Mt Isa Mines Ltd

Single Deck Multi-Flo Screen

A7640 &
A7641

METSO

Installation, Operation and Maintenance Manual

Single Deck Multi-Flo Screen

Mt Isa Mines Ltd

Serial No:

A7640 & A7641

MINERALS

Screen Installation, Operation and Maintenance Manual

Mt Isa Mines Ltd

Single Deck Multi-Flo Screen

Serial Number

A7640 & A7641

Metso Minerals (Australia) Limited
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CARRINGTON NSW 2294
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www.metsominerals.com

Installation, Operation and Maintenance Manual

Single Deck Multi-Flo Screen

SERIAL Number: A7640 & A7641

Customer: Mt Isa Mines Ltd

Project: N/A

Supplied 2006 by

Metso Minerals (Australia) Limited

PO Box 4,

CARRINGTON NSW, 2294.

Phone Number: +61 2 4969 1200.

Facsimile Number: +61 2 4962 1309.

3.0m x 8.5m Single Deck Multi-Flo Screen

This manual is a part of the equipment to which it relates. It is written for the use of installers, commissioning engineers, operators and maintainers. It should be kept for the life of the equipment and, in case of re-sale, passed on to any subsequent purchaser.
Information contained in this manual is specific to the equipment and is correct at the date of publication. As improvements are continually being made, Metso Minerals reserve the right to make alterations to the equipment design and specification without giving prior notice.
Any amendments issued by Metso Minerals should be promptly inserted into this manual.

NOTE: Before beginning installation or operation of the supplied equipment, it is strongly recommended that this manual be studied in detail by all personnel involved with the project.

If the information and instructions contained in this manual are disregarded then there is a risk of serious injury to personnel and/or damage to your equipment.

Warranty Validation Form

The attached manual depicts and describes the correct procedures to install and commission your screen for optimum performance.

You will note that contained in **Appendix B** of this manual is a **Commissioning / Audit Checklist Form**, which is to be actioned as follows.

1. When the screen installation and commissioning is supervised by Metso Minerals (Australia) Limited personnel the form will be completed and signed by them and an authorised officer of the owner to validate the warranty.

2. When the installation and commissioning is carried out by the owner, this Warranty Validation Form, together with the test cards are to be completed, signed and forwarded to Metso Minerals (Australia) Limited. (Refer addresses in the front of this manual.)

The form will be signed and returned by **Metso Minerals (Australia) Limited** to validate the warranty prior to putting the screen into operation.

We would like to take this opportunity and thank you for your support and business and look forward to being of service to you in the future.

Signed; installing engineer

Name: ……………………………

Signature: ……………………………

Signed; customers representative:

Name: ……………………………

Signature: ……………………………

GENERAL DETAILS

Item	Description
Customer:	Mt Isa Mines Ltd
Location:	Mt Isa QLD
Quantity / Size / Type	2 / 3.0m x 8.5m / SD Multi-Flo Screen
Number of decks	One (1)
Mount type	Floor Mounted
Mechanism	5 – 3
Number of mechanisms	1
Screen Slope	25°, 21.5°, 18°, 14.5°, 11°, 7.5°, 5°
Design Throw	12mm
Design Speed	800 rpm
Drive Type	Vee belt Drive
Hand	Inboard - Right
Motor type	45kW
Speed / Poles	1465 rpm; 4 poles
Voltage / Hertz	415V 50 Hz

PARTS AND SERVICE ENQUIRIES

Metso Minerals
PO Box 1028
Eagle Farm, QLD 4009
Australia
Phone: +61 7 3868 2144

Metso Minerals
45 Hargrave Road,
Carrington, NSW 2294
Phone: +61 2 4969 1200
Facsimile: +61 2 4962 2309

Metso Minerals
PO Box 399
West Perth, WA 6872
Australia

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MANUAL SECTIONS

1 General Information

Revision History	
16 January 2006	W. Lewington Converted from 2602-LH-01B.doc. Altered Header and footers Added Screen Terminology Preparation for handover to NC.

1.1 Introduction

Metso Minerals manufacture equipment intended for the feeding, crushing, grinding, scrubbing, sizing and sorting of minerals and similar solid materials. Examples of products are feeders and screens of various types and sizes, double toggle and single toggle jaw crushers, gyratory and cone crushers with or without computerised control systems, vertical and horizontal shaft impactors and scrubber barrels. During the design and manufacture of the equipment, a lot of effort is put into the avoidance of health and safety risks.

A single machine, delivered from Metso Minerals, will always be used as a component in a mineral processing plant. It is therefore virtually impossible for us as suppliers to provide operator instructions for every conceivable control system configuration in which the machine could operate.

This manual gives information on safe installation, operation and maintenance. It is not intended as a detailed manual for a specific machine. Its purpose is instead to alert customers, operators and maintenance personnel to the general hazards and risks which can be encountered in a crushing plant.

Our maintenance instruction manuals for individual machines give more detailed information regarding your equipment. Despite this, additional training by Metso Minerals may be necessary.

Historically, most injuries in crushing and screening plants occur during maintenance, although some occur during the inspection of moving parts or while clearing material blockages, so this safety manual emphasize safety precautions when these activities are undertaken.

To avoid potential safety risks it is important that:

- The recommendations in instruction manuals are studied and followed.
- Personnel are regularly given training on maintenance and safety.
- General and official safety regulations are followed.
- Dangerous areas are marked with warning signs.
- The appropriate equipment and tools are available.
- The owner and management live up to their responsibility to make sure that effective safety programmes and regulations are worked out and are followed by all personnel.

When writing to the company or ordering replacement parts, always refer to the **Serial Number** listed on the front cover of the manuals. Also, refer to the drawing or assembly number, part number and description, along with the quantity needed.

1.2 General Safety Considerations

The general safety precautions listed on the pages following should be considered as a guide only. There may be other conditions and variations in the operation of this equipment that are not covered in these general safety precautions. The purpose of the general safety precautions is to make all personnel aware of the general hazard and dangerous situations that exist around the equipment and the work area.

WARNING!
Machines are used for the handling and/or processing of minerals and other materials which may give rise to health risks for human beings and animals. It is the responsibility of the user to follow the relevant rules and regulations intended to prevent health risks – for example specific regulations applying to asbestos, quartzite, radon, etc.

During screening the main hazards are ejected stones, dust or noise emissions. The following can be supplied by Metso Minerals to reduce these hazards

- The screen can be fully enclosed. This will not only eliminate dust and reduce noise emissions, but also provide the operator protection from ejected stones.
- Noise levels can also be reduced by utilising non–metallic screen surfaces such as rubber or polyurethane. Screening surface changes will also be less frequent – reducing the risk of accidents. Rubber–lined feed boxes and discharge lips reduce wear and also absorb impact – reducing noise levels.

1.2.1 Notes, Cautions and Warnings

Three levels of advisory and cautionary statements are used throughout this manual to call attention to special information, operating procedures and safety precautions.

NOTE:
A general advisory statement intended to alert personnel to conditions affecting equipment operation, maintenance and servicing practices.

CAUTION!
A specific advisory statement or procedure intended to prevent damage to the equipment or associated components.

WARNING!
Intended to alert personnel to dangerous situations and hazards that exist around the equipment and work area. Failure to follow the instructions presents serious risk of personal injury or death.

1.2.2 Personnel Safety

Read and understand each of the warning, cautions and instructions in the operator's manual and on signs fixed to the equipment.

Report all accidents, immediately to your supervisor. Consult a doctor or medical facility as soon as possible if personal injury is involved.

Keep a list of emergency telephone numbers close to the telephone and instruct all work area personnel as to the location of the list.

Do not operate or work around equipment while under the influence of alcohol, medicines, tranquillisers or other drugs that can make you less alert or affect your judgement.

Use the handgrips, ladders, guardrails and other safety devices when getting on or off equipment; and when moving around while on the equipment. Use a safety belt when necessary.

Take precautions to keep hair, ties, scarves, sleeves, trouser legs and other loose fitting clothing from being caught on moving parts or controls.

Wear safety glasses, whenever there is any danger of flying debris, chips, object or dust that could be operating regulations. Be extra safe – always wear eye protection.

Wear gloves whenever possible to protect hands and fingers from cuts, scrapes, burns and solvents.

Always wear a hard hat and safety shoes when working under equipment, when work is being done above you, and when required for the area in which you are working.

Remove rings, watches and bracelets before handling, lifting or working on any parts and equipment.

In areas where loud noise is a problem, wear hearing protection devices.

Wear a breathing apparatus or respirator whenever painting or working with chemicals, solvents and other substances that may be hazardous to your health.

Do not take chances with your back. Use lifting and moving devices to help you with your work. Always lift with your legs, NOT with your back.

1.2.3 Work Area Safety

Keep the general work area clean and free of debris. Avoid stone or other material build–ups on walkways, platforms and ladders. Always keep the walking surfaces or platforms under conveyor transfer points free of debris or material build–up.

Do not allow unauthorised personnel in or around the work area. Know who is in your work area at all times. Use a head count when necessary.

Keep equipment surfaces that will be touched by hands and feet clean, dry and free of oil or grease.

Keep controls, push–buttons, levers and switches dry and free of oil or grease. Avoid operating controls, pushbuttons, levers or switches with wet or oily hands.

Keep hand grips, guard rails, ladders and platforms clean, dry and free of oil or grease.

Store parts and tools in a designated place when not in use.

Keep safety equipment in a designated place and ensure that work area personnel know the location and the proper use of the safety equipment.

Make a daily check of starting alarms and warning devices in the work area, and ensure that each device is properly working before starting or operating the equipment.

Do not stand under or allow anyone else to stand under equipment that is being hoisted or suspended. Use a safety hook or hook with safety latch when hoisting equipment and use spreader bars when necessary. Always use a signal man when hoisting or moving equipment.

Learn the weight limitations and clearances in and around your work area and for the equipment in use.

Be alert to conditions such as dust, smoke, fog, machinery and the general surroundings that may obscure the vision around your work area.

1.2.4 Equipment Safety

Do not alter, deface, or remove any factory installed information CAUTION, WARNING or DANGER signs affixed to the equipment.

Before setting up portable equipment, be sure that the ground surface is firm and level. Make sure that all supporting devices and blocking are securely in place. Follow manufacturer's recommended procedures for blocking and setting up equipment when applicable.

Before moving portable equipment with a tractor, check air brakes and running lights for proper operation. Ensure that the fifth wheel is locked into position and that jack legs and landing gear are raised high enough off the ground to provide sufficient clearance for transporting.

Never climb aboard equipment while it is in transit or being hoisted, or allow anyone else to do so.

Inspect all equipment components before each operating shift to ensure that no parts are damaged or suspected of being damaged. Repair or replace damaged parts before starting or operating the equipment.

Before starting or operating equipment, walk around the work area and the equipment to check that no personnel, animals, tools, parts or other foreign objects are in, on, under or around the equipment. Make sure that all guards and safety devices or properly installed and in good working condition. Check for warning tags or equipment components or controls before starting or operating the equipment.

Before starting equipment, make sure that all work area personnel and visitors know that the equipment is going to be started. Use appropriate warning devices such as horn, alarms, or flashing lights to warn personnel and visitors that equipment is going to be started. Use a head count to make sure that you know where all work area personnel and visitors are located.

When starting equipment, follow the manufacturer's recommended starting sequence.

Do not allow unskilled persons to start or operate any equipment without the proper supervision of a skilled operator.

Never leave equipment controls unattended. Always have a qualified operator relieve you if you must leave.

During start–up and while equipment is operating, be alert for improper readings, visual defects, odours or unusual sounds that could be a warning of a potential hazard. Shut down equipment immediately, following established shutdown procedures, if any unsafe condition should arise.

Do not work on equipment while it is in operation. Perform all required inspection, maintenance, lubrication or adjustments before starting or operating the equipment, or after the equipment is shut down. Use extreme caution during an inspection, maintenance, lubrication or adjustment procedure.

Perform all inspection, maintenance, lubrication and adjustment procedures with caution in accordance with manufacturer's recommended procedures.

1.2.5 Flammable and Hazardous Materials

Store flammable, combustible or hazardous materials in a safe place and in containers specifically designed and clearly marked for that purpose.

Store use cleaning and oil rags in the proper designed container as required by federal, state and local rules and regulations, and away from flammable and combustible materials.

Do not store flammable or combustible materials in, or around the equipment.

Do not permit smoking or open fires around fuel tanks or other combustible materials storage facilities.

Keep several fully charged fire extinguishers located throughout the work area. Know their location and how to operate them. Have them readily available during fuelling operations or when other fire hazards are present. Check the charge on each fire extinguisher at least once a month or when otherwise specified.

Shut down all engines and motor (with the exception of material transfer systems) when fuelling or transferring flammable, combustible or hazardous materials. Follow the recommended fuelling and transfer procedures for the substance of material being worked with.

Fill fuel storage tanks and other combustible materials storage facilities in a well ventilated area, away from smoking materials, open flames, heaters or other heat sources that could cause ignition of the material.

When refuelling or transferring flammable or combustible materials, ground the nozzle or spout against the storage facility filler neck to prevent static electrical sparks.

Never start a diesel or gasoline engine in an enclosed area unless there is adequate ventilation. Exhaust fumes can kill.

Do not use flammable or combustible substances such as gasoline, kerosene or diesel fuel for cleaning parts. Always use a non–flammable solvent for cleaning.

