#### **Related information**

Replacing the feeder gearbox oil (Page 208)



#### 11.7.39 Replacing the feeder gearbox oil



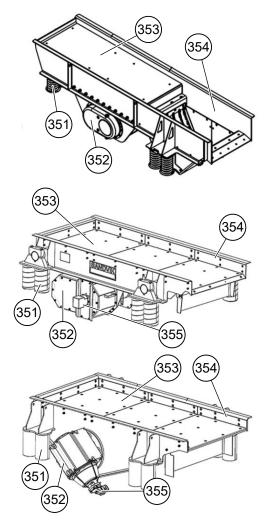
- 1. Make sure that the machine is level prior to replacing the feeder gearbox oil.
- 2. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the feeder gearbox.
- 3. Clean the area around the viewing port (3) and the area around the filler plug (1).
- 4. Do a check of the level of oil in the feeder gearbox. The oil level must reach the viewing port.
- 5. Put an applicable container under the drain port (4). Make sure the area around the port is clean.
- 6. Slowly open the drain port. Open the filler port if required to aid the oil flow out.
- 7. Allow all oil to flush through to the container.
- 8. Close the drain port.
- 9. Add oil of the correct specification. Remove the filler plug and add oil to the level indicated by the viewing port (3).
- 10. Close the filler plug.
- 11. Wipe up all spills.
- 12. Discard the contaminated materials to local environmental regulations.

#### **Related information**

Doing a check of the feeder gearbox oil level (Page 207)



#### 11.7.40 Doing a check of the springs (feeder)



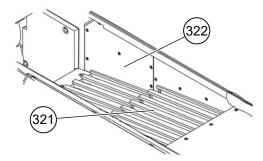
- 1. Identify the type of Sandvik feeder on the machine.
- 2. Do a visual inspection of all springs (351) that used to support the vibrating feeder.
- 3. Make sure that all springs are intact and are not worn, distorted or compressed. Replace damaged springs if necessary.

### 11.7.41 Doing a check of the condition of the feeder wear plates (liners)

- 1. Do a check of the condition of the feeder wear plates. Make sure that worn plates are replaced.
- 2. Make sure that all bolts are installed and tightened to the correct torque.

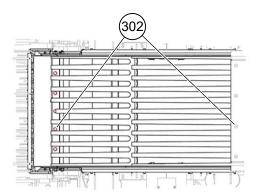


#### 11.7.42 Doing a visual inspection of the grizzly bars for wear, damage or blockages



- 1. Do a visual inspection of the grizzly bars (321).
- 2. Make sure that all bars are free from wear, damage or blockages. Replace the grizzly bars if necessary.
- 3. Remove blockages using suitable pry-bars following a job specific risk assessment.
- 4. Do not use powered equipment to remove blockages from grizzly bars.

#### 11.7.43 Replacing the grizzly bars



- 1.
- 2. Remove dust encapsulation, rubber transitions and external equipment that prevent access to the grizzly.
- 3. Remove wear plates on both sides of the feeder. Cut or remove all screws on both sides of the feeder to remove the plates.
- 4. Remove the rubber element or last steel liner, closest to the grizzly. Remove all screws under the feeder and remove the rubber element or liner.
- 5. Remove all screws holding the grizzly. There are two sets of screws, one at the front and one at the back.
- 6. Attach four applicable lifting straps or chains to the grizzly, two toward the front and two toward the back.
- 7. Use suitable lifting equipment, as defined in a site-specific risk assessment, to lift the grizzly out of the machine. Put the unit on the ground.
- 8. Install the new grizzly using the reverse of these instructions.



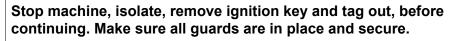
#### 11.7.44 Doing a visual inspection of the toggle plate for cracks, warping or damage

## **⚠ WARNING**

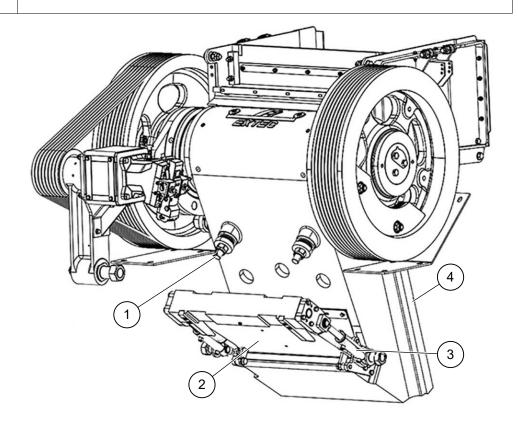




Working on or in close proximity to the machine whilst it is on and or operating could cause serious injury or death.



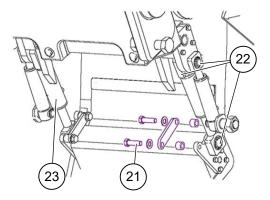




- 1. The jaw crusher is fitted with a toggle plate which operates as an overload protection device. The toggle plate protects the crusher from the excessive loads caused by objects entering the crusher which cannot be crushed. When the permissible loads are exceeded, the toggle plate will collapse from elastic buckling. The crusher will then automatically shut down. This provides a degree of protection to valuable machine components.
- 2. Do a visual inspection of the toggle plate (2) for cracks, warping or damage.

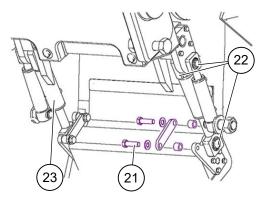


#### 11.7.45 Doing a check of the toggle plate hydraulic cylinders for damage, wear or dirt



- 1. Manually remove all dirt and loose material from the assembly. Do a check to ensure all components are free from dirt and loose material.
- 2. Do a check of the toggle plate hydraulic cylinders (23) for damage, wear or dirt.
- 3. Do a check of the pivot points and linkages for wear.
- 4. Apply a light coating of the recommended grease to the exposed surfaces of the hydraulic cylinder rods.

#### 11.7.46 Doing a visual inspection of the toggle hydraulic cylinder bearings



- 1. Do a check of the toggle hydraulic cylinder bearings (22) for damage, wear or dirt.
- 2. Do a check that the sealed bearing are intact and that there are no signs of wear or damage.

#### **Related information**

Replacing the toggle clamp hydraulic cylinder bearings (1000 hours) (Page 213)



#### 11.7.47 Replacing the toggle clamp hydraulic cylinder bearings (1000 hours)

## **⚠ WARNING**

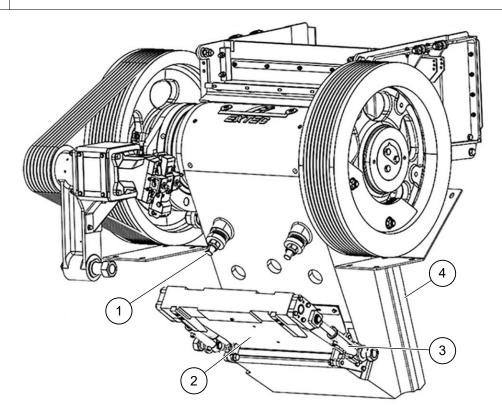
#### **FALLING EQUIPMENT HAZARD**





The fastening of loads and instructing or guiding of crane operators. should be entrusted to qualified persons only. NEVER work or stand under suspended loads as serious injury or death may occur.

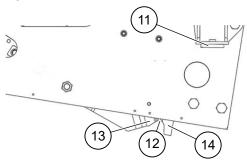
The observer providing instructions must be within sight or sound of the operator and positioned to have an all round view of the operation. ALWAYS make sure safety device such as locking wedges, securing chains, bars, or struts are utilized as indicated in throughout this manual. Make sure that part of the equipment raised for reason is prevented from falling by securing it in a safe reliable manner. Never work alone.



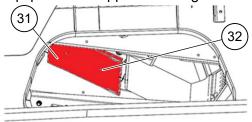
- 1. The jaw crusher is fitted with a toggle plate (2) which operates as an overload protection device. The toggle plate protects the crusher from the excessive loads caused by objects entering the crusher which cannot be crushed. When the permissible loads are exceeded, the toggle plate will collapse from elastic buckling. The crusher will then automatically shut down. This provides a degree of protection to valuable machine components.
- 2. Do a visual inspection of the toggle plate for cracks, warping or damage.
- 3. Remove the jaw lower curtains.



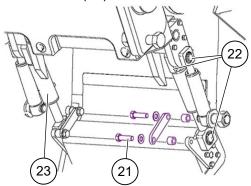
- 4. Start the engine in manual mode.
- 5. Adjust the jaw closed size setting (CSS) (12) to approximately 30 to 40mm.



- 6. Stop the engine. Lockout and tagout the machine.
- 7. Use applicable lifting equipment, as defined in a site-specific risk assessment, to connect to the toggle plate holes (32). Use the lifting equipment to support the weight of the toggle plate by lifting it slightly.



8. Remove the bolts, washers and spacers on both sides of the toggle mechanism (21).



- 9. Remove both tie bars.
- 10. Temporarily remove the locking screw from the jaw eject control valve on the hydraulic control block in the hydraulic cabinet.
- 11. Put the lever into position on the jaw eject control valve.
- 12. Start the engine.
- 13. Start the auxiliary hydraulic system.
- 14. Push the toggle valve to release the toggle plate.
- 15. Lower the toggle plate and remove the toggle plate through the clearance between the main conveyor and the crusher.
- 16. Do a visual inspection of the toggle clamp and toggle ram bearings (22) for cracks. Replace any parts as necessary.



- 17. Use applicable lifting equipment, as defined in a site-specific risk assessment, to connect to the toggle ram assembly (22). Use the lifting equipment to support the weight of the toggle ram assembly by lifting it slightly.
- 18. Remove the bolts holding the toggle ram assembly in place.
- 19. Lower the toggle ram assembly and remove the toggle assembly through the clearance between the main conveyor and the crusher.
- 20. Repeat these steps to remove the toggle ram assembly on the other side of the crusher.
- 21. Use applicable equipment to remove the bearings from the toggle ram assembly and replace as necessary.

#### **Related information**

<u>Doing a visual inspection of the toggle hydraulic cylinder bearings</u> (Page 212)

#### 11.7.48 Doing a visual inspection of the crusher chamber for wear or damage

## **A** DANGER



#### **ENTANGLEMENT HAZARD**

Working near a machine in operation could cause death or serious injury.

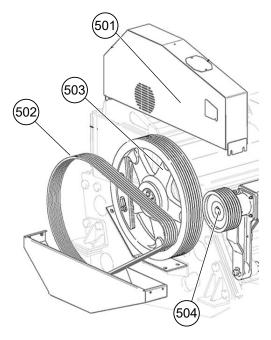


Set the ignition switch to 'OFF' and do the Lockout-Tagout procedure before you work near the machine. Do not wear loose clothes or jewellery when near the machine. Keep long hair away from components. Always use approve Personal Protective Equipment. Never operate the machine with safety devices, guards or decals removed or unsecured.

- 1. Do a visual inspection of the crusher chamber for wear or damage.
- Do a check on all tool surfaces, wear plates, fasteners and exposed components. Replace or repair any damaged or worn surfaces or components.







- 1. Open the drive belt guards (501).
- 2. Do a visual inspection of the drive belts (502) for (i) the condition of the belts, (ii) the tension in the belts, (iii) the tracking of the belts on the pulley.
- 3. Replace or adjust the belts as required.