When using epoxy–resin based materials, follow the manufacturers recommended procedures and precautions. Mix and pour epoxy materials in an open or well ventilated area. Do not burn cured resin without adequate ventilation. Avoid skin contact with uncured epoxy–resin materials.

Always inspect and charge batteries in an open or well ventilated area. Do not permit smoking materials or open flames near batteries.

Properly dispose of waste, drain fluids and hazardous materials with due regard and in full accordance with all federal, state and local environmental, safety, transportation and other regulatory agencies' rules, regulations and ordinances.

Think before you act, when working with flammable combustible or hazardous materials. Wear the appropriate clothing and protection devices, and follow the recommended procedures when working with these materials.

1.2.6 Pressurised Systems

Do not perform maintenance on pressurised system components without first relieving ALL pressure to the system.

Do not make internal checks on pressurised oil or fluid system reservoirs or levels until ALL pressure to the system is relieved. Pressurised oils and fluids are dangerous, if released incorrectly. Oil and fluids under pressure can get very hot; use extreme caution and allow the system to cool before working on it.

Do not attempt to remove an air or hydraulic cylinder clevis from its connection unless ALL pressure to the system is relieved.

Do not operate pressurised systems with worn or damaged hoses, valves or fittings. Replace defective components before pressurising the system.

Do not attempt to disassemble air or hydraulic cylinders unless trained and authorised, and you have the correct equipment for such maintenance. Some air and hydraulic cylinders contain a heavy spring which, if improperly released, could injure or kill anyone in its path.

Never adjust pressure relief valves beyond recommended values to get higher operating pressures. The manufacturer's recommended pressures give the safest performance with the longest life.

Follow the manufacturers recommended inspection and maintenance procedures for pressurised systems to ensure that safe operating conditions exist at all times.

1.2.7 Welding

Any welding or cutting operations should only be performed by experienced welders who are familiar with the welding equipment and the materials to be welded.

Take all necessary precautions to avoid dropping sparks or welding splatter on belts, hoses, tanks, other parts of equipment and work area personnel. Have several fully charged fire extinguishers close by whenever any welding or cutting operation is being performed.

Attach the welding ground cable to the piece being welded to avoid damage to the equipment and potential injury to personnel.

Always consult with the manufacturers of the equipment to be welded on before performing any welding operation.

1.2.8 Electrical Safety

Permit only licensed electricians to work on electrically live parts or any plant or equipment.

Always assume that an electrical circuit is live until it is proven dead by proper testing procedures.

Lockout and tag electrical/mechanical controls before performing any inspection, maintenance, lubrication or adjustment procedures.

Repair or replace electrical wires, cables and connectors that are frayed, cut, broken or damaged in any way.

Check that electrical ground wires, motor plugs and power cable connections are properly and securely connected before starting any equipment.

Know the location of all power lines and underground cables. Use extreme caution when working around these areas. Know the locations of all main electrical shut–off boxes.

Never work on electrical equipment while it is raining or while standing in water or on wet surfaces unless you know that the power is disconnected.

Be alert when working around with electricity. Report any electrical hazard immediately to your supervisor.

1.2.9 Ten Commandments of Safety

1. Support efforts to make you workplace safe and healthful. Do your part; observe safety regulations and established work practices.
2. Act responsible and with concern for the safety of others, as well as your own.
3. Check all tools and protective equipment frequently, to make sure they are in safe working order.
4. Educate yourself and others in the hazards associated with your job and safe ways to perform familiar tasks.
5. Ask others how to perform tasks with which you are unfamiliar. Playing it "by ear" can lead to costly accidents.
6. Think over accident and injury possibilities before starting on any project. Take appropriate precautions to protect yourself and others.
7. Warn others of the possibility of accidents and injuries if you see them working unsafely or creating potential hazards.
8. Stay alert for changes in work conditions and the work process.
9. Report unsafe acts and conditions immediately to your supervisor. Don't assume that someone else will do it.
10. Keep your work area clean. Keep tools and materials picked up and properly stored.

1.3 Screen Terminology

Certain terms are used throughout this manual to describe the screen and its operation. These terms are defined to avoid the possibility of confusion or misunderstandings, and to assure proper communication between users of this equipment and the factory.

Definitions are those common to Metso Minerals Limited (Australia) operations.

Base Mounted Screens: Screen supported by the building support structure.
Example: Floor mounted on coil springs.

Cross Member: Tubular structural shapes extending the width of the screen, on which the longitudinal bars are mounted.

Deck: Component consisting of a tubular cross members having spaced longitudinal bars carrying the support frame, screen surface and associated accessories.

Discharge Spout: Screen deck extension at the discharge end.

Dynamic Loads: Forces applied to the screen support structure due to screen vibration. These are expressed in terms of load, load direction and frequency. Dynamic loads are caused by deflection and extension of the screen support springs due to screen body motion.

Metso Minerals specifies these forces at both operating and resonant speeds on the Outline Installation Drawing provided.

Feed: Material presented to the screen for processing.

Feed Box: A feed end extension of the vibrating frame which accepts the feed.

Feed-Rate: Output of the screen is usually measured in tonnes per hour (t/h) or in cubic metres per hour (m^3/h).

"G's": The number of times the screen acceleration exceeds the force of gravity, expressed as the formula:

$$G's = \frac{RPM^2 \times \text{throw (mm)}}{1,788,160}$$

Live Mass: Mass of that portion of the screen that either rests on the spring mounts or is suspended from cables. Does not include springs, spring bases, cable spring-seats and guides.

Shipping Mass: Live mass of the screen plus all other parts making up the suspension system, plus any boxing or crating mass.

Total Mass - Shipping mass less boxing.

Vibrator motor: The stroke inducing component of the screen; comprised of eccentric counterweights

Support Beam- Heavy beam structure extending across the full width of the screen. The support beam transmits the motion generated by the vibrator motor to the screen body.

Operating Speed: Rotational vibrator speed, expressed in RPM; or the corresponding frequency of the screen vibration.

Resonant Speed: Speed at which the screen operating frequency corresponds to the natural frequency of the screen body-mass spring system - expressed in RPM.

Side Plates: Structural components of the vibrating screen body to which the screen support frames are attached.

Static Load: Loads in kilograms which the screen structure must support due to total screen mass (see Screen Installation Drawing).

1.4 Shipping, Receiving and Handling

Equipment is assembled as completely as possible for delivery, unless transportation in this manner is impractical, illegal, or may result in damage to the equipment. Items which are packed separately, for installation on site, include:

- Springs and Spring Bases
- Screen Surfaces
- Motors and ancillary drive equipment.
- Water Spray Systems
- Dust Enclosures
- Drive Guards

1.4.1 Check for Damage or Loss in Shipment

The equipment is thoroughly inspected and carefully prepared for shipment. However, it is possible for machinery to be damaged or lost in shipment.

Check each item carefully with the shipping manifest, freight bill or bill of landing.

Please inform the carrier immediately should you discover any damages or discrepancies. They will take your statement. This will assist in settling your claims promptly.

1.4.2 Handling Recommendations

Avoid body distortion or damage to screen side plates when lifting the screen, or when moving it from one location to another.

Wedge a 100 x 100mm wood spacer between the side plates close to the lifting points at both the feed and the discharge ends of the screen body to prevent bending or distorting of the side plates.

Position the 100 x 100mm wood spacers as shown below.

Raise the screen equally on all four corners, attaching the slings to the lifting lugs provided.

Use spreaders on slings to obtain vertical pull.

Refer to *Outline Installation Drawing* for static weights, screen dimensions, and location of lifting lugs.

> **CAUTION:**
> Be sure that the screen is not dropped or otherwise mishandled. Metso Minerals cannot assume responsibility for damage caused by improper handling after the screen leaves the factory.

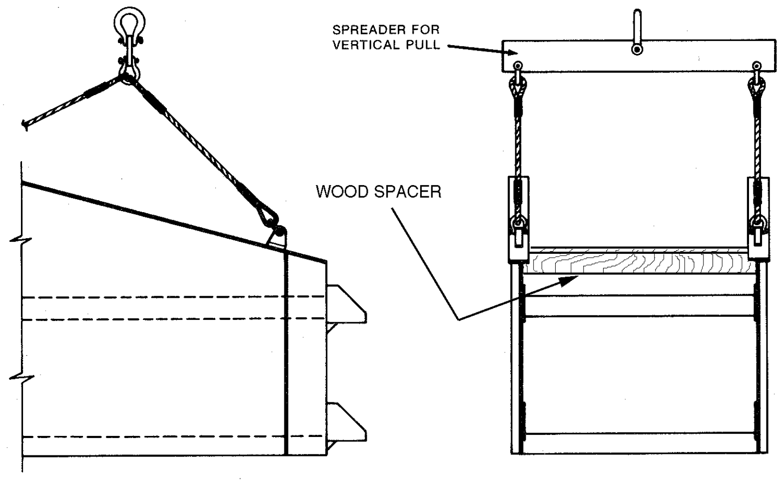

Figure 1.1 Use of spacers and spreaders when lifting the screen

1.5 Storage Considerations

Metso recommends storing screens in a building that is free of excessive moisture. If screens must be stored out of doors and exposed to the weather, protect them with well-fitted tarpaulins.

> **NOTE:**
> Periodically inspect all stored equipment for damage or corrosion, and take any necessary preventative measures.

Remove the screen surfaces from the screen body and store indoors to prevent corrosion damage or breakage from objects placed or dropped on the surface. If conditions do not warrant removal of surfaces, take precautions to prevent damage.

1.5.1 Mechanism Storage

Low-head mechanisms are shipped from the factory filled to the correct level with lubricating oil. This oil has a vapour corrosion inhibitor added that will prevent corrosion of interior mechanism parts for a six-month period, if the screen is not in operation.

If the screen and mechanism are to be held in storage for a period longer than six months, completely drain the oil after six-months and refill completely with oil.

1.5.2 Storage

Close off shaft openings with mastic tape to exclude moisture. Replace the housing breather vent with a plug (3041-0).

Provided that it has not been in storage for more than 60 days, the screen can be operated for up to 40 hours with the factory supplied oil.

Before putting the mechanism into operation (after more than 60 days in storage) drain the oil used for storage and refill the mechanism to the correct level with new oil.

If screen mechanism are taken out of services and stored for extended periods, take the following precautions to prevent corrosion damage to mechanism parts.

1. Drain the oil and refill completely with storage oil.
2. Close off shaft openings with mastic tape to exclude moisture.
3. Replace the housing breather vent with a plug (3041-0).

During storage, follow the same procedure as with new screens in storage. Use the same precautions when storing spare replacement mechanism.

1.6 Spare Parts

Wearing and replacement parts for Low-head screens are carried in stock by Metso Minerals (Australia) Limited. Spare parts are not included as standard equipment or regular machine purchases, but are ordered separately.

> **NOTE:**
>
> Long service life is a characteristic of properly maintained vibrator mechanisms. One reason for this is the use of precision bearings in these mechanisms, built to Metso specifications.
>
> Experience has shown that standard commercial bearings will not provide the same high level of performance, and that premature bearing failure can result in extensive damage to mechanism components.
>
> Precision bearings designed specially for your mechanism, are available from Metso Minerals (Australia) Limited. All mechanism parts including hardware, O-rings and gaskets should be carefully inspected whenever bearing replacement is required.
>
> Any damage to a mechanism or bearing housing resulting from the substitution of "standard" bearings will be the responsibility of the screen operator. Insist on "genuine" Metso replacement parts.

1.6.1 Recommended spare parts

To reduce down-time in emergencies, Metso recommends that, as a minimum, the parts listed in the *Recommended Spare Parts* list (attached) be held in your stock inventory.

If multiple units of the same size, or multiple mechanism or vibrator units of the same description (mechanism number and counterweight value) are being used in your plant, increase the recommended quantity of each item to best suit your situation.

A characteristic of Low-Head screens is that the mechanisms are fully encapsulated and housed separately from the vibrating body. Entire mechanisms can be removed as a unit and taken to a repair facility away from the plant area. This makes it practical to keep a spare mechanism on hand in "as-new" condition, as a change-out unit (especially where multiple identical mechanism units are in use), for interchange with a mechanism due for repair. This precaution keeps down-time for mechanism repairs at a minimum.

1.6.2 Ordering Spares

When ordering service parts, include the following information:

- Screen size
- Screen serial number – look for the serial number plate affixed on the screen side plate – or look for the serial number on the covering page of this manual
- Part description by name, along with catalogue numbers where applicable and part numbers
- Quantity of each part required
- Complete shipping instructions, including whether shipment should be via mail, express, surface or airfreight.

17/03/2006

RECOMMENDED SPART PARTS

Serial No.: A7640

Model.: Multi Flo Screen

Size.: 3.0m Wide x 8.5m Long Single Deck

Mechanism (s).: Twin 5-3

Item	Qty Per Screen	Rec. Order Qty	Description	Part Number	Price each Ex Works (AUD $)
1	2	2	Mechanism Breather	00-795-265-025*	$55.00
2	16	16	#5 Bolt Assembly	26-A10-099-801*	$150.00
4	12	6	Compression Spring – Outer	99-A40-001-009*	$790.00
5	12	6	Compression Spring – Inner	99-A40-001-010*	$222.00

NOTES:-

1) All prices are F.O.T Metso Minerals Newcastle Plant and are valid for 30 days from the above date.
2) Those items marked * are ex-stock, subject to prior sale.
3) Part Numbers ending with 801 or 802 etc, include hardware ie bolts, nuts, washers etc.
4) For Spare Parts enquires, please contact:-
   Telephone.: 02 4969 1200 or Facsimile.: 02 4962 2309
5) All the above items are painted to our standard Metso Minerals Paint Specification – Tan Beige

17/03/2006

RECOMMENDED SPART PARTS

Serial No.: A7641

Model.: Multi Flo Screen

Size.: 3.0m Wide x 8.5m Long Single Deck

Mechanism (s).: Twin 5-3

Item	Qty Per Screen	Rec. Order Qty	Description	Part Number	Price each Ex Works (AUD $)
1	2	2	Mechanism Breather	00-795-265-025*	$55.00
2	16	16	#5 Bolt Assembly	26-A10-099-801*	$150.00
4	12	6	Compression Spring – Outer	99-A40-001-009*	$790.00
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Telephone.: 02 4969 1200 or Facsimile.: 02 4962 2309
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2 Installation

Revision History	
29 April 2006	J Tonon Converted from Section_02A-Inst.doc

2.1 General Considerations

2.1.1 Foundations and Structural Supports

Screen location is usually determined by the process flow. The standard design configuration for Low-head screens is for base mounting on the supporting structure. Cable suspension can be provided as an optional arrangement.

The design of supporting structures and foundations for vibrating screen installations is complicated by the dynamic forces involved.

Review the specific conditions of your installation with an engineer who is experienced in this field. Maintenance requirements must also be considered during the structural design stage.

Provide adequate accessibility to screens to promote better servicing and repair.

CAUTION!

Vibration levels in the screen supporting structure should not exceed 10mm/s (peak level), measure at the bottom of the spring pedestals in tri-axial direction.

All exceptions from this requirement must be authorised by the Metso Minerals (Australia) Limited.

2.1.2 Feed and Discharge Arrangements

Arrange feed and discharge chutes to provide clearance for removing screen sections. Possible measures include bolting or hinging the discharge chute or arranging it for easy removal away from the screen.

Provide room to facilitate inspection of the screen body and mechanism, as well as access between the screen and hopper or flume to permit a man to get underneath the screen, if necessary.

CAUTION!

When installing the screen, maintain a minimum clearance of 76 mm (3”) between it and stationary spouts, chutes, hoppers, etc.

Screen movement will increase slightly in all directions during starting and stopping, when the mechanism speed coincides with the natural frequency of the screen and suspension.

For totally-enclosed screens with vibrating enclosures, provide sufficient slack in flexible feed and discharge fittings to allow for increased screen motion.

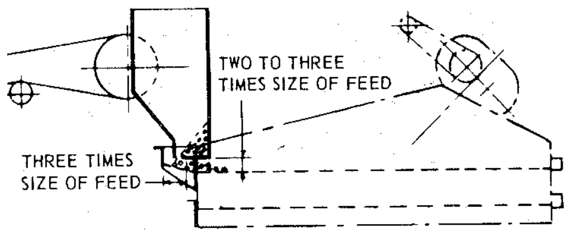
Several recommended feed arrangements are shown on the facing page.

For maximum screening efficiency, arrange the feed spout to distribute material evenly over the screen width, to utilise the full surface area.

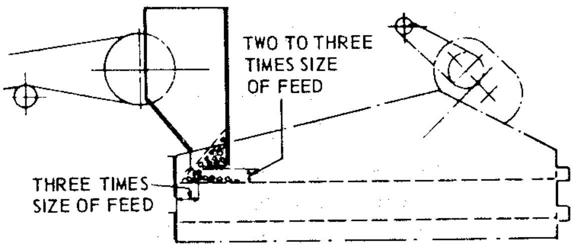
Reduce material velocity before it impacts the screen to prevent excessive surface wear. Design feed chutes to be approximately 305 mm (one foot) narrower than the screen width.

Feed boxes are recommended and available on new screens as a standard option.

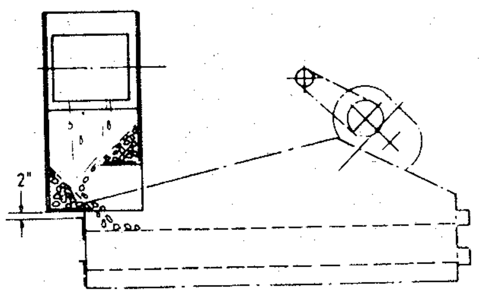
For small material (2.5" max.), using feed box.



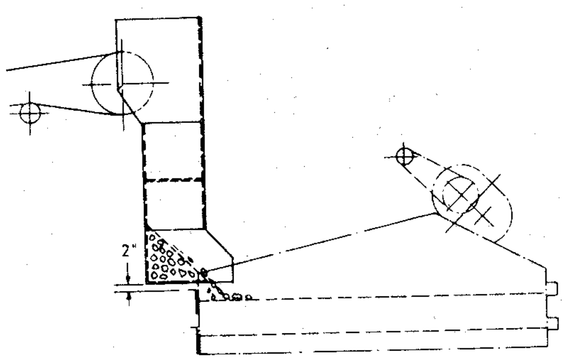
For small material (2.5" max.). without feed box.



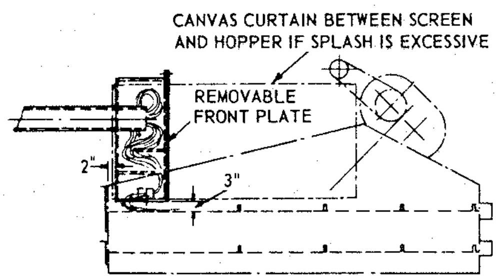
For small material, max feed size 2.5"



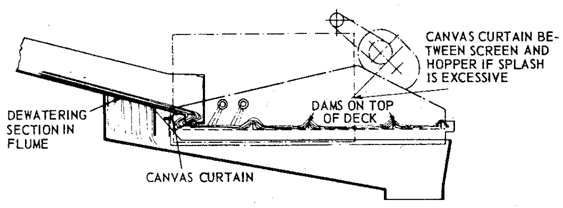
For two screens, max feed size 2.5"



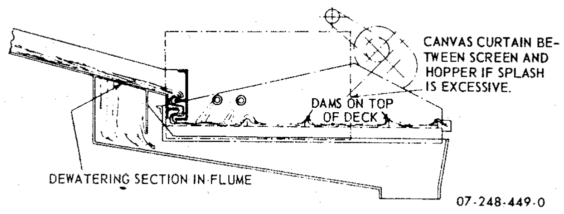
For slurries.



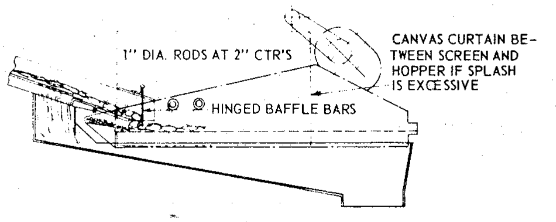
For de-watering and coal operations.



For de-watering and de-sliming, with baffles in feed chute to reduce feed velocity.



For feeding large material to de-watering screen.



NOTE:
Do not add skirt plates, baffle plates, feed boxes, discharge spouts, etc. to an existing screen without consulting the factory. Such additions will alter the location of the screen's centre of gravity and directly affect screen motion.

2.2 Installing Base-Mounted Screens

Standard base-mounted screens are furnished with pedestal-type support bases which can be mounted on and secured to either structural steel or reinforced concrete.

The concrete or steel supporting structure must be level and plumb. Use shims between the supporting structure and the spring bases, if necessary.

Figure 2.1 shows the fixed bracket mountings with four springs per mount, including two larger diameter outer springs and two smaller diameter inner springs. A spring-loaded **friction check** is located in the pedestal base.

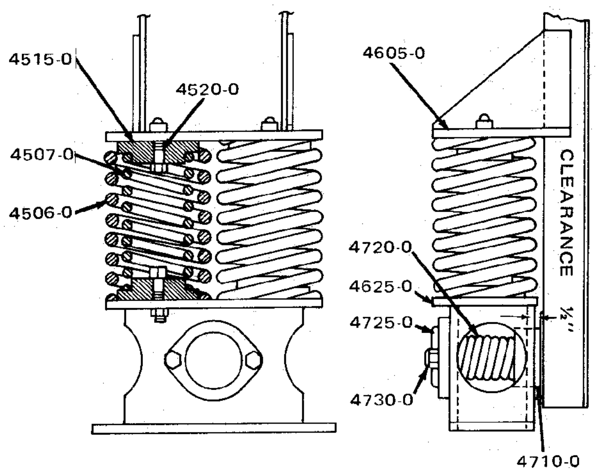


Figure 2.1 Fixed bracket mounting with inner and outer steel coil springs.

Catalogue Number	Description
4506-0	Outer Compression Spring
4507-0	Inner Compression Spring
4515-0	Spring Guide Washer
4520-0	Bolt, Washer and Locknut
4605-0	Fixed Support Bracket
4625-0	Spring Pedestal Base
4710-0	Friction Check
4720-0	Friction Check Spring
4725-0	Cover
4730-0	Cover-to-Support Base Bolt

2.2.1 Placing the Screen

1. Locate each pedestal base so that there is a 12.7mm (1/2") clearance between it and the friction check plate on the screen body. Be sure that the two pedestal bases on opposite sides of the screen at the feed and discharge ends are level with each other. Shim between the pedestal base and support structure to level, if necessary.
2. Assemble the steel coil springs on the spring guide washers located on the pedestal bases. If inner compression springs are provided, locate inner springs on the spring guide washers and then place the outer coil springs over the inner springs.

> **NOTE:**
> Set all supporting springs vertically.

3. Fixed bracket mounts are pre-installed so that they are set horizontally when the screen is located on the slope shown on the *Outline Installation* drawing.
4. Lower the screen in position on the supporting springs making sure that the bracket spring guides are properly seated on the springs.
5. Ensure that all supporting springs are positioned vertically on each pedestal base and located by the spring guides on the bases and support brackets.

> **NOTE:**
> If springs are not vertical, shift pedestal bases until vertical alignment is obtained.

6. Bolt pedestal bases securely to the steel or concrete supporting structure.
7. Install friction checks as shown in Figure 2.1.

2.3 Checking Spring Deflection

After the screen has been installed check to ensure that supporting springs have the same “deflected length” in comparison to the springs located on the opposite side of the screen at the same end of the screen (i.e. either feed end or discharge end). The deflected length of the springs may vary from one end of the screen to other.

> **NOTE:**
> The two spring sets at the feed end of the screen must have the same deflected length (± 3 mm) when compressed under the static load.
> The two spring sets at the discharge end of the screen must have the same deflected length (± 3 mm) when compressed under the static load.
> For future reference, these measurements should be recorded in the Installation Check List provided.

> **CAUTION!**
> Operating the screen with uneven support springs could result in premature failure of the screen body.

2.4 Drive Considerations

Use a high torque, 250% FLT, TEFC Industrial motor. The next larger size normal torque motor may be substituted, if the high torque motor is not available.

NOTE:

When locating motor bases for V-belt drives, be sure to allow for belt installation and tension adjustment.

A shorter centre distance (drive pulley to driven pulley) is required to allow easy belt installation.

A longer centre distance is needed for belt take-up and adjustment.

2.4.1 Motor Starter and Electrical Wiring

Across-the-line magnetic starters with the proper enclosure to suit the operating conditions are recommended for electric motors.

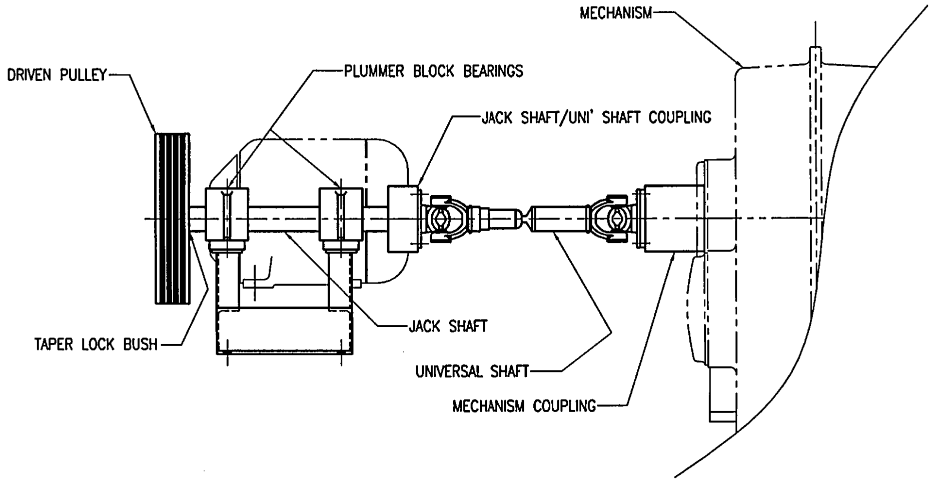
Most motors are high-torque, TEFC design. Follow the motor manufacturers notes (located in section 5 - if supplied with screen) on equipping starters, to take care of high momentary current requirements.

Install wiring to the motor in accordance with the relevant Australian Standards and requirements of any local inspection authority with jurisdiction in the territory in which the motor and starter are installed.