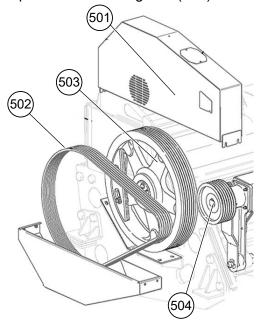
#### **Related information**

<u>Adjusting the crusher drive belt tension (QJ)</u> (Page 217) <u>Replacing the crusher drive belt (QJ)</u> (Page 219)

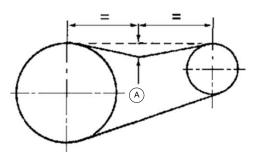


## 11.7.50 Adjusting the crusher drive belt tension (QJ)

- 1. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the belt drive guard.
- 2. Open the belt drive guard (501).



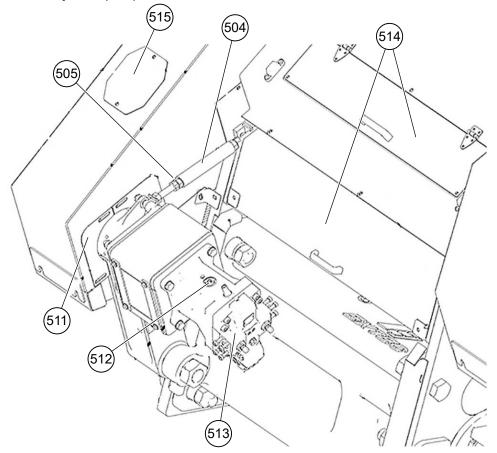
3. Read the belt tension table for the required settings.



4. Do a check on the tension in the belt (502).



5. Adjust the tension in the belt by loosening the locking nuts (505) on the tension adjuster (504).



- 504 Tension adjuster
- 505 Locknut
- 511 Sliding guards
- 512 Oil fill port
- 513 Hydraulic motor
- 514 Upper and lower crusher guards
- 515 Inspection plate
- 6. Increase or decrease the tension in the belts using the tension adjuster.
- 7. After each adjustment, do a check on the tension in the belts.
- 8. Continue adjusting the tension as necessary until the belts are set at the required tension.
- 9. Tighten the locking nuts on the tension adjuster.
- 10. Close the inspection door.

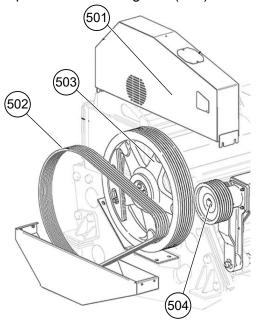
#### **Related information**

Doing a visual inspection of the crusher drive belts (QJ) (Page 216)

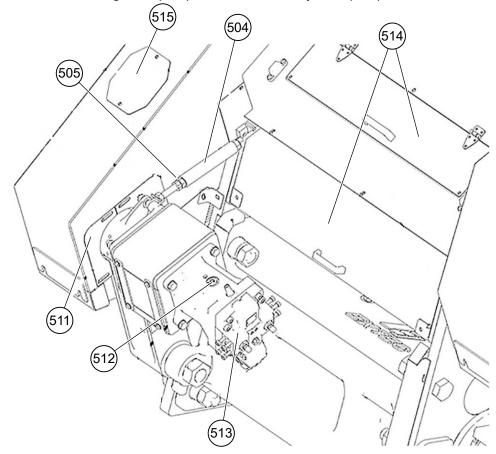


## 11.7.51 Replacing the crusher drive belt (QJ)

- 1. Use an applicable access platform as defined in a site-specific risk-assessment to access the drive belt.
- 2. Open the drive belt guard (501).



3. Loosen the locking nuts (505) on the tension adjuster (504).



4. Decrease the tension in the belts (502) using the tension adjuster.

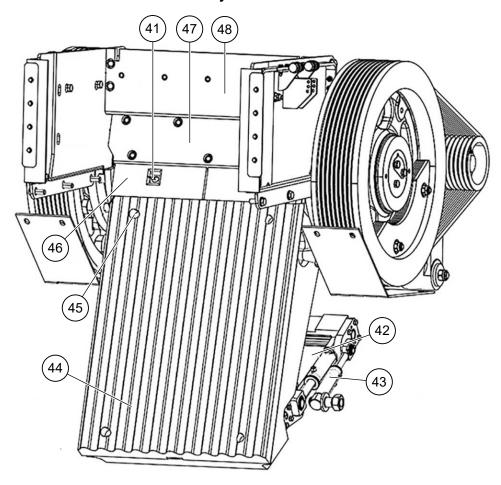


- 5. Remove the old belts.
- 6. Install the new belts around the pulleys.
- 7. Tension the belts.

#### **Related information**

Doing a visual inspection of the crusher drive belts (QJ) (Page 216)

## 11.7.52 Doing a check of the wear on the crusher jaws



- 41 Jaw fastener
- 42 Toggle plate
- 43 Hydraulic cylinder
- 44 Jaw
- 45 Lifting hole
- 46 Wedge
- 47 Wear plate
- 48 Wear plate



- 1. Do a check for wear and damage on the jaw plate teeth (44).
- 2. If the tooth height of a part of the jaw plate is reduced by 30%, reverse the jaw plate. The jaw plate can also be reversed to balance the amount of wear at either end of the jaw plate.
- 3. Read the instructions on how to reverse the jaw plate.
- 4. If the tooth height at the bottom of the jaw plate is almost down to the root, reverse the jaw.
- 5. Change the jaw before the tooth is worn down to the root.

## 11.7.53 Doing a check of the condition of the crusher wear plates (liners)

- 1. Do a check of the condition of the crusher wear plates. Make sure that worn plates are replaced.
- 2. Make sure that all bolts are installed and tightened to the correct torque.

#### 11.7.54 Making sure the crusher chamber is free of blockages

- 1. Do a check to make sure that the crusher chamber is free of blockages.
- 2. Read the safety procedures contained in this manual for details on how to safely clear a crusher blockage.
- 3. Only use pry-bars or other hand tools to remove any blocked or accumulated material. Do not use powered tools to remove material. Installed hydraulic breaker booms should only be used to break material that is bridging in the crusher.

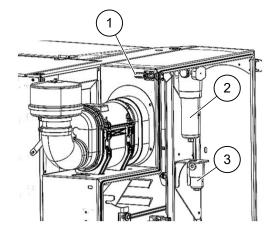
#### 11.7.55 Doing a check of the crusher box front and rear beam fixing bolts

- 1. Do a check of the crusher box beam fixing bolts using a suitable torque measurement tool.
- 2. Check and tighten as required. Read the bolt torque chart accompanying this manual.

#### 11.7.56 Doing a check of the bolts that secure the wear plates (liners)

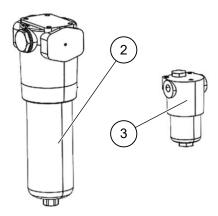
1. Do a check of the bolts that secure the wear plates (liners). Make sure that all bolts are installed and tightened to the correct torque.

#### 11.7.57 Replacing the high-pressure oil filter



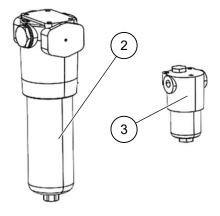


- 1. The high-pressure filter is installed on the powerpack. Locate and identify the filter (2) to be changed. Open the guards (1).
- 2. Put an applicable container under the filter housing.
- 3. Clean around the filter housing (2).



- 4. Remove the filter housing. Make sure any pressure in the system is carefully released.
- 5. Install the new filter and secure into place.
- 6. Repeat this procedure for all high-pressure oil filter.
- 7. Do a check of the hydraulic oil level and fill as required.
- 8. Start the engine.
- 9. Operate the machine until the hydraulic oil is at the correct temperature.
- 10. Stop the engine. Lockout and tagout the machine.
- 11. Do a check that the hydraulic oil level is correct. Fill as required.
- 12. Do a check for oil leaks from the filter.
- 13. Discard the contaminated materials to local environmental regulations.

#### 11.7.58 Replacing the charge oil filter



- 1. The charge filter is installed onto the powerpack. Locate the filter (3) to be changed. Open the guards.
- 2. Put an applicable container under the filter housing (3).



- 3. Clean around the filter housing.
- 4. Remove the filter housing. Make sure any pressure in the system is carefully released.
- 5. Install the new filter and secure into place.
- 6. Discard the contaminated materials to local environmental regulations.

#### 11.7.59 Doing a check of the springs (pre-screens)

# **⚠ WARNING**



### **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 starting maintenance procedures. Make sure all guards are in place and secure.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.

# **⚠ WARNING**

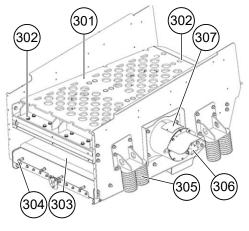


#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



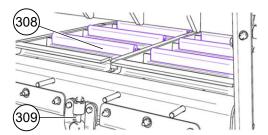
When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.



1. Do a check of the springs (305) to make sure they are present and not damaged.



## 11.7.60 Doing a check of the pre-screen capping rubbers



- 1. Do a check of the condition of the pre-screen capping rubbers (308) supporting the screening media.
- 2. Replace the capping rubbers if they are worn or damaged.

### 11.7.61 Doing a check of the pre-screen drive coupling

# **⚠ WARNING**



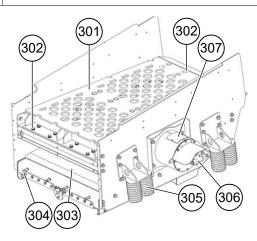
#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.



- 1. Open the viewing port on the pre-screen drive housing (307).
- 2. Do a check of the condition of the coupling for wear and damage.
- 3. Close the viewing port on the pre-screen drive housing.



## 11.7.62 Doing a check of the tension in the screen meshes (pre-screen)

# **⚠ WARNING**



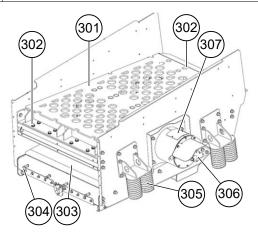


Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.



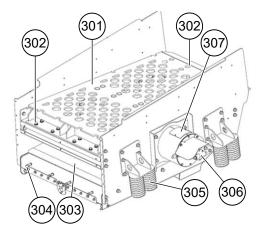
- 1. Do a check of the condition of each screen mesh (303) before additional tension is applied. Do not increase the tension in the mesh if it is damaged or excessively worn.
- 2. Use the mesh tensioning mechanism (304) to increase or decrease the tension in the mesh. Adjust the tension slowly while monitoring the effect of the adjustment on the mesh.
- 3. Make sure that the tensioned mesh evenly contacts all cross-bars and is tight against the capping rubber.

#### **Related information**

Doing a check on the wear and condition of the screen meshes (Page 226)



## 11.7.63 Doing a check on the wear and condition of the screen meshes

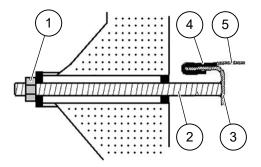


- 1. Do a check of the wear and condition of the screen meshes (303).
- 2. Do a check that all mesh apertures are intact and that there are no broken elements.
- 3. Replace the screen meshes if they are worn or damaged. The screen meshes are worn when they fail to screen to the required specification. Oversized particles will start to appear in the material.

#### Related information

Doing a check of the tension in the screen meshes (pre-screen) (Page 225)

#### 11.7.64 Adjusting the mesh tension (threaded nut type)



- 1. Use the threaded nut (1) to adjust the tension in the mesh (5).
- 2. Take a note of which direction to turn the threaded nut to increase the tension in the mesh.
- 3. Take a note of which direction to turn the threaded nut to decrease the tension in the mesh.
- 4. Increase or decrease the tension according to requirements.



## 11.7.65 Doing a check of the torque on the grizzly bar bolts

# **⚠ WARNING**



**OPERATING MACHINE HAZARD** 

Being positioned on an operating machine could cause death or serious injury.

Do not work on or near to the machine unless it is stopped.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.