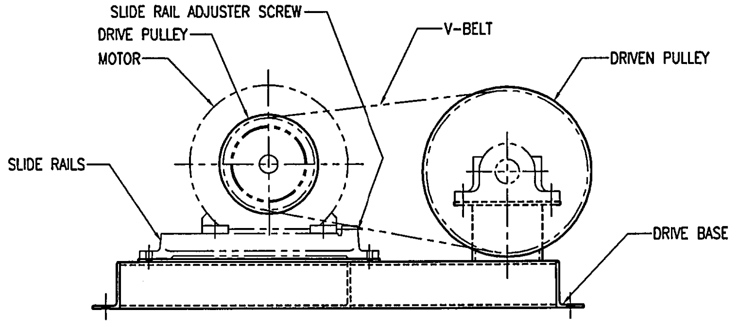
2.4.2 Motor Mounting – Centre & Inboard – RH or LH

After the screen is located in the proper operating position, install the motor on its independent mount. Be sure the motor is readily accessible for inspection and maintenance. It should be rigidly supported, level and mounted on the base with sufficient allowance for future belt take-up.

Install the motor after the screen has been mounted in the operating position. See Figure 2.2. Locate the motor as per the Outline Installation drawing as shown in Section 5 of the Manual.



OUTBOARD DRIVE ASSEMBLY
END ELEVATION



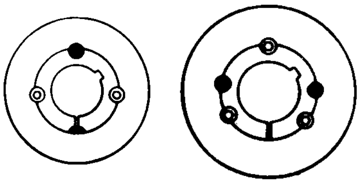
OUTBOARD DRIVE ASSEMBLY
ELEVATION

Figure 2.2 Drive motor mounted independently.

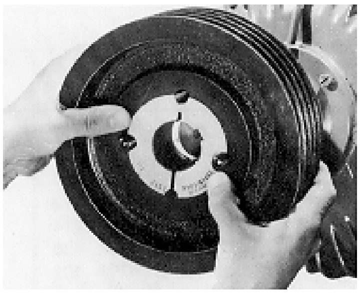
2.5 Taperlock Bushes

2.5.1 To Install Taperlock Bushes:

1. Remove the protective coating from the bore and outside of bush, and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or dirt, insert bush in hub so that holes line up.
2. Sparingly oil thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub, shown thus ⦿ in diagram.



3. Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will nip the shaft first and then hub will be slightly drawn on to the bush.



Insert screws and locate on Shaft

Tighten screws finger tight

Tighten screws alternately

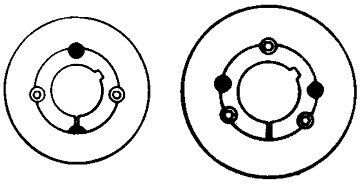
4. Using a hexagon wrench tighten screws gradually and alternately.

Bush Size	Number of Screws	Tightening Torque
1008	2	5.6 Nm
1108	2	5.6 Nm
1210	2	20 Nm
1610	2	20 Nm
2012	2	30 Nm
2517	2	50 Nm
3020	2	90 Nm
3535	3	115 Nm
4040	3	170 Nm
4545	3	190 Nm
5050	3	270 Nm

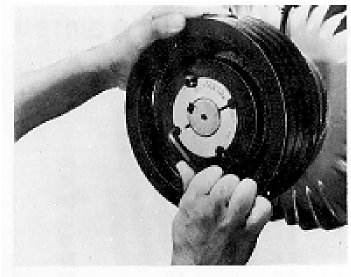
5. Hammer against large end of bush, using a block or sleeve to prevent damage. (This will ensure that the bush is seated squarely in the bore.) Screws will now turn a little more.
6. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.
7. If a key is to be fitted place it in the shaft keyway before fitting the bush. It is essential that it is a parallel key and has TOP CLEARANCE.
8. After drive has been running under load for a short time stop and check tightness of screws.
9. Fill empty holes with grease to exclude dirt.

2.5.2 To Remove Taperlock Bushes:

1. Slacken all screws by several turns, remove one or two according to number of jacking off holes shown thus ● in diagram.



2. Insert screws in jacking off holes after oiling thread and point of grub screws or thread and under head of cap screws.



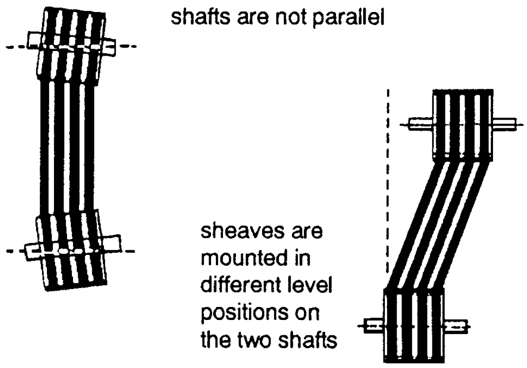
Removing a Taper Lock® bush

3. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.
4. Remove assembly from shaft.

2.6 Checking Drive Pulley Alignment

The V-belt drive must be carefully aligned in order to be able to transmit the design power and minimise wear on the drive belts. After fitting the pulley/bush onto the shaft, use a straight-edge to check that the belt pulley grooves are correctly aligned.

Common types of misalignment are shown below.



2.6.1 Fitting V-Belts

V-Belts are classified according to a length tolerance and matched sets in accordance with manufacturer's recommendations should only be fitted. The belts are installed as follows:

1. Adjust distance between shafts to the minimum that will allow the belts to be fitted without the use of screw drivers, levers etc.

CAUTION!

Never use tools to roll or pry belts into the pulley grooves. This can damage belt cords and lead to belt roll-over, short life or breakage. It is also a difficult and unsafe practice.

2. Insert the belts into the pulley grooves.
3. Calculate the peripheral speed of the belt pulley in accordance with the formula given in the diagram.
4. Tension the belts as specified by the higher value of the deflection force stated in the table below.

2.6.2 Adjusting Belt Tension

Belt tension should be checked after 50 hours operating time. Approximately 80% of the total elongation of the belts will occur during this initial period of operation.

Tension is controlled as follows:

1. Measure the distance between shafts
2. Check the necessary force for deflecting each belt 16mm per metre of distance between shafts.
3. Increase tension of belts if the necessary deflection force is less than what is stated in table, and vice versa if the deflection force turns out to be higher than that specified.

At normal operating conditions it is recommended to have a belt tension of approximately 80% of maximum deflection force stated in the table.

Increased tension may be necessary if start conditions are more severe.

If belts squeal during start-up or operation, refer to the *Trouble-Shooting Guide* in Section 3 for the appropriate action.

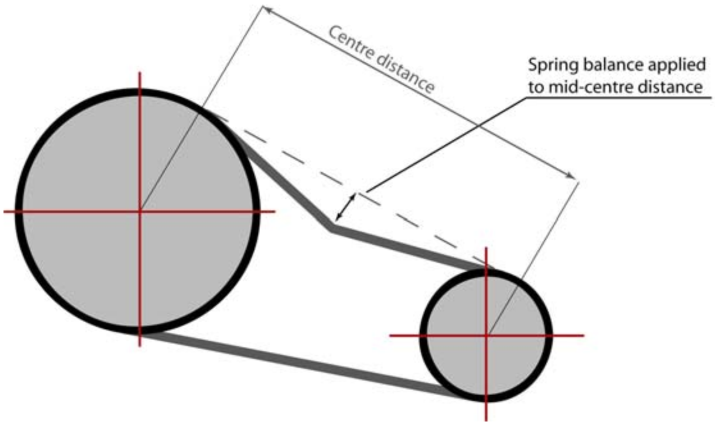


Figure 3: Belt tensioning diagram

Belt Type	Force required to deflect belt 16mm per metre of span		
	Small Pulley Diameter (mm)	Newton (N)	Kilogram force (kgf)
SPZ	56 to 95	13 to 20	1.3 to 2.0
	100 to 140	20 to 25	2.0 to 2.5
SPA	80 to 132	25 to 35	2.5 to 3.6
	140 to 200	35 to 45	3.6 to4.6
SPB	112 to 224	45 to 65	4.6 to 6.6
	236 to 315	65 to 85	6.6 to 8.7
SPC	224 to 355	85 to 115	8.7 to 11.7
	375 to 560	115 to 150	11.7 to 15.3

2.6.3 Drive Guards

The drive guards supplied with each screen are a Metso standard design, which allow for custom fitting on site. Metso Minerals ensures that the drive guards are designed in accordance with relevant Australian Standards, however, the final fitting, and approval for subsequent use is the responsibility of site operators and management.

Equipment users bear responsibility for the fitting of drive guards conforming to statutory requirements and safety rules. Guards must have no gaps or openings allowing personnel to reach inside and get caught in the drive.

WARNING!

Never operate belt-driven equipment without adequate drive guards, properly placed and secured. Do not be lulled into a false sense of security by a temporary or makeshift guard.

2.7 Installation Checks

1. Check for any damage which may have occurred during installation;
2. Check that the screen is installed at the correct slope.
3. Check clearance between the screen and surrounding structure for compliance with minimum spec;
4. Check hold-down bolt tightness;
5. Check that all replaceable liners are fitted - especially on feed box, feed chute and side plates;
6. Check that the screen deck is installed and tensioned correctly, and modular panels, if fitted, are secure;
7. Check that motors are correctly installed and conform to manufacturer's specifications. Verify that rotation checks have been signed off, and rotation is correct;
8. Check that all guards are secure and will not interfere with drive belts and pulleys;
9. Check drive arrangement for loose items, and correct belt tension;
10. Check mechanism lubrication. Note that factory-supplied lubricant is not to used for more than 40 hours operation. Any auto-lube systems must be checked for correct operation;
11. Ensure that the design operating speed is known and that actual operating speed can be verified on start-up and recorded;

3 Operation

Revision History	
May 2002	2nd Issue: Pages 1 and 13 up-dated.
11 January 2005	W. Lewington Converted from 2602-LH-03B.doc . Altered Critical Speed diagram to suit Banana Screen.
16 January 2006	Changed file name and added headers and footers. Preparation for changeover to NC.

3.1 Safety Considerations

Be extremely cautious when moving near steel coil springs because there is risk due to nip points between the spring coils.

There should always be a suitable clearance between the screen body and adjacent structures and components in order to avoid nip risks and to allow the screen body to move freely.

Always make sure that all safety guards are fitted prior to operation.

If possible, avoid welding work on the screen body. Such work can increase stresses in the plates and possibly damage the screen body.

Be extremely observant when moving around vibrating screens in operation.

To avoid injuries, always wear a safety helmet and protective goggles.

3.2 Pre-Commissioning

1. Check for any damage which may have occurred during installation.
2. Check that the screen is installed at the correct slope.
3. Check clearance between the screen and surrounding structure for compliance with minimum spec.
4. Check hold-down bolt tightness.
5. Check that all replaceable liners are fitted - especially on feed box, feed chute and side plates.
6. Check that the screen deck is installed and tensioned correctly, and modular panels, if fitted, are secure.
7. Check that motors are correctly installed and conform to manufacturer's specifications. Verify that rotation checks have been signed off, and rotation is correct.
8. Check that all guards are secure and will not interfere with drive components.
9. Check drive arrangement for loose items.
10. Check mechanism lubrication. Note that factory-supplied lubricant is not to used for more than 40 hours operation.
11. Ensure that the design operating speed is known and that actual operating speed can be verified on start-up and recorded.
12. Check that all ancillary devices are securely installed and do not interfere with operation of the screen.

3.3 Commissioning

3.3.1 Before Introducing Feed Material

Check for abnormal noises.

Check the operating speed and throw (see Page 3-4).

> CAUTION!
>
> If an abnormal speed condition exists, contact Metso Minerals immediately.
>
> Operation of the screen prior to Metso review and approval of the screen commissioning throw cards may void the warranty and result in premature failure of the equipment.

Check the mechanism(s) for oil leaks.

Check that vibration in the surrounding structure is not adversely influenced (increased significantly) by operating the screen.

> CAUTION!
>
> Do not continue operating the screen without rectifying any abnormal conditions identified in the pre-commissioning and commissioning checks.

3.3.2 After The Screen Has Been Operating For One Hour

Check hold-down bolts for tightness.

Check compression of screen suspension springs is consistent with measurements recorded during screen installation
(refer to *check sheets* located in the covering pages of this manual).

Check that all components of the screen deck are secured/tensioned correctly.

Check the temperature of the mechanism bearings and lubricating oil.

Check for loose bolts.

3.4 Checks on Critical Speed

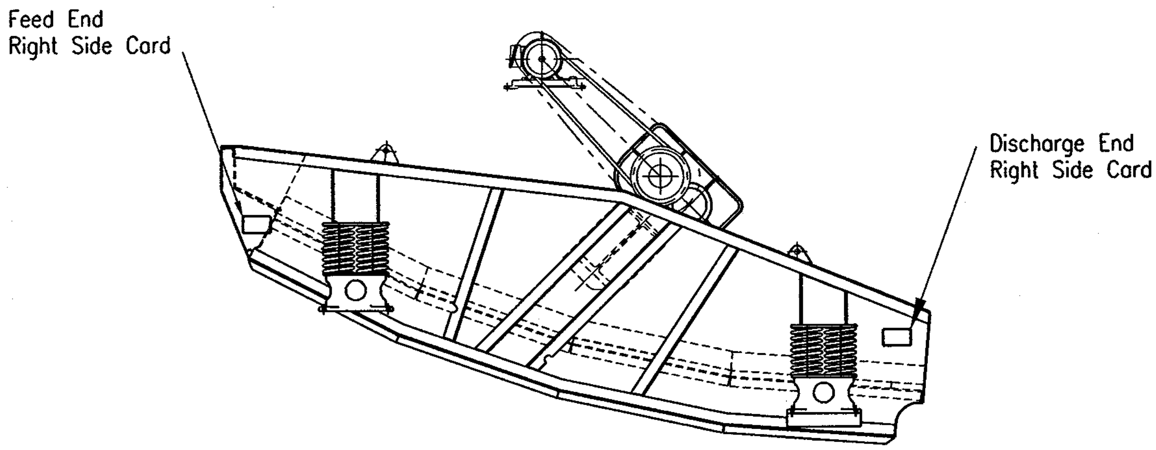
Critical speed (as related to vibrating screens) is defined as the natural frequency of the screen body. This is not the same as the natural frequency of the screen body/suspension spring system, which can be observed at low speeds during the starting and stopping cycles.

Critical speed depends on screen body stiffness, mass balance and bolt tightness. Although screen suspension does not normally affect critical speed, uneven compression of suspension springs can alter the screen's motion pattern.

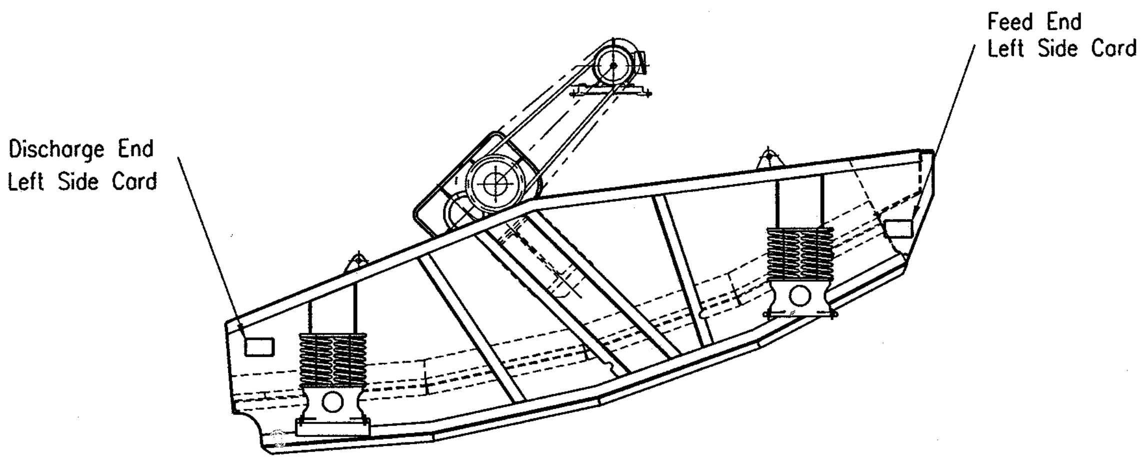
> **IMPORTANT**
>
> Do not operate the screen above or below the speed shown on the cover page of this manual without first consulting Metso Minerals.

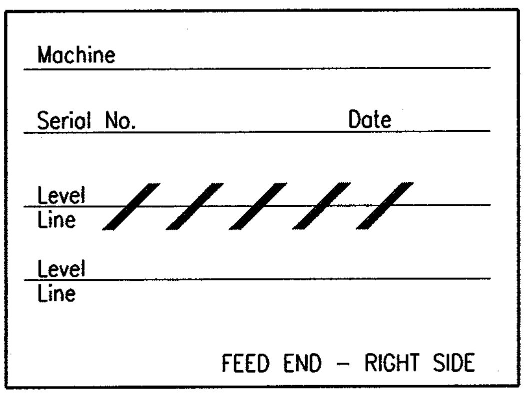
Make the following checks on critical speed conditions after installation checks are completed:

1. Securely fasten **throw cards** to the screen body in the four corner positions, using adhesive or masking tape. A master layout for the required throw cards is attached. Position cards on approximately the same location on both feed end and discharge end corners. After cards are attached draw a true horizontal line on the top of each card so that the true angle of motion can be determined.
2. Use any support which enables you to hold a pencil or fine-point pen securely at the same height as the cards. Place the bottom of the support on the floor, vertical to the cards, so that a pencil or ballpoint pen supported or secured to the support just touches the card. It is NOT possible to accomplish this by holding a pencil freehand against the cards.
3. With screen operating at full speed and pencil or fine-point pen at right angles to the side plate, momentarily touch the card in a series of spots. Be sure pencil or fine-point pen is held firmly and rigidly to prevent any secondary motion.
4. Fill out each of the four test cards, noting where each card was attached to the screen. List the serial number and where, when and by whom the test was conducted.
5. If the motion pattern recorded on the feed end cards is not similar to each other, a critical speed condition may have developed. A critical speed condition usually exists if the amplitude of the screen on two diagonal corners is considerably smaller than on the other two diagonal corners. When this condition exists, the screen body usually has a slight side vibration. Therefore, the full motion may not be recorded on the card when the pencil is held at right angles to the side plate.



Locate Throw Cards in the same position
on both Feed End corners
and both Discharge End corners.





THROW CARD

If a critical speed condition does exist, check the following:

1. Compression of the suspension springs. Ensure that springs at feed and discharge end are compressed alike.
2. Screening surface and clamps. Be sure they are tight.
3. If screening surface is clogged with build-up of packed material on surface, remove packed material and clean the surface, as well as body parts such as support frames.
4. Bolts for tightness.

After all these points have been checked, make a second test pattern on the same cards. If the motion pattern is still uneven from side to side at each end of the screen, forward four test cards to the address given below, marked with the information requested. Do this promptly, as continued operation of a screen in critical speed may cause damage to the screen body.

All test cards are to be marked with the screen serial number and mailed to Metso Minerals (Australia) Limited at the address provided on the covering page of this manual.

3.5 Trouble-Shooting

3.5.1 Screen Stoppage

Possible Cause	Symptoms/Corrective action
Overheating of Mechanism	Too much or too little lubricant will cause bearing to overheat and lose internal diametrical clearance, resulting in seizing of bearing. Check the oil level. Correct level, and allow mechanism to cool prior to restarting.
Failed Bearing	After the mechanism has cooled, rotate it by hand for indication of bearing trouble. If the mechanism does not rotate freely, one or more bearings may have failed. Replace all mechanism bearings after thoroughly cleaning out the mechanism housing.
Rubbing in labyrinth seal	Check labyrinth groove on outer face of the bearing seal plate for possible build-up of fine material. This could cause frictional heat resulting in bearing seizure. Clean out grooves. Check seal plate bolts for tightness. Check gasket thickness between seal plate and bearing housing. Gasket thickness for all mechanisms is 0.794 mm.
V-Belt Drive (if fitted) (See also; page 3-8)	Belt breakage or jumping off pulley resulting in loss of speed and bogging down of screen. If necessary to replace belts do so in matched sets to maintain uniform belt stretch. Loss of belt tension due to a motor coming loose on support and not maintaining required belt centres or. On cable-suspended screens the tension spring assembly not installed correctly, or having come loose or broken (check tension spring assembly as per instructions). Locate spring on building structure with cable attached to screen body.
Power Failure	Check power and motor leads
Thrust loading of bearings.	Allow mechanisms to completely cool down, then check for proper end float. Follow the procedure detailed in Section 4.

3.5.2 Uneven Screen Motion

Possible Cause	Symptoms/Corrective action
Build-Up Material	Material clinging to the screen becomes dead weight and will affect both throw and motion. Inspect screen surfaces, support frames, boxes and discharge spouts for material build-up. Remove all material from body.
Screen Support	Inspect springs for indication of coil breakage or possible build up of material around spring coil. Check possible setting of building support beams. Check level of all support points. On cable-suspended screens, check height of suspension springs. It is important that the suspension spring compression is equalised and that the screen is level. Uneven compression of the springs may cause distortion in the screen body - resulting in uneven vibration.
Critical speed	Refer to the instructions for checking the critical speed on page 3-4.
Feed arrangement	Check feed arrangement to screen. Check for possible surge loading of screen. Install a surge hopper ahead of screen to provide an even steady feed rate.
Loose body parts	Check all body bolts for tightness. Inspect screen surface for possible looseness.

3.5.3 Spring Breakage

Possible Cause	Symptoms/Corrective action
Uneven loading	It is important that loading of springs be equal to avoid possible bottoming and overstressing of spring. Check spring alignment.
Corrosion	Inspect springs for corrosive action. If necessary, spray or dip springs in corrosion preventive mixture.
Wobble	Excessive wobble will result in reduced spring life. Refer to Metso for recommendations on eliminating spring wobble.
Material build-up	Material build-up around spring coils will reduce number of active coils and increase spring stress, causing premature failure.
Unlike springs	It is important that pairs of springs be of like characteristics: height, wire diameter, outside diameter and spring rate. Unlike springs can cause uneven loading and premature failure.

3.5.4 Loss Of Amplitude (Throw)

Possible Cause	Symptoms/Corrective action
Material build-up	Material build-up on the screen will increase body weight and cause a decrease in throw. Remove the build-up.
Belt slippage	Loss of speed will result in reduced conveying capacity and increase bed depth and body weight - resulting in decreased throw. Replace worn belts and pulleys.
Power fluctuation	Low plant voltage can result in slower motor speed with results similar to those stated in 'belt slippage'

3.5.5 Loss Of Oil

Possible Cause	Symptoms/Corrective action
Loose plugs	Check all plugs in housings for possible looseness.
Worn bearing	Excessive wear in bearing results in oval motion of seal and subsequent loss of oil. Replace all bearings.
Housing vent	Check housing vent for possible looseness. Excessive dripping of oil from top vent indicates too much oil in mechanisms.
Seal leakage	Oil seal not assembled in seal plate correctly. Damaged seal. Damaged contact area on drive shaft. Remove the seal plate and inspect thoroughly Air pressure build-up in the housing due to a clogged housing vent can cause oil leakage through the seal Clean out the vent to correct.
Damaged gaskets	Check all gaskets for possible leakage or damage
Cracked housing	Check housing for possible cracks. It may be necessary to run mechanism until housing is hot before cracks can be observed.

3.5.6 V-Belt Drive (if fitted)

Possible Cause	Symptoms/Corrective action
Belt Slip	Grooves are shiny, not enough tension.. Increase tension - refer to section 2. Overloaded drive.. Correct overload condition.
Drive belts squeal (during operation)	Overloaded drive.. Correct overload condition. Not enough arc of contact.. Increase centre distance. Heavy starting load.. Increase belt tension. Look for ways to reduce load.
Mismatched belts	New belts installed with old.. Replace with full matched sets only. Improper groove angle - worn groove. Replace pulley Non-parallel shafts.. Realign drive - refer to section 2.
Belt turned over	Cord broken due to prying or forcing on belt and pulley Correctly replace new set of belts. Overloaded drive.. Correct overload. Impulse loading.. Apply proper tension - refer to section 2. Pulley and shaft misaligned .. Realign drive - refer to section 2. Worn pulley grooves.. Replace pulley
Breaking belts	Shock loading.. Apply proper tension - refer to section 2. Recheck drive alignment - refer to section 2. Review machine installation for ways to relieve shock load conditions. Foreign objects in drive.. Provide drive shroud
Belts wear rapidly	Pulley grooves worn.. Replace pulley - refer to section 2. Mismatched belts.. Replace with matched belts! Belts slipping.. Increase tension - refer to section 2. Pulleys misaligned.. Realign drive arrangement Grease on belts.. Eliminate source of grease. Clean belts with soap and water.
Loss in driven speed	Belt slipping .. Shut down drive and test pulley temperature by feel. Excessive heating can result from belt slippage .. Increase tension - refer to section 2.

3.6 Lubrication

Low-Head screen mechanisms are oil lubricated, with continuous splash lubrication during operation, as the counterweights pass repeatedly through the reservoir pool of oil in the housing's lower portion. Splashing action causes an oil spray inside the mechanism enclosure during operation, and assures an adequate distribution of lubricant to the bearings and gears.

The lubricant used in screen mechanisms must meet a variety of requirements. The primary demand on oil lubricants is the ability to support load, while minimising bearing wear. Secondary demands include protection against corrosion formation, resistance to oil deterioration and heat transfer capability.

The recommendations which follow are general in nature, but have been found to give good results under most operating conditions. In any specific problem area, consult the nearest Metso Minerals Field Service Engineer.

Operators of multiple units of vibrating screens should note that the same oil lubricant specifications apply to both Low-Head and Ripl-Flo screens with oil lubricated mechanisms. However, depending on variations in ambient conditions for specific screen locations, it may be advisable to use oils with different viscosities because of temperature variations, refer to the lubricants listed in the table on page 3-11.

The oil lubricant should conform to the following specifications for high quality extreme pressure gear oils:

- High stability against oxidation with mild extreme pressure characteristics.
- Minimum foaming tendency.
- Neutralisation number for an oil that will not attack highly polished anti-friction bearings over long operating periods.
- Timken film strength of 21 kg minimum.
- Minimum viscosity index of 90 must be a natural property of the oil.
- Oil viscosity in the following temperature ranges, with some allowable variance for manufacturing tolerances.

These oils have much greater film strength, adhesiveness, resistance to shock loading and lower pour points than straight mineral oils of the same viscosity. Reputable brands are sufficiently stable and non-corrosive, and will not attack roller bearing surfaces.

Table 3.1 ISO/ASTM Viscosity System.