# **MARNING**



#### **FALLING HAZARD**

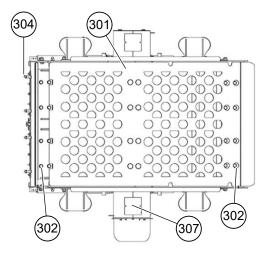
Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

1. Make sure that the grizzly bars are fastened securely and the bolts are tightened to the correct torque.

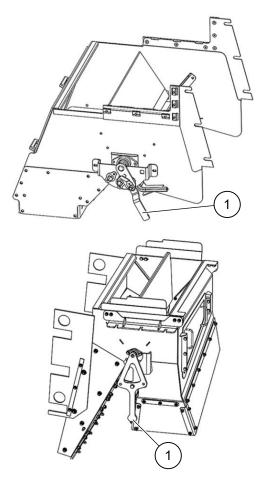
### 11.7.66 Doing a visual inspection of the pre-screen/grizzly bolts



1. Make sure that all bolts are present and set to the correct torque on the pre-screen bolts (302) for grizzly bars or upper deck (301).



## 11.7.67 Doing a visual inspection of the diverter chute, rubber skirting and wear plates



- 1. Do a visual inspection on the condition of the diverter chute. Make sure that all fabricated panels are intact and all fasteners are present. Check the handle (1) function.
- 2. Do a check that the internal diverter plate is not excessively worn by checking it meshes correctly with the chute walls. Do a check that the bearings are intact and function correctly.
- 3. Do a visual inspection of the rubber skirting.
- 4. Do a visual inspection of the wear plates (option) around the diverter chute.

# 11.8 Service procedures

The following procedures describe procedures which should be done as and when required. If in doubt, contact your local Sandvik representative.

### 11.8.1 Crusher belt tensioning table (QJ341)

Device	Method	New belt	Existing belt
Load tension gauge	Load at span center	125N (28lbf)	125N (28lbf)
Deflection tension gauge	Deflection at 'A'	17mm (0.7in)	20.6mm (0.8in)



Additional deflection value per 1m of belt		4mm (0.16in)	3mm (0.12in)
Optibelt - TT tension tester	Acoustic frequency	38.19Hz	9.11Hz
Optibelt - Optikrik II tension tester	Static tension per belt	1090N (245lbf)	839N (189lbf)

## 11.8.2 Greasing table (QJ341)

The following table gives guidelines on grease application for machines operating under typical conditions. If necessary, contact Sandvik for guidelines on how to identify the optimum greasing requirements for your intended processing conditions.

Subassembly	Number (pins)	Amount (g)	Frequency	Comments
Main conveyor	3	2.5	Daily	
Natural fines	3	2.5	Daily	
Torque arm				Autogreaser
Jaw crusher				Autogreaser
Feed conveyor				None
Magnet belt	4	2.5	Daily	
Prescreen	2	16	40 hours	
Pan-feeder motor	2	35	2000 hours	

Only apply grease which has been approved by Sandvik. Read the fluid and lubricants table included in this manual for details on the correct grease specification to use. Using the incorrect grease will invalidate the warranty.

Do not use grease that contains molybdenum. Grease that contains molybdenum can cause damage to parts and will invalidate the warranty.

#### **Related information**

**Greasing the bearings** (Page 206)

#### Increasing the frequency of maintenance under severe operating conditions

- These maintenance instructions are given for typical operations of up to 8 hours per day, 5 days per week (40 hours per week). Periodic maintenace can be completed within the shift or outside the shift by qualified and experienced personnel with an exception for vibrating component bearings which require a Sandvik approved technician. Typical operating conditions are considered to be in the range -10 to +50 degrees Celsius ambient.
- 2. Severe operating conditions require more frequent maintenance to both the machine and the engine.

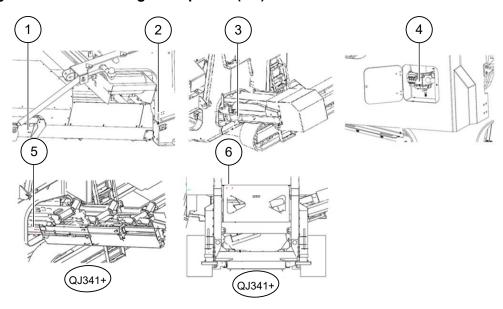


- 3. Severe operating conditions (also known as adverse conditions) include: frequent stopping and starting of the machine, leaving the engine idle for long periods of time, extremes of environmental temperatures, operating the machine for long shifts (in excess of 10 hours per day), operating the machine for long hours each week (in excess of 50 hours per week), and, operating the machine in corrosive environments.
- 4. Read the engine manual that accompanies the machine for information on engine service requirements under severe operating conditions.
- 5. Contact your local Sandvik representative for further information on machine service requirements under severe operating conditions.

#### **Related information**

**Greasing the bearings** (Page 206)

#### 11.8.3 Identifying the main machine grease points (QJ)



- 1 Main conveyor grease points
- 2 Magnet grease points
- 3 Side conveyor grease points
- 4 Autolubrication
- 5 Extended side conveyor grease points (if fitted)
- 6 Prescreen grease points (QJ341+ only)

Look at the machine and the illustrations to identify the main machine grease points.



## 11.8.4 Accessing grease nipples locations

- 1. Read the accompanying tables and illustrations to identify the locations of the grease nipples on the machine.
- 2. Make sure the machine and auxiliary functions are positioned to enable access to the grease nipples.
- 3. Make sure the machine is locked out and tagged out before grease is applied to the grease nipples.
- 4. Do a task specific risk assessment before grease is applied to the grease nipples. Make sure that any stored energy in conveyors is released or safeguarded against.

#### 11.8.5 Applying a protective layer of grease on exposed surfaces

 Make sure that all exposed metallic surfaces that are not protected by paint, electrodeposited coatings or polymeric coatings are lightly greased with a general-purpose grease.

#### 11.8.6 Greasing the conveyor(s)

- 1. Grease each conveyor with the recommended quantity and type of grease.
- 2. Make sure that all bearings on the conveyor are correctly lubricated.
- 3. Read the related table for quantities and types of grease to use. Read the related table and illustrations for the locations at which to apply the grease.

#### 11.8.7 Cleaning off any excess grease

- 1. Do a check that all greased components and points are sufficiently greased.
- 2. Clean off any excess grease and apply new grease as necessary.

## 11.8.8 Accessing maintenance display screens



- 1. Push button [6] on the main menu to access the maintenance display screens
- 2. Enter the 4-digit security code which is available from your Sandvik representative. Use the numbered buttons on the side of the screen. Each button number is equivalent to entering its number on the screen.



- 3. Push the [OK] button when the code has been entered.
- 4. Access is granted when the correct code has been entered. If the incorrect code is entered, access will be denied for 60 seconds.
- 5. When the maintenance screens have been accessed, the warning siren and flashing beacon activate and there is a 10 second delay before any function can be operated.

#### 11.8.9 Doing a visual inspection of electrical connectors and cables

- 1. Do a visual inspection on all electrical connectors and cabling to make sure that they are free from dirt, damage and corrosion, are dry, sufficiently insulated and correctly connected.
- 2. Read the electrical schematics included in the Operator's Manual for details on the cable connections.

### 11.8.10 Accessing the diagnostic display screens



- 1. Push and hold the [OK] button on the main menu to access the diagnostic display screens.
- 2. Push the [OK] button to return to the main menu.

# 11.8.11 Doing a check of all display screens and protective screens on cameras, sensors etc.

- 1. Do a check that all plastic protective screens on cameras, sensors and displays are clean and intact
- 2. Replace or repair damaged screens

#### 11.8.12 Cleaning the machine

- 1. Clean all dirt and loose material from the machine. Do a check inside the powerpack, cabinets and storage areas to ensure that they are free from dirt and loose material.
- 2. Before the machine is washed with water or a high-pressure cleaner, make sure that all electrical systems or sensitive surfaces and components are protected from water.
- 3. After the machine is washed, do a check that all exposed metallic surfaces, hydraulic cylinder rods, grease points and slides to ensure that they are sufficiently greased.



## 11.8.13 Doing a check of the software function

- Read the section on Controls in the machine manual and do a check to make sure that each display screen software function operates correctly.
- 2. Troubleshooting and repair of all functions must only be done by a Sandvik approved person. This must be done annually.
- 3. Do not operate the machine if there is a fault.

#### 11.8.14 Doing the electrical inspection

- 1. Read the electrical schematics and spare parts list included in the Operator's Manual for details on the cable connections, electrical components and systems on the machine.
- 2. Make sure that all functions are tested to ensure safe operation. Start the machine without material on the machine and do a check that each function starts/stops and operates correctly. If a machine function does not start or is not functioning correctly, stop the machine, and, lock-out and tag-out the machine. Notify a suitably qualified electrical technician to troubleshoot/repair the machine. Do not operate the machine in production.
- 3. Do a visual inspection of all electrical switches, lights and indicators. If a switch, light or indicator is damaged or not functioning correctly, lock-out and tag-out the machine. Notify a suitably qualified electrical technician to troubleshoot/repair the machine. Do not operate the machine in production.
- 4. Do a visual inspection on all electrical connectors and cabling to make sure that they are free from dirt, damage and corrosion, are dry, sufficiently insulated and correctly connected. If any electrical connectors or cabling is damaged or wet, lock-out and tag-out the machine. Notify a suitably qualified electrical technician to troubleshoot/ repair the machine. Do not start the machine.

#### Related information

Information and datasheets (Page 287)

#### 11.8.15 Replacing the pre-screen capping rubbers and mesh

# **⚠ WARNING**



#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.

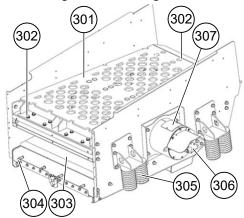


When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

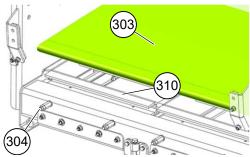
Make sure that the lockout procedure is completed before the start of the maintenance procedures.



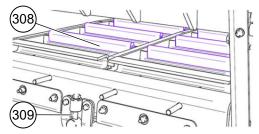
- 1. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the pre-screen.
- 2. Clean all debris and compacted dust from the mesh tensioning mechanism (304), the hook and the support bars.
- 3. Do a check on the tensioning mechanism to ensure the correct method is used. Decrease the tension evenly across the mesh (303) by alternating the loosening of the tensioning mechanisms.



4. Unhook the mesh from the tension bar and mesh hook (310).



- 5. Remove the mesh from the machine. Use suitable lifting equipment, as defined in a site-specific risk-assessment, to lift the mesh out of the machine.
- 6. Replace the capping rubbers (308) as required. Make sure that all rubbers are even.



- 7. Install the new mesh. Use suitable lifting equipment, as defined in a site-specific risk-assessment, to lift the mesh into the machine.
- 8. Tighten the tensioning mechanism alternately in small steps. Make sure that the hook strips locate evenly on the hook plates.
- 9. Adjust the mesh until it is sufficiently tensioned.



#### 11.8.16 Replacing the pre-screen springs

# **⚠ WARNING**



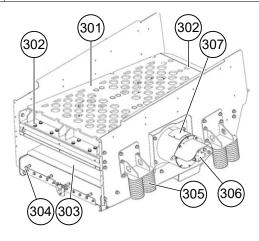
#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.



- 1. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the pre-screen lifting eyes.
- 2. Use an applicable crane with suitably rated lifting tackle to lift the screen enough that the spring and spring cover (305) become loose. Use an observer to monitor the other side of the machine.
- 3. Pull the springs out horizontally.
- 4. Change the spring guides if necessary. Put the new spring guides in position on the spring support retainer.
- 5. Put the new springs on top of the lower spring guide on the spring support retainer. Put the spring covers over the spring.
- 6. Put the upper spring guide in position at the top of the spring.
- 7. Make sure all the spring supports will enter the springs.
- 8. Slowly lower the pre-screen until it rests completely on the springs.
- 9. Do a check of the condition of the spring cover.