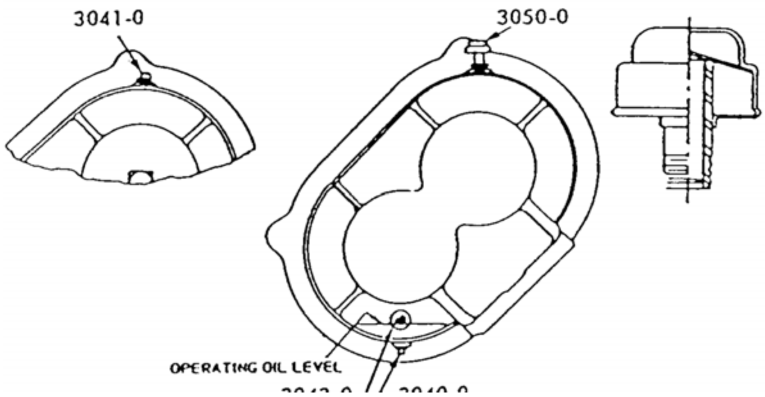
Property	ISO VG 150	ISO VG 220	ISO VG 320
Mid-point Viscosity cSt at 40 ^{O}C min.	150	220	320
Min. Kinematic Viscosity cSt at 40 ^{O}C	135	198	288
Max. Kinematic Viscosity cSt at 40 ^{O}C	165	242	352
Viscosity index	90.	90	90
Pour Point max.	20^{O}C.	15 ^{O}C	15 ^{O}C
Timken OK Load min.	21 kg	21 kg	21 kg

CAUTION!

Depending on the ambient temperature conditions, only 220 or 320 grade oils should be used for **Number**5 and 5 ½ type mechanisms

3.6.1 Oil Fill Quantity

The amounts listed below should be sufficient to bring oil level in the lower portion of the mechanism housing to the operating level, which is determined by the housing **oil level indicator plug** (3043-0). Maintain oil level at this point at all times.



Mechanical Size	Quantity (Litres)
1	0.95
2	1.9
3	2.3
4	5.6
5	13.2
5 ½	14.2

3.6.2 Checking Oil Level

1. Stop the screen for a sufficient length of time to allow all oil to drain to the bottom of the housing.
2. Remove the oil level indicator plug from housing.
3. The correct oil level is to the bottom edge of the indicator hole.

> CAUTION!
> The oil level plug should only be removed when the screen is not in operation. Replace the plug before resuming screen operation.

3.6.3 Adding Oil

Remove the breather vent (3050-0) on top of the housing.

Add only enough oil to bring the reservoir pool to the correct level.

> **CAUTION!**
> Never add oil without first removing the oil level indicator plug.
> Do not exceed the indicated oil level. Too much oil in the housing will cause overheating, and may cause motor overloads to trip.

3.6.4 Checking Oil Temperature

Stop the screen and insert a thermometer into the oil pool through the hole for the housing oil level indicator plug.

NOTE

Oil temperature rise over that of the surrounding air should stabilise at no more than 32°C. New mechanisms may run at a slightly higher temperature during the running-in period.

If higher than recommended temperature readings are experienced during normal operation, check the lubrication specification and make certain that the oil level is not too high.

3.6.5 Recommended Lubricants

A tabulation of lubricating oil suppliers and brand name of products which have been found to give good results under the specified conditions. These are offered only as typical examples, and other brand names may be used with equally good results.

Supplier	Ambient Temperature Range		
	5 to 38°C	**30 to 50°C**	**39 to 66°C**
Ampol	Gearlube-SP150	Gearlube-SP220	Gearlube-SP320
BP	Energol GR-XP15	Energol GR-XP220	Energol GR-XP320
Castrol	Alpha SP150	Alpha SP220	Alpha SP320
Caltex	Meropa 150	Meropa 220	Meropa 320
Esso	Spartan EP150	Spartan EP220	Spartan EP320
Mobil	Mobilgear 629	Mobilgear 630	Mobilgear 632
Shell	Omala Oil 150	Omala Oil 220	Omala Oil 320
Valvoline	Valmega 150	Valmega 220	Valmega 320

3.6.6 Oil Change

Drain the oil from the mechanism after the first **40 hours of operation**.

Oil should be drained from the mechanism as soon as possible after screen shutdown, while it is still warm and drains easily.

Following the initial oil change, subsequent oil changes should occur at regular intervals.

The recommended interval between oil changes is 1000 operating hours, or six months, whichever comes first.

At the same time, check the housing for oil leaks. And tighten bolts if necessary.

To change the oil, proceed as follows:

1. Remove the oil drain plug (3040-0), housing oil level indicator plug (3043-0) and housing breather vent (3050-O).

> **IMPORTANT**
> Before removing the vent and plugs, wipe the area around them clean to avoid getting contaminants inside the mechanism through the opened parts

2. After the oil has drained completely reinstall the drain plug (3040-O).
3. Add the correct grade of new oil through the port exposed by removing the housing breather vent (3050-0).
4. Add oil until it overflows out of the port exposed by removal of the oil level indicator plug (3043-0).

> The approximate quantity of oil required for the mechanism is listed in Section 3.6.1.

5. Clean the housing breather vent (3050-O) and install.
6. Install the oil level indictor plug.

4 Care and Maintenance

Revision History	
29 April 2006	J. Tonon Updated from 2602-MFLH-TM-04.

4.1 General Considerations

Follow a systematic pattern of regular inspection and keep a log of the periodic inspections and maintenance-related activities for each screen. Metso Minerals recommends that any log of maintenance performed on the equipment include the following:

- Machine serial number;
- Date and description of maintenance activity; and
- Operating hours and Tonnage produced since installation

One of the best rules in screen maintenance is to keep a record of actual operating hours. After a predetermined operational period, give the screen a thorough major inspection. The length of time in this initial operating period will vary with the type of application and can best be determined by experience.

Examine new equipment after a relatively short operation period. Then lengthen the time before the next major inspection. Follow this system until you have a pattern that best suits your installation, and adhere to it as your operating schedule.

Systematic inspection will result in less maintenance and consequently lower repair bills. Maintenance checks will help detect wear and other problem areas before they cause serious damage.

4.2 Routine Maintenance Schedule

4.2.1 Daily Checks

Screen Mechanism Refer to Section 3 for lubrication procedure.	Check mechanism oil level. Remove oil level indicator plug in housing. Check oil level prior to screen start up. In case of continuous operation, stop screen a sufficient length of time to allow all oil to drain to the bottom of the housing. Proper oil level will result in a steady drip from indicator hole. Check mechanism vents. Clean or replace if necessary. Check for any indication of loose mechanism bolts
Drive Assembly Refer to Section 2 for V-belt adjustment procedures.	Check V-Belt drive for indication of looseness, turning, wear or breakage. Replace belts in sets to maintain uniform belt stretch. Check drive and drive pulleys for possible looseness. Check alignment of pulleys (visual check only) Be sure guards are secured in place.
Screen Body	Check for possible interference between screen body and stationary hoppers, chutes and building beams due to material build-up or insufficient operating clearance. Check screen decks for blinding, or build-up of material. Remove if present. Check deck arrangement for possible loose, or damaged surface, clamp bars/bolts, hold-down bars/bolts, buffer strips. Note that top deck wear (and damage) is usually much more severe than on lower decks. With screen running, check for loose bolts or parts. Stop screen prior to tightening of bolts or parts to avoid possible personnel injury. With screen running, check pattern of material flow over screen decks. Bed should be evenly distributed over full width of screen.
Screen Mounting	Check spring compression for even loading Check springs for breakage or material build-up around the coils Check snubber assembly.

CAUTION!

Do not continue operating the screen without rectifying any abnormal conditions identified in the daily maintenance checks.

4.2.2 Weekly Maintenance Checks

Screen Mechanism	Check oil or for indication of contamination (metal particles similar to fish scales indicates spalling of bearing). If present, flush out mechanism and refill with correct amount of new oil. Refer to Section 3 for lubrication procedures. Check mechanism while running for possible noise.
Screen Body	Check side plate for loose bolts, excessive wear, or possible cracking. Repair per instructions. Check screen surface for wear, looseness or breakage. Check perforated plate hold-down bolts. Check clamping bars for looseness and excessive wear. Check support frames thoroughly for wear cracking or breakage. Repair if necessary per instructions. Check buffer strips for wear. Worn buffer strips will reduce deck camber, resulting in loss of screen surface support and premature failure of deck cloth. Check the compressed length of the screen suspension springs and record any variation from the measurements recorded when the springs were initially installed.

CAUTION!

Do not continue operating the screen without rectifying any abnormal conditions identified in the weekly maintenance checks.

4.3 Screen Repair

On-site repairs are an integral part of successful operation and maintenance of the screen. It should be noted however that, when carried out by the operator, certain on-site repair work must only proceed after consultation with Metso engineering personnel.

Metso Minerals (Australia) Limited will provide supervision for on-site repair works if requested, and can also offer training for site maintenance staff, thus ensuring that the most effective methods are employed in future repair work.

Major repairs may necessitate urgent replacement of components to avoid total structural failure.

4.3.1 Screen Design Considerations

Screen designs are continually being developed to minimise the need for difficult repair work and maximise the use of replaceable sacrificial parts as part of a regular maintenance program. Examples of these developments include:

- replaceable wear liners
- replaceable subframe/deck support items

For all options to maximise maintenance advantages on Metso Minerals screens, please consult Metso Minerals at any time.

Friction grip bolts are usually employed to secure components which will be dismantled for maintenance purposes (Eg. mechanism, liners etc..). For certain applications, Metso Minerals has permitted the use of huck bolts on its equipment. Unless a replacement bolt is being used where originally installed, please contact Metso Minerals to establish whether huck bolting is appropriate.

CAUTION!

If (without any clear reason) huck bolts breakage occurs, contact Metso Minerals for advice immediately - the performance/integrity of the screen may be adversely affected if the cause of the breakage is not identified, or the bolt is not replaced, as soon as possible.

4.3.2 Emergency Screen Repairs

In the event that site personnel elect to repair any Metso screen without consulting Metso Minerals (Australia) the following recommendations apply.:

Adding holes to the screen body

Do not cut holes in the vibrating body with a oxy-torch - it will induce stresses around the cut area. When it is necessary to add holes to the vibrating body in the field, DRILL THEM.

> **NOTE:**
> Flame-cutting on the vibrating body in field will be done at the operator's responsibility.

If holes are **inadvertently** cut in the body with a torch, file or grind the edges of the hole smooth. Failure to remove indentations may cause cracking due to the stress concentration.

Items which cannot be welded (due to stress relieving):

All screens larger than 2.0 metres wide are subject to stress relieving of welded (critical) components, including:

- Support Frames
- Mechanism Beam
- Individual/Integral Cross Members
- Feed and Discharge End Channels

> **CAUTION!**
> On no account must these items be weld repaired before consultation with Metso Minerals personnel - to establish a suitable procedure for rectifying the problem.

Items which cannot be welded (due to component criticality):

On all screens the side plates are manufactured without any welding in critical areas. On screens larger than 2.0 metres wide, there is no welding allowed, and all interfacing components are bolted to the side plates. Therefore, in the first instance, repairs to the side plates must be a drilling and bolting operating. If any welding absolutely necessary seek advice from Metso Minerals (Australia) before commencing work.

4.4 Mechanism Disassembly, Repair and Re-Assembly

The short shafted, encapsulated design of LOW-HEAD mechanisms makes it possible to remove a complete mechanism unit from the screen for repair and install a spare replacement unit in its place to minimise screen down time while repairs are being accomplished.

Metso offers a comprehensive and cost effective mechanism refurbishment and exchange program. This will ensure mechanism availability and reliability, and also offer warranty support after fitting an overhauled mechanism.

> **CAUTION!**
> Incorrect setup of a mechanism during repair or overhaul can result in premature screen structural failure, preceded by reduced equipment performance.

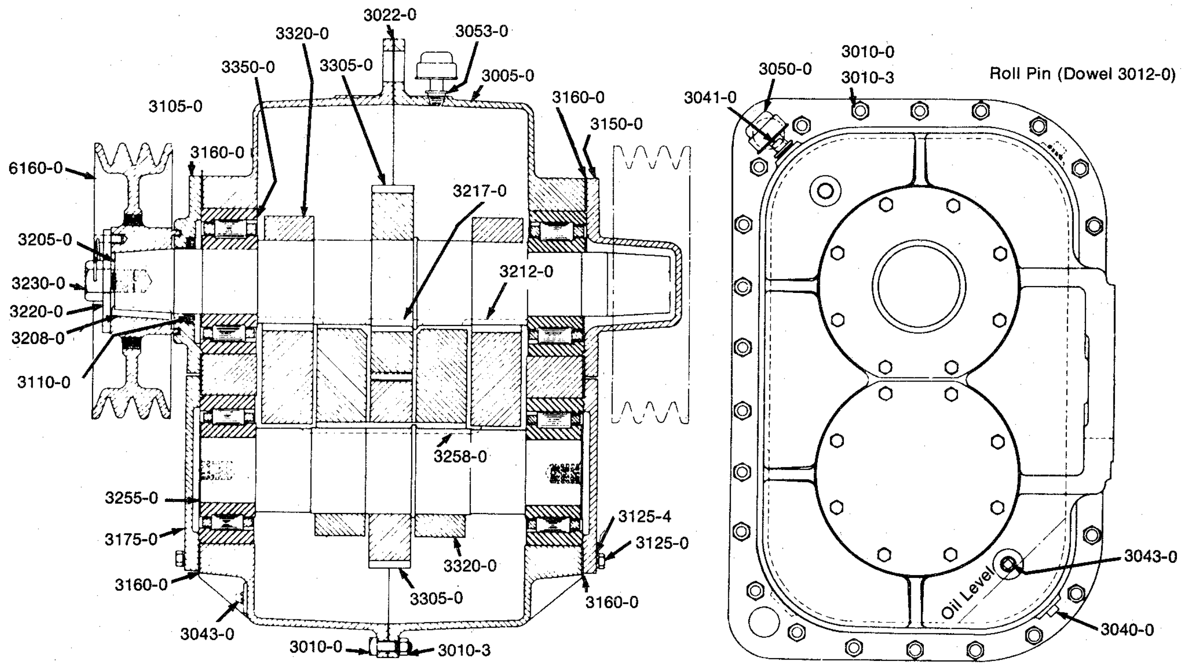


Figure 4.1 Typical Cross Section through Low-Head Mechanism.

Cat. No.	Description
3001-0	Mechanism Assembly complete
3005-0	Mechanism Housing
3010-0	Bolt -- housing halves
3010-1	Nut
3010-2	Washer
3010-3	Locknut
3010-4	Lockwasher
3012-0	Dowel -- housing halves
3022-0	Gasket -- housing halves
3040-0	Plug -- housing drain
3041-0	Plug -- housing inlet
3043-0	Plug -- housing oil level
3050-0	Vent--- housing breather
3053-0	Reducing Bush -- vent
3105-0	Bearing Cap -- drive end
3110-0	Oil Seal -- drive shaft bearing
3125-0	Bolt -- seal plate or bearing cap

Cat. No.	Description
3125-4	Lockwasher
3150-0	Bearing Cap, non drive end
3160-0	Gasket -- bearing cap
3175-0	Bearing Cap -- driven shaft
3205-0	Drive Shaft
3208-0	Key – mechanism sheave
3212-0	Key -- countertrweight to drive shaft
3217-0	Key -- gear to drive shaft
3220-0	Retainer
3230-0	Bolt -- retainer to drive shaft
3230-4	Lockwasher
3255-0	Driven Shaft
3258-0	Key -- gear and counterweight
3305-0	Gear
3320-0	Counterweight
3350-0	Bearing
6160-0	Mechanism sheave

4.4.1 Mechanism Disassembly

Before attempting to work on a mechanism, study the parts relationship on the cross sectional view, Figure 4.1. Disassemble the mechanism for inspection, or to replace bearings, gears and other parts, following this sequence.

1. Drain oil from the mechanism by removing the oil drain plug (3040-0) and housing breather vent (3050-0). See Section 3 for the quantity of oil to be handled for each mechanism.
2. Remove mechanism hold-down through and tap bolts (3420-0 and 3425-0). Note that these fastening devices are torqued up tightly during installation.
3. Penetrating oil will aid in loosening nuts and tap bolts. Avoid damaging the fits between the mechanism support and housing feet. Replace any damaged fastener parts before assembly.

> **NOTE:**
> Do not attempt to change the bearings without removing the mechanism from the screen.

4. Use a lifting device to remove the mechanism from the support beam. There are two cored holes in the housing flange for lifting. Take the mechanism to an authorised Metso Minerals screen service facility or other clean workplace for dismantling and rebuilding.
5. Place the mechanism on its side, on wooden supports, with the mechanism sheave side up (Figure 4.2). Remove the mechanism sheave and the bearing cap on the drive shaft (3175-0). At this point, check the accessible end of the driven shaft and determine if it has a tapped hole that can be used for lifting purposes. If the hole is not on the accessible end of the shaft, replace the bearing cap and turn the mechanism over. This should make the tapped end of the shaft accessible for later use in lifting the shaft. The driven shaft is tapped on one end only, except for No.1 mechanism, while the drive shaft is tapped on both ends.
6. Remove the bolts (3010-0) holding the housing halves together. Roll pins for specific mechanism sizes are located on Figure 4.2. Remove both roll pins (3012-0). The roll pins serve as dowels to accurately locate the housing joint and maintain the correct bearing and shaft alignment.

> **NOTE:**
> Replace roll pins with every mechanism assembly.

7. Two tapped holes are located in opposite corners of the housings, at the joint, for mounting jacking screws (See Figure 4.2 for location). To part the housing halves, take two of the joint bolts previously removed in Step 5 and insert them in the two tapped holes for use as jacking bolts. Work both screws, on opposite corners of the housing, at the same time to prevent binding. Remove and discard the housing gasket (3022-0).
8. Insert two eye-bolts (See Figure 4.2 for eyebolt diameter) in the two tapped holes designated for this purpose. Secure a safety hitch through each eye-bolt and raise the upper housing half with a lifting device.

> **CAUTION!**
> Be careful when raising the housing half (Step 7). It is possible for the bearing outer races (if damaged) to fall out of housing and cause personal injury.

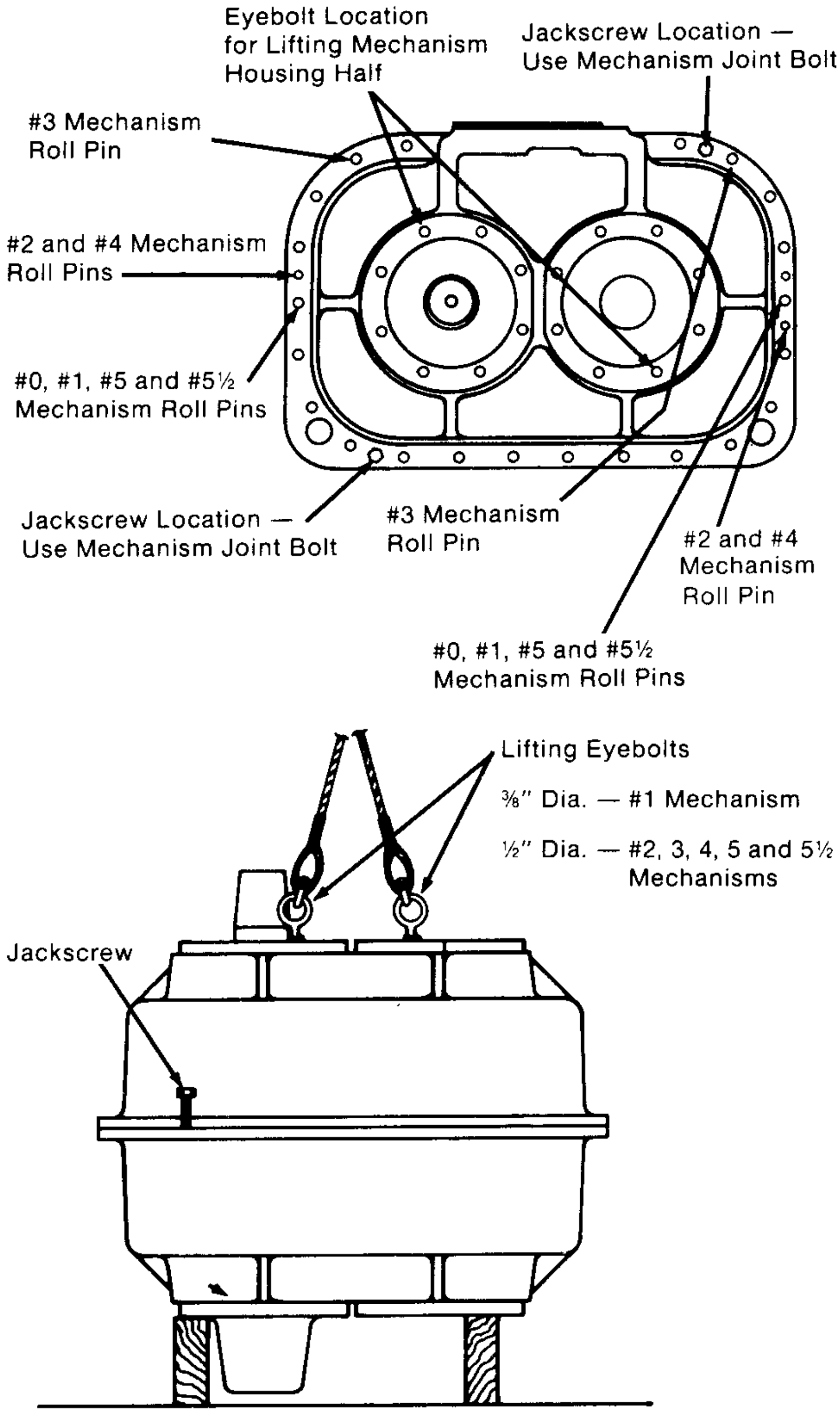


Figure 4.2 Method of dismantling housing halves (lower)
Roll pin, eyebolt and jackscrew locations (upper)

4.4.1 Mechanism Disassembly (cont'd)

9. Lift shaft assemblies from the lower housing half, using eyebolts in the tapped hole or holes provided in the end of each shaft. Refer to Step 4 above, for comments on the tapped end of the shaft. Tapped hole sizes are tabulated below.

> **WARNING!**
> Be careful, when lifting shafts, to avoid personal injury due to damaged bearing parts falling off the raised components.

Table 4.1 Tapped hole sizes for mechanism shafts.

Mech. Size	Drive Shaft	Driven Shaft
1	3/4" - 10 UNC**	1/2" - 13 UNC**
2-3-4	1 1/4" - 7 UNC**	3/4" - 10 UNC*
5 or 5 1/2	1 1/4" - 7 UNC**	1 1/4" - 7 UNC*

** Tapped hole in each end of the shaft.

* Tapped hole in one end of the shaft only.

10. Invert the lower housing half and remove the two bearing caps (3175-0 and 3150-0).

> **WARNING!**
> Be careful, when raising the housing half. It is possible for damaged bearing races to fall out of the housing and result in personal injury.

11. Carefully drive the four outer bearing races out of the housing bores using a 38 mm to 51 mm diameter brass rod.

> **CAUTION!**
> Do not scar, scuff or otherwise damage bearing housing bores when removing or installing outer bearing races.

12. Match-mark all interior mechanism parts, such as shafts, gears and counterweights, before disassembly, as a guide when re-assembling the mechanism.

13. The inner bearing race, with the roller cage assembly in place, as well as the A, B, C, D and E counterweights (3320-0) and gears (3305-0) can be quickly removed from the shafts, if a 100-tonne capacity press is used.

> **CAUTION!**
> Do not press the "F" counterweights off the shaft. Use pull rods, installed in tapped holes located in "F" counterweight hubs, to remove them. See Figure 4.3 and Figure 4.4.

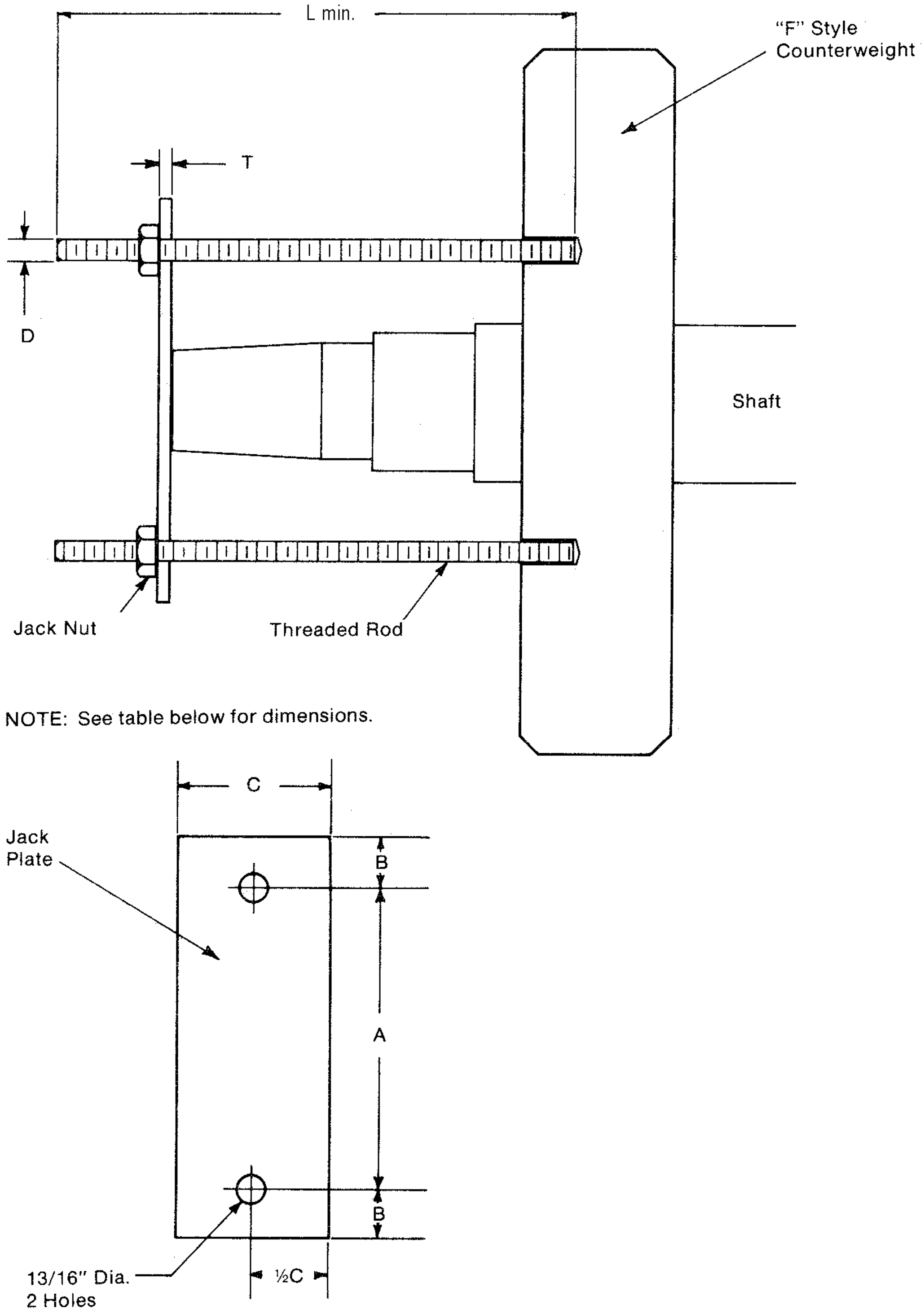


Figure 4.3 Method of pulling 'F' type counterweight off shaft.