## 11.8.17 Replacing the screen mesh (pre-screen)

# **WARNING**



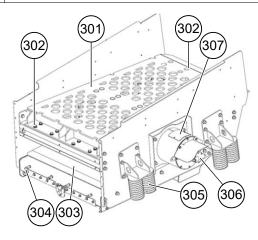
#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.



- 1. Loosen the tension bar locking nuts (304) to decrease the mesh (303) tension.
- 2. Remove the mesh.
- 3. Do a check of the capping rubber.
- 4. Install the new mesh.
- 5. Tighten the tension bar locking nuts evenly.

#### 11.8.18 Replacing the upper screen

# ⚠ WARNING



#### **FALLING HAZARD**

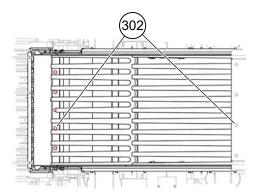
Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

Make sure that the lockout procedure is completed before the start of the maintenance procedures.





- 1. Do a check that the hopper sides are in their lower position.
- 2. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the pre-screen upper screen.
- 3. Clean all dirt and compacted dust from the upper screen and retaining bolts (302).
- 4. Attach suitable lifting equipment to the upper screen as defined in a site-specific risk assessment. Attach four applicable lifting straps or chains to the screen, two toward the front and two toward the back.
- 5. Remove the end rubber to access the upper screen attachment nuts.
- 6. Remove the nuts, bolts and spacers.
- Use suitable lifting equipment, as defined in a site-specific risk assessment, to lift the upper screen out of the machine. Move the screen forward to clear the feeder. Lift it clear and put the unit on the ground.
- 8. To reinstall the upper deck, follow these instructions in reverse.

### 11.8.19 Doing a check on all bearings for damage or wear

- 1. Do a check of all bearings for damage or wear.
- 2. Replace damaged bearings.
- 3. Make sure that lubrication lines fitted to bearings function correctly.

#### 11.8.20 Doing a check that all safety decals are present and are not damaged

- 1. Do a check that all safety decals are present. Read the list of decals printed in the machine manual.
- 2. Replace any damaged decals. Replacement decals may be ordered from Sandvik.

#### Related information

QJ341+ decal locations (Page 48)

### 11.8.21 Doing a check that the tank breather vents are not blocked

1. Do a check that the tank breathers vents are not blocked. Clean or replace as necessary.



# 11.8.22 Doing a visual inspection of all grease autolubrication hoses for damage, wear or kinks (option)

- 1. Read the autolubrication manual supplied with your machine for details on how to maintain the autolubrication system.
- 2. Do a visual inspection of all grease autolubrication hoses for damage, wear or kinks.

#### 11.8.23 Doing the maintenance for the grease autolubrication system (option)

- Read the autolubrication manual supplied with your machine for details on how to maintain and fill the autolubrication system. The grease pump delivery rate is set by the factory during manufacture and should not be adjusted.
- 2. Read the machine manual for details of the recommended grease.

#### Related information

Information and datasheets (Page 287)

#### 11.8.24 Doing a visual inspection of the magnet belt

# WARNING



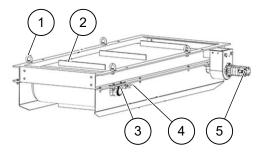
#### FLYING MATERIAL HAZARD, MAGNET HAZARD

Material will exit from height from all conveyors and ferrous material will exit from the magnet chute which may cause injury or death.



Strong magnetic field on the magnet conveyor. Do not go near it if you have a pacemaker as this may cause death.





- 1. Use an applicable access platform, as defined in a site-specific risk-assessment, to access the magnet belt (2).
- 2. Do a visual inspection of the magnet belt to make sure it is not damaged. Rotate the belt to do a check of all operating surfaces.

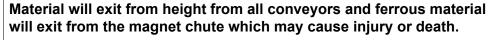


### 11.8.25 Doing the magnetic separator maintenance

# **⚠ WARNING**



## FLYING MATERIAL HAZARD, MAGNET HAZARD

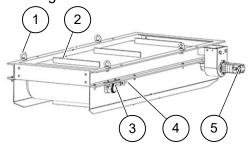


Strong magnetic field on the magnet conveyor. Do not go near it if you have a pacemaker as this may cause death.





- 1. Read the magnet Original Equipment Manufacturer's maintenance instructions for the complete maintenance information.
- 2. Use a suitable access platform, as defined in a site-specific risk assessment, to access the magnetic separator.
- 3. Remove any pieces of metal attached to the magnet. Do a check to make sure that pieces of metal are not trapped between the belt (2) and the magnet.



- 4. Do a check on the tension in the belt. Adjust the belt if required. The tension mechanism (3) is located on the tail drum.
- 5. Do a check that the conveyor belt is centered on the drums.

#### 11.8.26 Making sure that the hydraulic couplings are secure and free from leaks

- To check for hydraulic fluid leaks, do a visual inspection of the ground below and around the machine. Make sure there are no oil spillages present.
- 2. Start the engine and start the screening or crushing (as applicable) operation.
- 3. Allow the machine to operate for 20 minutes.
- 4. After 20 minutes, stop the operation and move the machine out of the area.
- 5. Stop the engine. Lockout and tagout the machine.

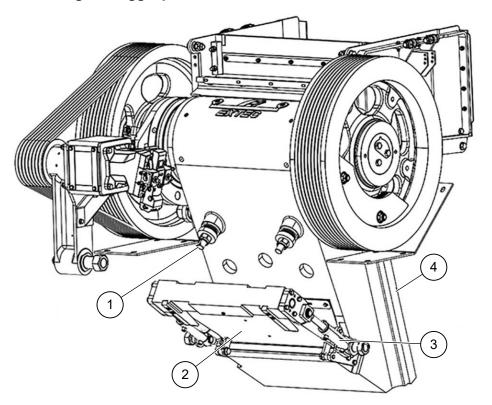


- 6. Do a visual inspection that all hydraulic couplings are secure and free from leaks.
- 7. Do a visual inspection of the ground area which the machine operated in for leaks.

#### 11.8.27 Doing a check of the crusher inlet chute

- 1. View the crusher inlet from the maintenance platform.
- 2. Do a check that the crusher inlet chute is free from wear or damage.
- 3. Do a check that all bolts that hold the crusher inlet chute in place are present and at the correct torque.

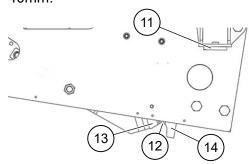
#### 11.8.28 Replacing or removing the toggle plate



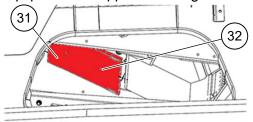
- 1. The jaw crusher is fitted with a toggle plate (02) which operates as an overload protection device. The toggle plate protects the crusher from the excessive loads caused by objects entering the crusher which cannot be crushed. When the permissible loads are exceeded, the toggle plate will collapse from elastic buckling. The crusher will then automatically shut down. This provides a degree of protection to valuable machine components.
- 2. Do a visual inspection of the toggle plate for cracks, warping or damage.
- 3. Remove the jaw lower curtains.
- 4. Start the engine in manual mode.



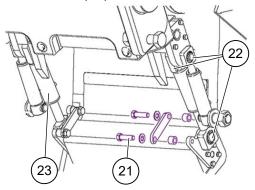
5. Adjust the jaw closed size setting (CSS) (12) to approximately 30 to 40mm.



- 6. Stop the engine. Lockout and tagout the machine.
- 7. Use applicable lifting equipment, as defined in a site-specific risk assessment, to connect to the toggle plate holes (32). Use the lifting equipment to support the weight of the toggle plate by lifting it slightly.



8. Remove the bolts, washers and spacers on both sides of the toggle mechanism (21).



- 9. Remove both tie bars.
- 10. Temporarily remove the locking screw from the jaw eject control valve on the hydraulic control block in the hydraulic cabinet.
- 11. Put the lever into position on the jaw eject control valve.
- 12. Start the engine.
- 13. Start the auxiliary hydraulic system.
- 14. Push the toggle valve to release the toggle plate.
- 15. Lower the toggle plate and remove the toggle plate through the clearance between the main conveyor and the crusher.
- 16. Do a visual inspection of the toggle clamp and toggle ram bearings (22) for cracks. Replace any parts as necessary.



## 11.8.29 Doing a check of the torque for the crusher hammer/jaw retaining bolts

1. Do a check of the torque for the crusher hammer/jaw retaining bolts and tighten as necessary.

#### 11.8.30 Preparing to remove the jaw plates

# WARNING

## FALLING EQUIPMENT HAZARD





The fastening of loads and instructing or guiding of crane operators. should be entrusted to qualified persons only. NEVER work or stand under suspended loads as serious injury or death may occur.

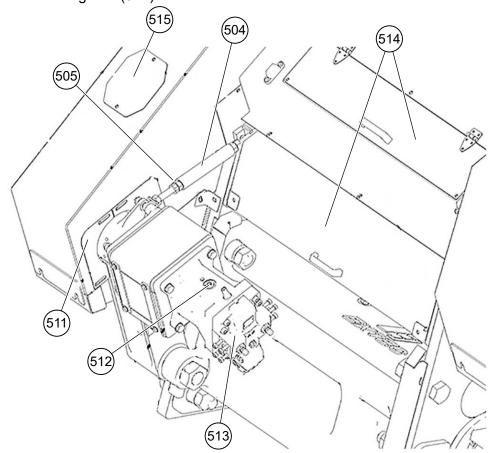
The observer providing instructions must be within sight or sound of the operator and positioned to have an all round view of the operation. ALWAYS make sure safety device such as locking wedges, securing chains, bars, or struts are utilized as indicated in throughout this manual. Make sure that part of the equipment raised for reason is prevented from falling by securing it in a safe reliable manner. Never work alone.

# Always do a site specific risk assessment before doing all maintenance procedures.

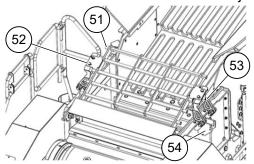
- Start the engine in manual crushing mode. Operate the conveyor if necessary to make sure that all material has been discharged off the conveyor.
- 2. Open the jaw plates gap fully by adjusting the closed side setting (CSS) to the maximum setting.
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Clean around the jaw area and remove any dirt or compacted material.



5. Remove the guard (514).



- 6. Remove the cover-plate above the jaw (514).
- 7. Remove the lower curtains below the jaw.
- 8. Remove the bolts and fold back the jaw inlet guard (51).



9. Do a check that the jaw is clean and free from dirt. Remove any dirt from the wedges, lifting holes and bolting holes.



### 11.8.31 Removing the fixed jaw

# **⚠ WARNING**

## FALLING EQUIPMENT HAZARD





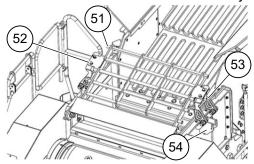
The fastening of loads and instructing or guiding of crane operators. should be entrusted to qualified persons only. NEVER work or stand under suspended loads as serious injury or death may occur.

The observer providing instructions must be within sight or sound of the operator and positioned to have an all round view of the operation. ALWAYS make sure safety device such as locking wedges, securing chains, bars, or struts are utilized as indicated in throughout this manual. Make sure that part of the equipment raised for reason is prevented from falling by securing it in a safe reliable manner. Never work alone.

Always do a site specific risk assessment before doing all maintenance procedures.

If there are problems reported when changing the jaw plates according to this procedure, contact Sandvik for further guidance.

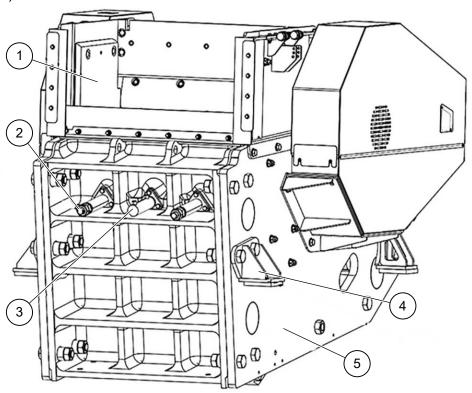
- 1. Start the engine in manual crushing mode.
- 2. Open the jaw plates fully by adjusting the closed side setting (CSS) to the maximum setting.
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Clean around the jaw area and remove any dirt or compacted material.
- 5. Remove the guard.
- 6. Remove the cover-plate above the jaw.
- 7. Remove the lower curtains below the jaw.
- 8. Remove the bolts and fold back the jaw inlet guard (51).



9. Do a check that the jaw is clean and free from dirt. Remove any dirt from the wedges, lifting holes and bolting holes.



10. Loosen and remove the locking nuts and retaining nuts from the bolts (2).



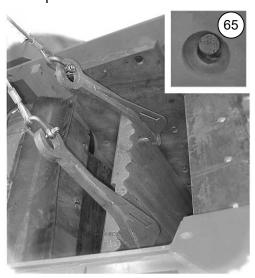
- 11. Remove the bolts by pushing them out from the back of the fixed jaw plate. Do not enter the crushing chamber.
- 12. Attach the jaw lifting device (61-63) to suitable lifting equipment as defined in a site-specific risk assessment.



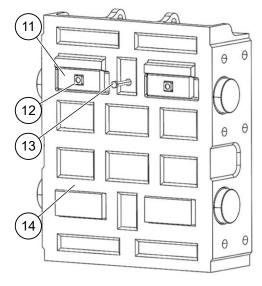
13. Remove any dirt and loose material from the sides of the fixed jaw.



14. Put the jaw lifting devices in position in the jaw lifting holes (65). Make sure they are installed correctly, are central to the jaw plate and vertical to the point of lift.



- 15. Install the lever to the jaw eject control valve. The lever is stored in the toolbox.
- 16. Start the engine.
- 17. Activate the auxiliary hydraulic system.
- 18. Pull the lever to activate the jaw release hydraulic cylinder (3) which will bring the jaw forward.
- 19. Stop the engine. Lockout and tagout the machine.
- 20. Slowly lift the jaw up and out of the machine. When the jaw plate is clear of the machine, move it away from the machine to a safe holding location.
- 21. Remove the wedges (11).

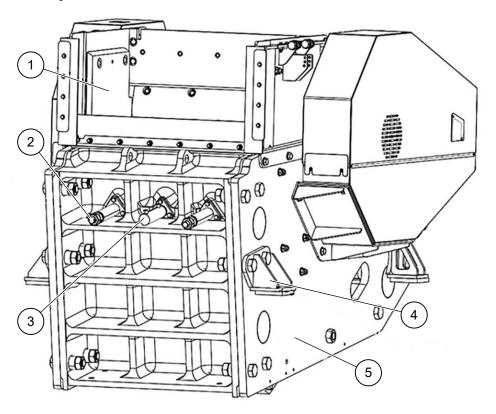


22. Do a check that the jaw release hydraulic cylinder (13) is now fully extended with the fixed jaw plate removed from the crusher.



- 23. Start the engine.
- 24. Push the lever forward to retract the rod into the hydraulic cylinder.
- 25. Remove the lever and place it in the toolbox.

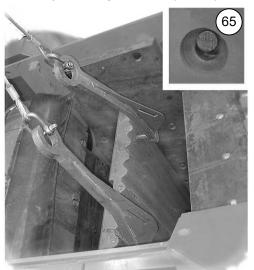
#### 11.8.32 Installing the fixed jaw



- 1. Do a check to make sure that the jaw release hydraulic cylinder (3) is fully retracted. Use the hydraulic control jaw eject lever to retract the cylinder if necessary.
- 2. Clean the main frame to remove any dirt or loose material.
- 3. Do a check on the jaw plate to make sure it is clean and free from dirt particularly in the holes and cavities.



4. Put the jaw lifting devices (61-63) in position in the jaw lifting holes (65).



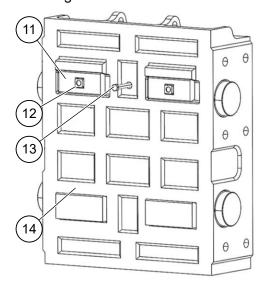
Make sure that they are installed correctly, are central to the jaw plate and vertical to the point of lift. Use suitable lifting equipment as defined in a site-specific risk assessment.



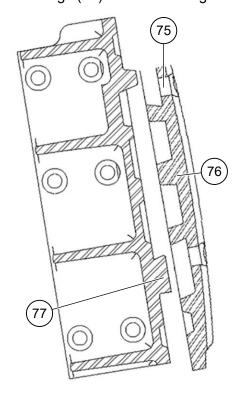
5. Lift the jaw into the vertical position and do a check of the lifting equipment. Do a visual inspection of the jaw lifting tool to make sure that it is secure on the jaw.



6. Install the wedges (11) into position on the jaw. Use an application of grease to keep the wedges in position during the lift. Make sure all personnel are aware the wedges are not fixed to the jaw during the lift. Before the lift is started, do a check that the wedges are not resting on the lifting tool.

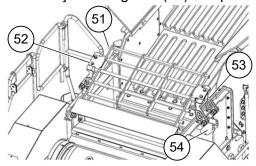


- 7. Lift the jaw and move it into position above the crusher.
- 8. Slowly lower the jaw into position in the crushing chamber. Make sure that there is clearance of 10mm to 15mm on each side of the jaw plate.
- 9. Lower the jaw so that it slides down the jaw crusher face (14). The angled faced recesses in the lower part of the jaw should engage over the two lugs (77) on the crushing chamber face.





- 10. Secure the jaw in position temporarily. Do not enter the jaw crusher as there is a risk the jaw will slip.
- 11. Carefully remove the lifting tool. Do not enter the jaw crusher as there is a risk the jaw will slip.
- 12. Make sure the fixed jaw plate is installed correctly. The two faces must fully contact so that there is no clearance between the bottom of the jaw crusher and the fixed jaw. Use an inspection mirror or camera at a safe distance to perform this inspection.
- 13. Install the securing bolts (12) all the way through the jaw and jaw crusher.
- 14. Install the retaining nuts and lock nuts (2) but do not tighten.
- 15. Adjust the position of the fixed jaw plate as necessary and make sure it is centred.
- 16. Tighten the retaining nuts. The required torque is 5609Nm for 10.9 M42 or 4137 lb-ft.
- 17. Tighten the locknuts.
- 18. Install the jaw lower curtains.
- 19. Fold the jaw inlet guard (51) into position and secure with fasteners.



#### 11.8.33 Removing the swing jaw

# WARNING





#### **FALLING EQUIPMENT HAZARD**

The fastening of loads and instructing or guiding of crane operators. should be entrusted to qualified persons only. NEVER work or stand under suspended loads as serious injury or death may occur.

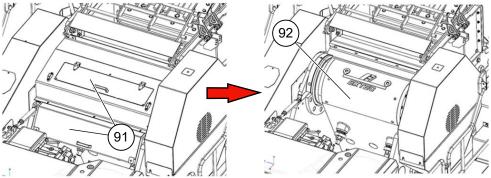
The observer providing instructions must be within sight or sound of the operator and positioned to have an all round view of the operation. ALWAYS make sure safety device such as locking wedges, securing chains, bars, or struts are utilized as indicated in throughout this manual. Make sure that part of the equipment raised for reason is prevented from falling by securing it in a safe reliable manner. Never work alone.



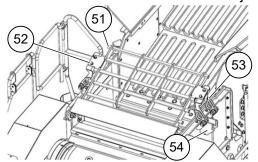
Always do a site specific risk assessment before doing all maintenance procedures.

If there are problems reported when changing the jaw plates according to this procedure, contact Sandvik for further guidance.

- 1. Start the engine in manual crushing mode.
- 2. Open the jaw plates fully by adjusting the closed side setting (CSS) to the maximum setting.
- 3. Stop the engine. Lockout and tagout the machine.
- 4. Clean around the jaw area and remove any dirt or loose material.
- 5. Remove the guard.
- 6. Remove the cover-plate (91) above the swing jaw (92).



- 7. Remove the lower curtains below the jaw.
- 8. Remove the bolts and fold back the jaw inlet guard (51).



- 9. Use suitable lifting equipment, as defined in a site-specific risk assessment, to remove the wear plate.
- 10. Clean around the swing jaw area and remove any dirt or loose material.
- 11. Remove any dirt and loose material from the sides of the fixed jaw.

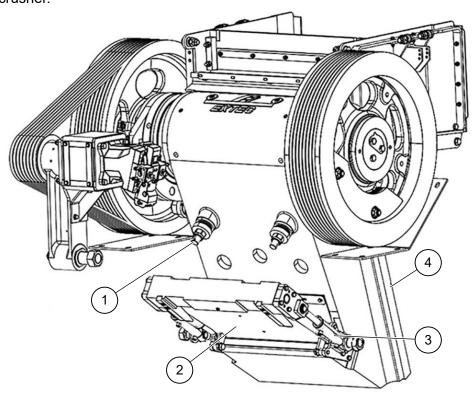


41 47 48 41 47 48 46 45 44 44

12. Remove the wedge nuts (41) on the swing jaw.



13. Remove the wedges (46) and wedge bolts (1) as a complete assembly. Slowly draw out the wedge bring the bolt with it. Do not enter the crusher.

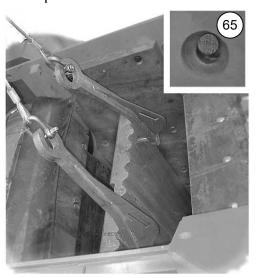


14. Attach the jaw lifting device (61-63) to suitable lifting equipment as defined in a site-specific risk assessment.





15. Put the jaw lifting devices in position in the jaw lifting holes (65). Make sure they are installed correctly, are central to the jaw plate and vertical to the point of lift.



16. Slowly lift the jaw up and out of the machine. When the jaw plate is clear of the machine, move it away from the machine to a safe holding location.

### 11.8.34 Installing the swing jaw

- 1. Clean the main frame to remove any dirt or loose material.
- 2. Do a check on the jaw plate to make sure it is clean and free from dirt or loose material. Make sure to do a check of the holes and cavities.



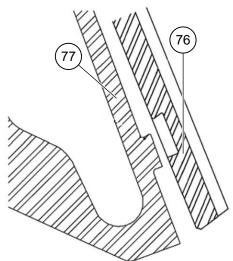
3. Put the jaw lifting devices (61-63) in position in the jaw lifting holes (65). Make sure they are installed correctly, are central to the jaw plate and vertical to the point of lift. Use suitable lifting equipment as defined in a site-specific risk assessment.



- 4. Lift the jaw into the vertical position slightly above the ground and do a check of the lifting equipment. Do a visual inspection of the jaw lifting tool to make sure that it is secure on the jaw.
- 5. Lift the jaw and move it into position above the crusher.
- 6. Slowly lower the jaw into position in the crushing chamber. Make sure that there is clearance of 10mm to 15mm on each side of the jaw plate.



7. Lower the jaw plate until it is located onto the recesses (77). Make sure that there is an even clearance on each side of the jaw plate.

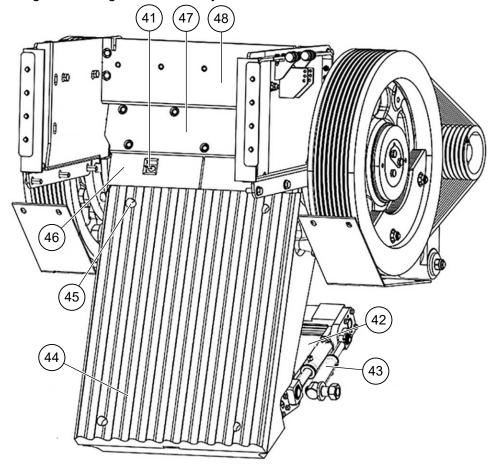


- 8. Secure the jaw in position temporarily. Do not enter the jaw crusher as there is a risk the jaw will slip.
- 9. Carefully remove the lifting tool. Do not enter the jaw crusher as there is a risk the jaw will slip.
- 10. Make sure the swing jaw plate is installed correctly. The two faces must fully contact (80) so that there is no clearance between the bottom of the jaw crusher and the swing jaw. Use an inspection mirror or camera at a safe distance to perform this inspection.



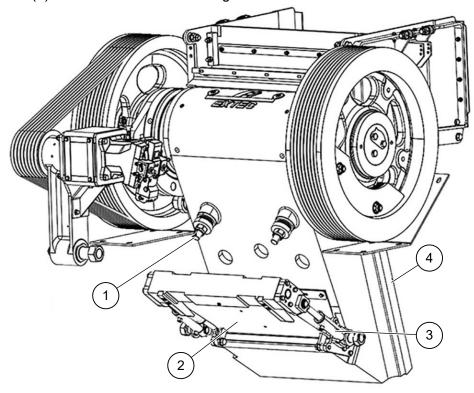


11. Take the wedge (46) and wedge bolt (41) and install it as one assembly using the bolt to guide the wedge into position. Repeat for the other wedge and wedge bolt assembly.





12. Loosely install the location washers, spring washers, thick washers and nuts (1) onto the bolts but do not tighten.

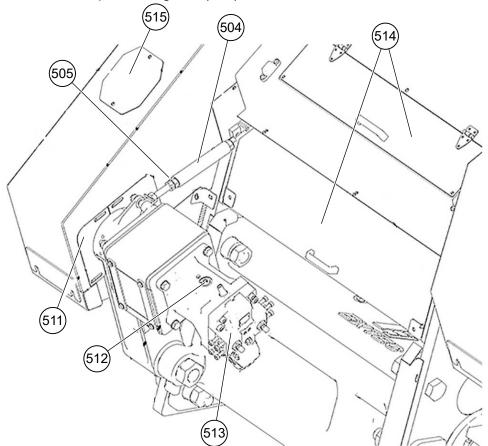


- 13. Use a hammer if necessary to make sure wedges are correctly positioned.
- 14. Tighten the nuts (1) correctly to the required torque (5609Nm for 10.9 M42 or 4137 lb-ft).
- 15. Use suitable lifting equipment, as defined in a side specific risk assessment, to install the wear plate.
- 16. Install the upper plate.
- 17. Install the jaw lower curtains.
- 18. Dismantle the jaw lifting equipment, stow and secure in position.

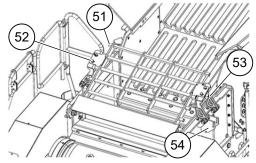


# 11.8.35 Installing the jaw guards

1. Install the cover plate and guard (514).



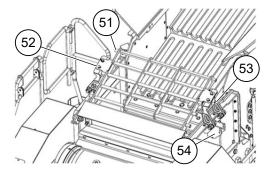
2. Install the inlet guard (51) and secure in place using the bolts (52).



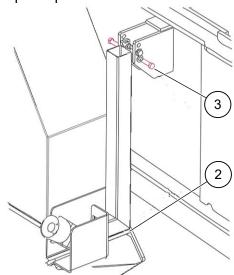
3. Put the sonar into the required position (54) and install the nuts and bolts. Make sure that the sonar is correctly positioned so it can detect the material entering the crusher on the other side of the grid bars.



# 11.8.36 Installing the jaw inlet sonar



- 1. Make sure the jaw inlet grid (51) is in position before the sonar is lifted into position.
- 2. Remove the pin from the sonar mounting bracket (3) and lift the sonar up into position.



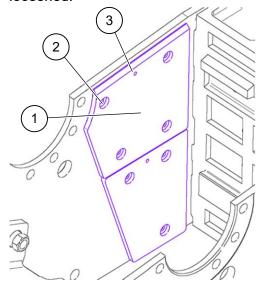
3. Install the pin to into the sonar mounting bracket to secure the sonar in position.

# 11.8.37 Replacing the crushing chamber liner plates

- 1. Remove the swing jaw plate.
- 2. Remove the fixed jaw plate.



3. Attach suitable lifting equipment, as defined in a site-specific risk assessment, to the plate lifting point (3) and support the weight of the liner plate. Make sure the jaw plate (1) cannot swing when the bolts are loosened.



- 4. Loosen the top plate nuts (2) and then remove the bolts and washers. Lift the top wear plate out of the crushing chamber.
- 5. Repeat the procedure for the remaining liner plates.
- Attach suitable lifting equipment, as defined in a site-specific risk assessment, to the plate lifting point and support the weight of the new liner plate.
- Install the new liner plates in the reverse order that they were removed.
   Make sure that the bolts are tightened to a torque of 711Nm (524 lb-ft) when the plates are installed.
- 8. Do a check that all plates are secure and installed correctly.
- 9. Install the swing jaw plate.
- 10. Install the fixed jaw plate.

#### 11.8.38 Adjusting the conveyor belt tracking

- 1. This is a controlled process and should only be done by a suitably qualified and experienced service engineer.
- 2. Contact your Sandvik representative if a conveyor belt requires tracking.

# 11.9 Fluids and lubricants table (QJ341+)

Subassembly	Quantity	Ambient tempera- ture range (deg. C)	Recommended brand	Com- ments
Feeder gearbox	6.4 liters	-	RENOLIN CLP 220	



Autolubrication unit	9 to 16 kg (system depend- ent)	-20 to 150	SKF LGHB 2	NLGI grade 2
Hydraulic vibra- tors	35g/2000 hours	-	Kluber Staburgas NBU 8 EP	OEM document
Torque arm bearings	1 liter	-20 to 150	SKF LGHB 2	NLGI grade 2, 400g tube
Hydraulic sys- tem	660 liter	-10 to 50	RENOLIN B 46 HVI PLUS	
Hydraulic sys- tem	660 liter	-25 to 25	RENOLIN B 32 HVI PLUS	
Hydraulic sys- tem	660 liter	-35 to 15	RENOLIN MR 310	
Manual grease points	-	-25 to 50	RENOLIT DURA- PLEX EP2	
Track tension	-	-25 to 50	RENOLIT DURA- PLEX EP2	
Track gearbox	5 liter	-25 to 90	TITAN GEAR MP 90	

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

Read the Material Safety and Datasheets for each fluid and lubricant on the machine.

#### **Related information**

Safety Requirements (Machinery) (Page 166)

Doing a check on the autolubrication grease reservoir (if fitted) (Page 205)



# 12 Engine maintenance instructions



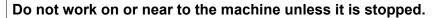
# 12.1 Safety Requirements (Engine)

# DANGER



#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.





Keep away from the feed hopper and conveyor discharge where there is a risk of death or serious injury from ejected debris.



# **A** DANGER



#### **IGNORING INSTRUCTIONS HAZARD**

Not using minimum approve PPE (personal protective equipment) could result in death or serious injury.



Always wear approved PPE.

# **⚠ WARNING**



#### **IGNORING INSTRUCTIONS HAZARD**



To prevent death or serious injury you must read, understand and obey the machine's Operation and Maintenance instructions. Inspect the machine before use to make sure it is safe to operate. Scheduled maintenance is necessary to keep the machine safe to use. If maintenance is not done, machine performance will decrease.

Always keep this manual with the machine. Look for damage and defects before you operate the machine. Report defects to a supervisor. Do not operate the machine if you find defects.



# **⚠ WARNING**



#### **PERSONNEL HAZARD**

If you do not have sufficient knowledge of the manual or procedures you could cause death, serious injury or damage to the machine.

Only approved personnel must operate or maintain this machine.



# **⚠ WARNING**



#### **UNAUTHORISED MODIFICATIONS HAZARD**

Use of non-standard parts could cause death or serious injury.
Only use parts specified in the Sandvik spare parts book.



- The safety instructions that follow are applicable to all service and maintenance tasks. Other safety instructions, specified for some maintenance procedures, will be given in the procedures' instructions.
- Maintenance is necessary for (i) personnel safety, (ii) best machine performance, (iii) prevention of mechanical failures.
- You must complete and log maintenance tasks at the necessary intervals. Unusual wear or component failure will occur if maintenance tasks have not been completed.
- For maintenance procedures and schedules that are related to Original Equipment Manufacturers, read the Original Equipment Manufacturer information supplied separately.

# 12.2 Reference Information

- For information related to the recommended lubricants and fluids for use in the machine, read the Fluids and Lubricants chart that is included in the documentation pack.
- For the hydraulic and electrical diagrams applicable to this machine, read the Hydraulic Schematics and Electrical Schematics that is included in the documentation pack.
- For maintenance procedures and schedules that are related to components made by Original Equipment Manufacturers, read the Original Equipment Manufacturer information supplied in the documentation pack.



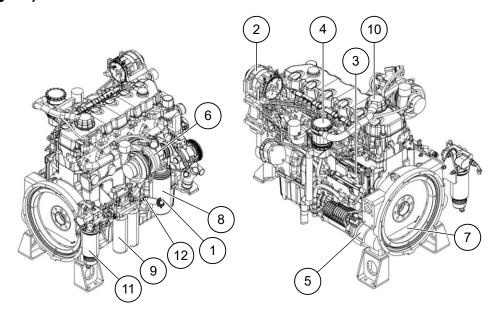
### 12.2.1 Engine Manual

• The engine manufacturer supplies a manual which contains information on the engine fitted to the machine. Read the engine manual and follow the engine maintenance instructions contained in it.

#### 12.2.2 Engine Specifications

- Alternative specifications of engines can be fitted to the machine powerpack. The engine serial number plate is located on the engine.
   The engine information plate is located on the engine.
- Make sure any information regarding servicing requirements, reported faults and spare parts are correct and applicable to the engine fitted.

# 12.3 Identifying the main locations for engine maintenance (CAT C9.3 Stage 5)



- 1 Oil filler cap
- 2 Alternator and drive belt
- 3 Engine control module (ECM)
- 4 Crankcase ventilation filter
- 5 Starter motor
- 6 Turbocharget
- 7 Flywheel (power output)
- 8 Oil filter
- 9 Fuel filter
- 10 Crankcase breather
- 11 Diesel-water separator
- 12 Oil level dipstick



# 12.4 Engine Maintenance Procedures

- Before you operate or perform maintenance on the engine, you must read and understand the OEM engine manual supplied with your machine.
- If you do not understand or cannot do the service tasks in the OEM engine manual, contact the Sandvik Service Department.

### 12.4.1 Doing a check of the engine coolant level

# **MARNING**

# **BURN HAZARD**



Hot coolant under pressure

Release pressure slowly. Never remove radiator cap while the engine is running

Make sure that the required Personal Protective Equipment (PPE) is used

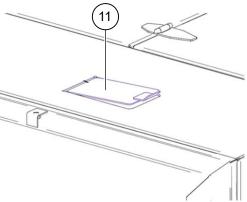
# **⚠ WARNING**

#### **HOT SURFACE HAZARD**

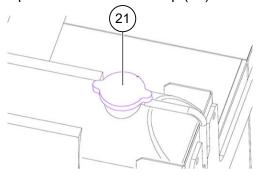
The engine could still be hot after operation and cause severe burns Make sure that the engine is cool before maintenance is started Make sure that the required Personal Protective Equipment (PPE) is used



1. Open the radiator compartment cover (11).



2. Open the radiator filler cap (21).

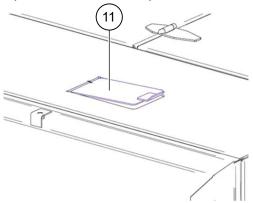


- 3. Do a check that the radiator coolant is full. The coolant level must be visible from the radiator filler port.
- 4. Replace the radiator filler cap.
- 5. Close the radiator compartment cover.

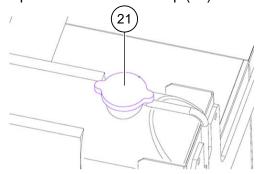


# 12.4.2 Getting a sample of engine coolant for analysis

1. Open the radiator compartment cover (11).



2. Open the radiator filler cap (21).

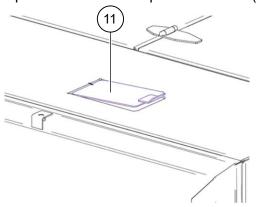


- 3. Do a check that the radiator coolant is full.
- 4. Use a tube and handpump to extract a sample of coolant from the radiator into a clean sample bottle.
- 5. Replace the radiator filler cap.
- 6. Wipe up all spills.
- 7. Close the radiator compartment cover.
- 8. Discard the contaminated materials to local environmental regulations.
- 9. Get the sample tested by an approved testing laboratory. If the coolant quality is unacceptable, change the engine coolant.

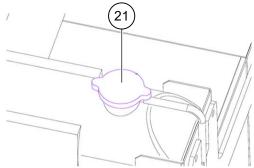


# 12.4.3 Changing the engine coolant

1. Open the radiator compartment cover (11).



2. Open the radiator filler cap (21).



- 3. Do a check that the radiator coolant is full.
- 4. Put a suitable container underneath the radiation drain plug.
- 5. Open the drain plug and collect the coolant in the container.
- 6. Close the drain plug.
- 7. Fill the radiator to the required level with new coolant.
- 8. Do a check that the radiator coolant is full.
- 9. Replace the radiator filler cap.
- 10. Wipe up all spills.
- 11. Close the radiator compartment cover.
- 12. Discard the contaminated materials to local environmental regulations.

#### **Related information**

Fluids and lubricants table (CAT C9.3 Tier 4F) (Page 286)



# 12.4.4 Doing a check of the engine oil level

# **⚠ WARNING**

# HOT SURFACE HAZARD



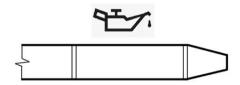
The engine could still be hot after operation and cause severe burns

Make sure that the engine is cool before maintenance is started

Make sure that the required Personal Protective Equipment (PPE) is

worn

- 1. Open the engine compartment cover.
- 2. Put an applicable container under the dipstick port. Make sure the area around the dipstick port is clean.
- 3. Do a check of the engine oil level using the dipstick.



4. Discard the contaminated materials to local environmental regulations.

### 12.4.5 Getting a sample of engine oil for analysis

- 1. Start the engine and operate the engine until it reaches its operating temperature.
- 2. Stop the engine. Lockout and tagout the machine.
- 3. Put an applicable container under the sample access port. Make sure the area around the port is clean. If there is no sample access port on the engine, use the port for the dipstick.
- 4. Slowly open the port. Do not contact the oil as it will be hot.
- 5. Allow some oil to flush through to the container.
- 6. Use a clean length of tubing to allow a sample of oil to flow into a labelled sample container.
- 7. Close the port.
- 8. Add engine oil to the required level.
- 9. Discard the contaminated materials to local environmental regulations.
- 10. Get the sample tested by an approved testing laboratory. If the oil quality is unacceptable, change the engine oil and filter.



# 12.4.6 Replacing the engine oil

# **⚠ WARNING**

# **HOT SURFACE HAZARD**



The engine could still be hot after operation and cause severe burns

Make sure that the engine is cool before maintenance is started

Make sure that the required Personal Protective Equipment (PPE) is worn

- 1. Start the engine and operate the engine until it reaches its operating temperature.
- 2. Stop the engine. Lockout and tagout the machine.
- 3. Put a funnel under the drain port and use a hose to connect the funnel to an applicable fluid collection container. Make sure the area around the port is clean.
- 4. Slowly open the port. Do not contact the oil as it will be hot.
- 5. Allow all oil to flush through to the container.
- 6. Close the port.
- 7. Identify the correct specification of engine oil.
- 8. Add engine oil to the required level.
- 9. Discard the contaminated materials to local environmental regulations.

#### 12.4.7 Replacing the engine oil filter

- 1. The engine oil filter is installed on the engine. Open the powerpack and locate the engine oil filter.
- 2. Put an applicable container under the filter housing.
- 3. Clean around the filter housing.
- 4. Remove the filter housing. Make sure any pressure in the system is carefully released before the filter is removed.
- 5. Lubricate the rubber seal of the new oil filter with a thin layer of oil.
- 6. Install the new filter onto the engine and secure it into place. Do not excessively tighten the filter into place.
- 7. Discard the contaminated maerials according to local environmental regulations.

### **Related information**



# 12.4.8 Draining the diesel fuel-water separator

# **⚠ WARNING**



#### FIRE HAZARD



All smoking is PROHIBITED including electronic cigarettes when refuelling or handling diesel fuel. Smoking or using other naked flames in the vicinity of flammable materials and or fuels, could cause serious injury or death.

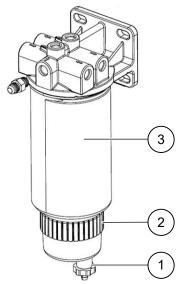


DO NOT do maintenance on the system near naked flames or sources of sparks, such as welding equipment.



IMMEDIATELY clean up spilt fuel and dispose of correctly to minimize any environmental impact. To avoid spillage use drip trays.

- 1. Open the engine compartment cover.
- 2. Locate the diesel fuel-water separator fitted to the engine.



- 3. Put an applicable container under the fuel water trap (1).
- 4. Do a visual check of the separator bowl (2) to make sure that water or sediment is contained in the bowl.
- 5. Open the drain tap in the base of the water trap (1). Drain out until only diesel fuel flows out. Close the drain tap.
- 6. Discard the contaminated materials to local environmental regulations.



# 12.4.9 Replacing the fuel filter

# **⚠ WARNING**



#### **FIRE HAZARD**



All smoking is PROHIBITED including electronic cigarettes when refuelling or handling diesel fuel. Smoking or using other naked flames in the vicinity of flammable materials and or fuels, could cause serious injury or death.



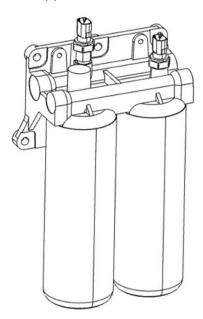
Never do maintenance on the fuel system with the engine running.



DO NOT do maintenance on the system near naked flames 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. Open the engine compartment cover.
- 2. Turn off the fuel supply.
- 3. Put an applicable container under the fuel filter.



- 4. Clean the filter and clean around the filter.
- 5. Remove the filter.
- 6. Install the new filter and secure into place.
- 7. Discard the contaminated materials to local environmental regulations.
- 8. Make sure the fuel system is primed before you start the engine. Read the engine manual.
- 9. Start the engine and operate the engine until it reaches its operating temperature.



- 10. Stop the engine. Lockout and tagout the machine.
- 11. Check for any fuel leaks.

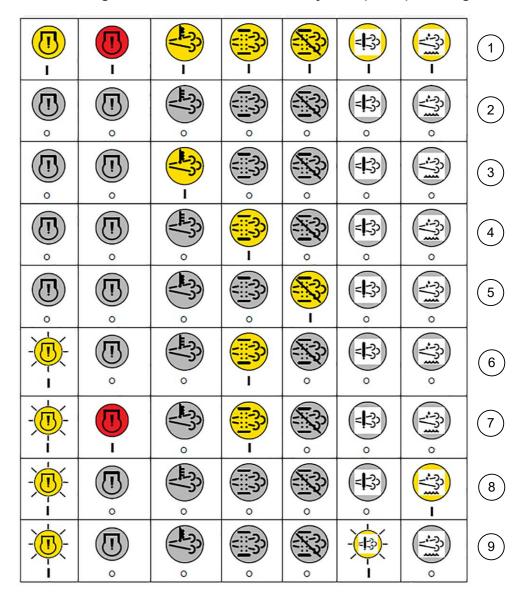
# 12.4.10 Doing a check of the diesel exhaust fluid (DEF) level

1. Look at the display screen on the control panel to do a check of the DEF level gauge.

#### **Related information**

Fluids and lubricants table (CAT C9.3 Tier 4F) (Page 286)

### 12.4.11 Doing a check of the Engine Exhaust After-treatment System (EATS) warnings



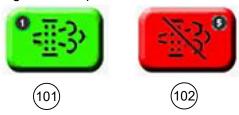
- 1. Lamp check at ignition key on. Make sure all lamps operate.
- 2. No faults are present.
- 3. High exhaust temperature on during active regeneration.
- 4. DPF above 80% soot loading. This warns the operator that regeneration is required.



- 5. Regeneration has been inhibited by the operator, the application or the engine control.
- 6. DPF is above 100% soot loading. The engine power derates depending on soot load. Regeneration required.
- 7. DPF above 140% soot loading. The engine will shutdown. Contact Sandvik.
- 8. Low DEF level. Fill the DEF tank.
- 9. Engine emissions system failure as a result of tampering or too low DEF level. Contact Sandvik.

### 12.4.12 Doing a check of the diesel particulate filter (DPF) regeneration warning light

- The display screen mounted on the control panel has a DPF regeneration warning light.
- 2. Start the engine.
- 3. Push button 1 (101) to activate the DPF regeneration. Monitor the regeneration sequence. Button 5 (102) can be pushed to stop the regeneration process in the event of a problem.



- 4. Do a check that the DPF regeneration warning light functions correctly before, during and after DPF regeneration.
- 5. Stop the engine. Lockout and tagout the machine.
- 6. If there is a fault with regeneration, contact your Sandvik representative before operating the machine.

### 12.4.13 Starting the diesel particulate filter (DPF) regeneration

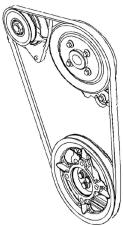
- 1. Push the engine information button on the main menu.
- 2. Scroll through the pages to the EATS page.
- 3. Push the DFP regeneration button.
- 4. Monitor the regeneration process.

#### 12.4.14 Adjusting the tension in the alternator drive belt

- 1. Read the engine manual supplied with your engine for details on how to do a check of the tension in the belt.
- 2. Open the engine compartment cover to access the engine. It may be necessary to remove guards to access the belt.



3. Apply the recommended force given in the engine manual to the alternator belt mid-way between the pulleys.

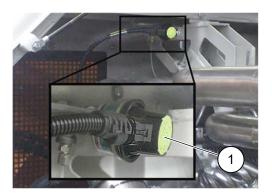


- 4. Measure the deflection and compare it to the recommended deflection given in the engine manual.
- 5. Adjust the belt tensioner as required to adjust the tension to within the recommended limits.
- 6. Make sure that the belt tensioner is securely fastened after the belt is correctly tensioned.
- 7. Close the engine compartment cover.

# 12.4.15 Doing a visual inspection of the grounding stud

- 1. Do a visual inspection of the grounding stud on the engine.
- 2. Replace the components if they are corroded or broken.

### 12.4.16 Doing a check of the service indicators on the air filter (CAT engine)



- 1. Do a check of the service indicator on the air filter. A warning will be displayed on the display screen if there is a fault or a blockage in the air filter.
- 2. Replace the filter or clear the blockage.
- 3. Push the air flow restriction reset switch (1) after servicing the air filter.



# 12.4.17 Doing a visual inspection of the water pump for leaks or damage

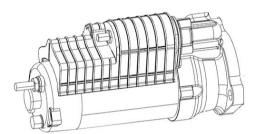
- 1. Do a visual inspection of the water pump for leaks or damage and replace if necessary.
- 2. Read the engine manual for information on the water pump.

### 12.4.18 Replacing the engine crankcase breather

- 1. Open the engine crankcase breather housing.
- 2. Remove the used filter element and seal from the breather body.
- 3. Install a new filter element and seal.
- 4. Lubricate the seal with new oil and install it into its place.
- 5. Install the cover and tighten it into place.

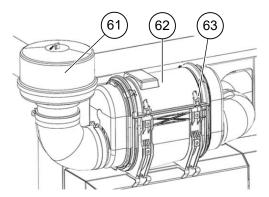
### 12.4.19 Doing a check of the starter motor

1. Do a visual inspection of the electrical connections to the starter motor.



- 2. Make sure that the connections are clean and that there is no corrosion present.
- 3. Start the engine and listen for any abnormal sounds.
- 4. Stop the engine. Lockout and tagout the machine.

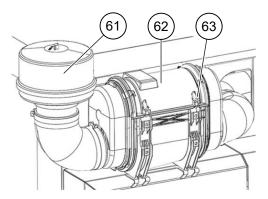
#### 12.4.20 Doing a check of the air precleaner



- 1. Clean around the air precleaner-filter assembly.
- 2. Remove the air precleaner cover (61).
- 3. Do a check inside the air precleaner.
- 4. Install the precleaner cover.



### 12.4.21 Doing a visual inspection of the air precleaner rubber seals



- 1. Clean around the air precleaner-filter assembly.
- 2. Remove the air precleaner cover (61).
- 3. Do a check of the rubber pipes and seals and replace them as necessary.
- 4. Install the precleaner cover.

# 12.4.22 Replacing the engine air filters (primary and secondary)

# **⚠ WARNING**



#### **FALLING HAZARD**

Falling from or on to this machine could result in death or serious injury.



When at a height of 2m (6ft) or more above ground level, always use an approved safety harness or platform. Never climb on a moving machine or use components as a climbing aid.

# **⚠ WARNING**



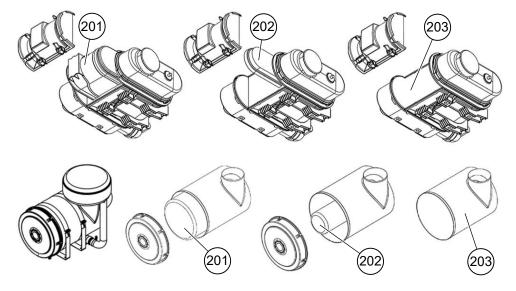
#### **OPERATING MACHINE HAZARD**

Being positioned on an operating machine could cause death or serious injury.



Do not work on or near to the machine unless it is stopped.



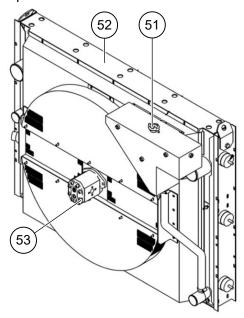


- 1. Identify the type of filter installed on the powerpack.
- 2. Clean around the air filter assembly.
- 3. Remove the cover.
- 4. Remove the primary engine air filter (201).
- 5. Remove the secondary engine air filter (202).
- 6. Clean inside the housing (203) of the engine air filter with a clean, dry cloth.
- 7. Install the new secondary engine air filter.
- 8. Install the new primary engine air filter.
- 9. Install the cover.
- 10. Discard the contaminated materials to local environmental regulations.



### 12.4.23 Doing a check of the radiator

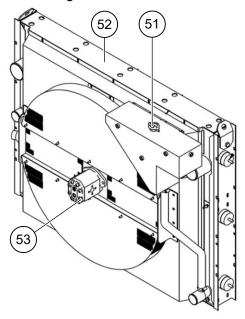
1. Do a check to make sure that the radiator (52) is clean. Clean as required.



- 2. Do a check to make sure that the coolant level (51) is correct. Fill as required.
- 3. Do a check that there is no oil leaking from the hydraulic motor (53).

### 12.4.24 Cleaning the engine radiator

- 1. Open the radiator compartment.
- 2. Use an applicable cleaning cloth to clean around the exposed surfaces of the radiator, the connecting pipes and the housing (52). Make sure the housing and surfaces are clean of any oil, grease or dirt.





- 3. Use pressurised air to remove loose material between the radiator fins. Make sure that all loose material is removed.
- 4. After cleaning, do a visual inspection of the radiator fins and tubes.
- 5. Close the radiator compartment.
- 6. Start the engine.
- 7. Operate the engine for a few minutes.
- 8. Stop the engine. Lockout and tagout the machine.
- 9. Open the radiator compartment cover.
- 10. Do a visual inspection of the radiator fins and tubes and do a visual inspection for any leaks. Do any repairs that are necessary.
- 11. Close the radiator compartment cover.

### 12.4.25 Checking the electrolyte in the battery and fill to the required level as necessary

# **MARNING**



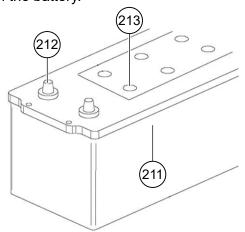
#### POISON AND CONTAMINATION HAZARD

Fuels, fluids and lubricants used in this machine can contain chemicals which could cause death or serious injury.



Discard these correctly to prevent environmental damage. Obey local and national laws or regulations. Make sure the correct procedures from material safety data sheets (MSDS) are used when personnel move, store and use hazardous materials. Do not put waste on to the ground, down a drainpipe or into a source of water. Always use containers that do not leak when you drain fluid

- Remove the panel to access the battery.
- 2. Remove the filler caps (213) and do a check on the level of electrolyte in the battery.



3. Add distilled water to restore the electrolyte to the 'full' level. Fill it until the level is slightly above the top of the electrolytic plates. Do not use hard, soft, artificially softened or contaminated water.



- 4. Do a check on the condition of the electrolyte using a battery test refractometer.
- 5. Replace the panel.

### 12.4.26 Cleaning the batteries

# **⚠ WARNING**

#### POISON AND CONTAMINATION HAZARD

Automotive batteries contain sulphuric acid, an electrolyte which can cause burns and explosive gases when charged.

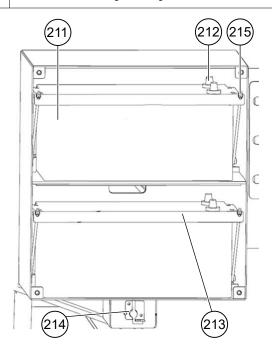


Only recharge batteries in an area with good airflow. Do not short circuit batteries as this could cause a spark and explosion.

Make sure there is no smoking when maintaining batteries.

Always isolate and disconnect the battery cables before doing welding on the machine.

To remove a battery, always disconnect the negative cable firstand to install a battery always connect the negative cable last.



- 1. Remove the panel to access the batteries.
- 2. Do a visual inspection of the batteries (211).
- 3. Use an applicable cleaning cloth to clean the battery casings.
- 4. Replace the panel.



### 12.4.27 Replacing the batteries

# **⚠ WARNING**



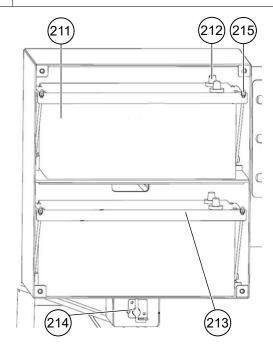
#### LIFTING HAZARD

The removal of large or heavy components without sufficient lifting equipment is not permitted and could cause death or serious injury.

Two people are necessary to lift a battery from the battery cabinet.

For safety, it is recommended to use a lifting platform to lower and raise the battery to the cabinet.





- 1. Remove the panel to access the batteries (211).
- 2. Clean around the batteries and remove any loose material or dirt.
- 3. Do a check that the battery terminals (212) are secure, uncorroded and free of scale.
- 4. Release the locating clamp on each battery (215).
- 5. Disconnect the negative (-) terminal clamp.
- 6. Disconnect the positive (+) terminal clamp.
- 7. Remove the battery. Two people must lift the battery.
- 8. Place the new battery on the mount with the positive and negative terminals in the same relative position.
- 9. Connect the positive terminal clamp.
- 10. Connect the negative terminal clamp.
- 11. Secure the locating clamp on each battery.



- 12. Apply petroleum jelly or non-acidic grease to the terminals to protect the connections.
- 13. Replace the panel.

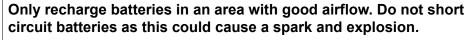
### 12.4.28 Doing a check of the terminal connections on the battery

# **⚠ WARNING**

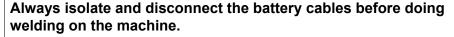


#### POISON AND CONTAMINATION HAZARD

Automotive batteries contain sulphuric acid, an electrolyte which can cause burns and explosive gases when charged.

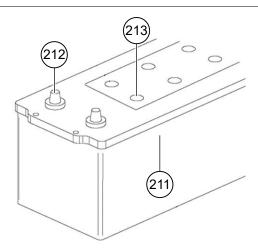


Make sure there is no smoking when maintaining batteries.





To remove a battery, always disconnect the negative cable firstand to install a battery always connect the negative cable last.



- 1. Locate the battery (211).
- 2. Do a visual inspection of battery terminal connections (212). Clean the terminals if dirty or corroded.
- 3. If necessary, remove the ground cable (-) first, remove the positive cable (+) last. Do the reverse to reattach the cables.
- 4. Apply petroleum jelly or non-acidic grease to the terminals to protect the connections.
- 5. Replace the panel.



# 12.5 Fluids and lubricants table (CAT C9.3 Tier 4F)

Subassembly	Quantity	Ambient tem- perature range (deg. C)	Recommend- ed brand	Comments
Engine oil	40 liters	-10 to 50	TITAN CARGO 15W-40	
Engine oil	40 liters	-35 to 25	TITAN CARGO MAX 5W-30	
Engine coolant	70 liter	All tempera- tures	UNIVAR CA- FLON HDA	
Diesel fuel		All tempera- tures	Ultra-low sul- phur diesel	Check ma- chine tank volume
Diesel exhaust fluid				ISO 22241 specification

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

#### **Related information**

<u>Doing a check of the diesel exhaust fluid (DEF) level</u> (Page 275) <u>Changing the engine coolant</u> (Page 270)



# 13 Information and datasheets



# 13.1 Original Equipment Manufacturer (OEM) Information

Please make sure you read this content carefully. It contains information supplied by original equipment manufacturers of components and hazardous substances used in the machine, therefore Sandvik has reservations for misprints.

The following documentation will be included in the manual pack, either as print or in digital format:

- 1. Strickland tracks maintenance
- 2. Engine manufacturer's instruction manual
- 3. Crusher manual (for crushers only)
- 4. Grease autolubrication system (when fitted)
- 5. Material safety and datasheets (MSDS)

This list is not exhaustive. Additional OEM information will be included in the manual pack as required and Sandvik reserves the right to add or remove OEM documentation.

### 13.1.1 OMB hydraulic vibrators

The OEM documentation included in the manual pack contains operation and maintenance information for the OMB hydraulic vibrators installed on the machine feeder.

Read this documentation for operation and maintenance instructions.

# 13.2 Electrical schematics

Read the electrical diagrams document for details on the electrical system.

# 13.3 Hydraulic schematics

Read the hydraulic diagrams document for details on the hydraulic system.





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