Mech.	D	L min.	T	A	B	C
2	3/4" - 10 UNC	280	38	152	38	50
3	3/4" - 10 UNC	305	38	197	38	50
4	3/4" - 10 UNC	355	38	241	38	50
5	3/4" - 10 UNC	406	38	292	38	50
5 1/2	3/4" - 10 UNC	406	38	292	38	50

14. If a 100-tonne capacity press is not available, the roller cage assemblies and inner bearing races can be removed in the following manner, which will make them unsuitable for further use.

    a) Use a cold chisel and split the brass retainers of the roller cage assemblies, by making cuts on each side, at 180^{O} apart.

    b) Heat a 12 mm wide strip across the full width of the inner race, using a large tipped acetylene torch, until the strip becomes red in colour. This should expand the metal so that the inner race can be driven off the shaft, using brass rod.

CAUTION!
Do not use a steel rod for driving inner bearing races off the shaft. Use a brass rod and avoid damaging shaft surfaces.

15. The largest diameter on a mechanism shaft has a circumferential lip against which the gear is located (See Figure 4.4). To remove a worn gear, use a 100 tonne capacity press and press the bearing counterweight and gear off the gear side of the lip.
16. If the counterweights and gear are not being removed from the shaft during the mechanism assembly, check and make sure they are tightly mounted on the shafts.
17. Outer races of precision bearings built to Metso Minerals standards are sized for an interference fit with mechanism housing bores. If bores have been damaged, return the mechanism to the factory or to an authorised Metso Minerals service facility for repairs.

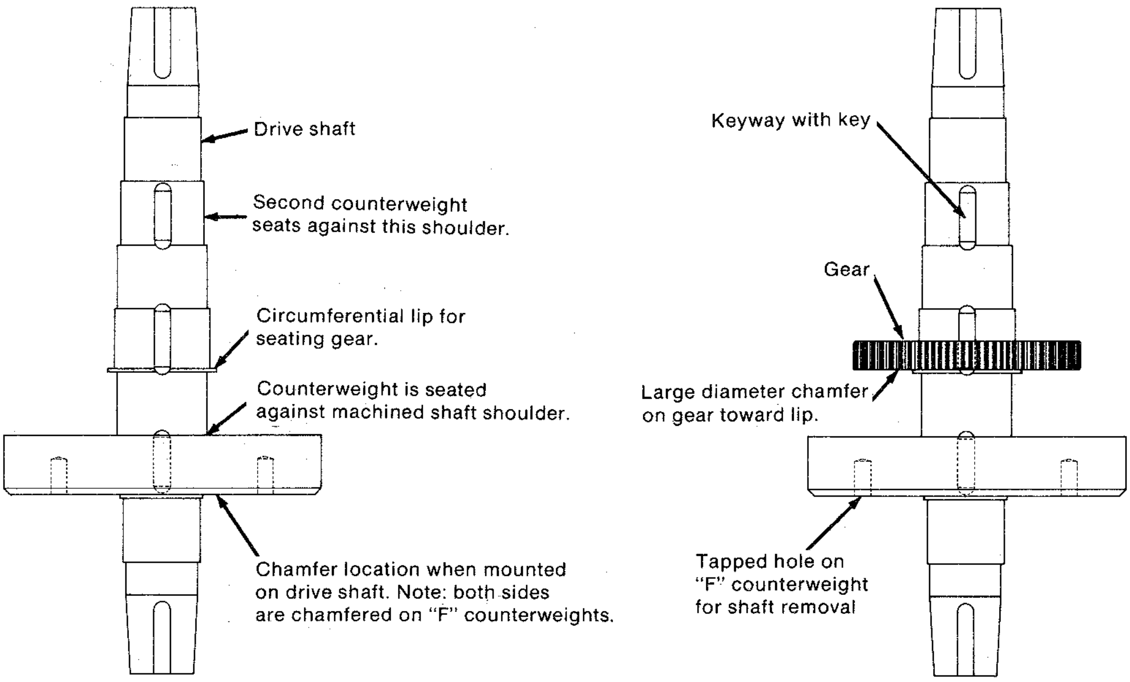


Figure 4.4 Mechanism shaft (key features)

4.4.2 Mechanism Re-Assembly

Before re-assembling a Low-Head mechanism, thoroughly clean all parts, including housing halves, with kerosene, using a brush. Wipe parts with clean rags - avoid leaving threads. Remove and discard oil gaskets and clean all machined surfaces. Dress burrs, scuffs or dents on machined surfaces with a file and emery cloth to obtain a smooth surface.

4.4.3 Handling and Installing Bearings

- Work with clean tools, in clean surroundings.
- Handle bearings only with clean, dry hands.
- Use clean, lint-free rags - no cotton waste.
- Store new bearings in the original, unopened package. Do not open the package until ready to install the bearing.
- Do not interchange bearing parts. Keep components of each bearing - inner and outer races and roller cages - together for assembly.
- Do not spin bearings with compressed air.
- Keep used bearings wrapped in oil-proofed paper until ready to install them.
- Wash used bearings in kerosene, or another approved solvent, then rinse them in light oil.

CAUTION!
When replacing bearings, use only precision bearings built to Metso specifications, and available from Metso Minerals service facilities. Do not use "standard" bearings. They will not give satisfactory service any may damage mechanism parts.

4.4.4 Heating Bearings, Gear and Counterweights

NOTE:

For proper mechanism operation, the gears on the drive and driven shafts must be correctly installed, with match marks lined up.

See Figure 4.10 for match marks and gear assembly. To make sure the gears are properly oriented during assembly, the large diameter chamfer on the bore on one side of each gear must be against the large circumferential lip on each shaft.

See Figure 4.4and Figure 4.7 for lip locations on drive and driven shafts.

Bearings, gears and counterweights are installed on mechanism shafts with interference fits. These parts must be heated before installation to expedite placement of the parts on the shafts. Use a high flash point oil, and follow local fire regulations. Fully submerge items to be heated for 30 minutes, in oil heated to a temperature of no more than 120^{O}C (250^{O}F). Use a container with rolled, not soldered, seams.

Counterweights may also be heated in oil, in an oven or with a torch. Do not exceed a maximum temperature of 176^{O}C (350^{O}F).

NOTE:

Use a thermometer to measure temperatures accurately. Do not depend on guess work. Style "E" and "F" counterweights have lead inserts with a low melting point and must not be overheated.

WARNING!

Be extremely careful when handling hot oil or heated bearings.

Figure 4.5 Arrangement for assembling counterweight on shaft.

4.4.5 Assembling Gears, Counterweights and Bearings on Shafts

Remove one of the heated counterweights from the heat source and locate it horizontally on blocks, or a table top, as shown on Figure 4.4 and Figure 4.5. There must be provision for the drive shaft to extend below the counterweight after it is mounted in the counterweight bore. Place the counterweight for assembly with the chamfered side down. This will assure that the chamfered side of each counterweight will face toward the drive shaft bearings, and away from the gear, when the mechanism drive assembly is completely assembled.

> **NOTE:**
> Assemble Style "F" counterweights so that the tapped holes in one face are away from the gear, and accessible for use in pulling the counterweight off the shaft. See Figure 4.3.

Install a lifting eyebolt in the tapped hole in one end of the drive shaft. See Table 4.1 for eyebolt dimensions. Lift the shaft into position over the heated counterweight and lower it through the bore until the machined shoulder of the shaft contacts the counterweight solidly with the chamfered side away from the gear location. See Figure 4.4. Note the exception for Style "F" counterweights in Step 1 above.

Remove one of the heated gears from the heat source and assemble it on the drive shaft up against the circumferential lip. See Figure 4.4. Be sure to place the gear on the shaft so that the large chamfer in the gear bore is against the circumferential lip on the shaft.

Remove the second heated counterweight from the heat source and assemble it on the drive shaft with the chamfered side facing upward, away from the gear. The counterweight must be located securely against the shaft shoulder. See Figure 4.6. Note the exception for Style "F" counterweights, Step 1.

Installation of the hot counterweights and gear on the shaft may have caused it to become heated up. Allow it to cool to room temperature before proceeding with bearing installation.

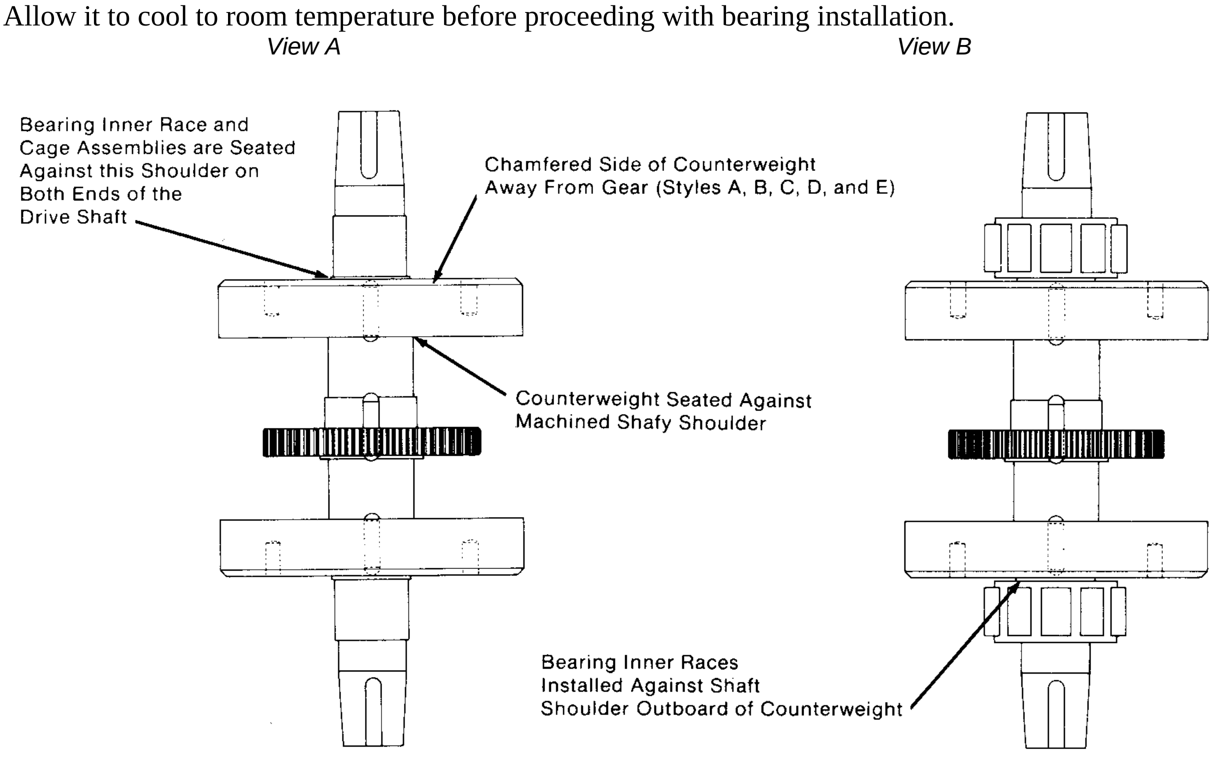


Figure 4.6 Installation of second counterweight and bearing inner races with roller cage assemblies on drive shaft.

4.4.5 Assembling Gears, Counterweights and Bearings on Shafts (cont'd)

Using the installed eyebolt and a lifting device, lift the drive shaft, gear and counterweight assembly, and place it on the table with the shaft horizontal, and the larger portion of the two counterweights in the down position. Install one of the heated bearing inner races, along with the roller cage, on each end of the shaft with the identification numbers outward toward the near end of the shaft. Bearing inner races must bear snugly against the shaft shoulders.

Next, prepare to install the counterweights, gear and bearing parts on the driven shaft. Locate one of the heated counterweights on blocks, or a table, as shown on Figure 4.7 and similar to the arrangement pictured on Figure 4.5. There must be a provision for the shaft to extend below the counterweight after it is mounted in the counterweight. Place the counterweight with the chamfered side up for installation on the driven shaft. See Item 1 for style "F" counterweight exception.

Install a lifting eyebolt in the tapped hole in the end of the driven shaft farthest from the circumferential lip on the shaft. See Table 4.1 for eyebolt dimensions. Lift the shaft into position over the heated counterweight and lower it through the bore until the circumferential lip of the shaft contacts the counterweight solidly, with the chamfered side up, and toward the gear location. See View "A" Figure 4.7.

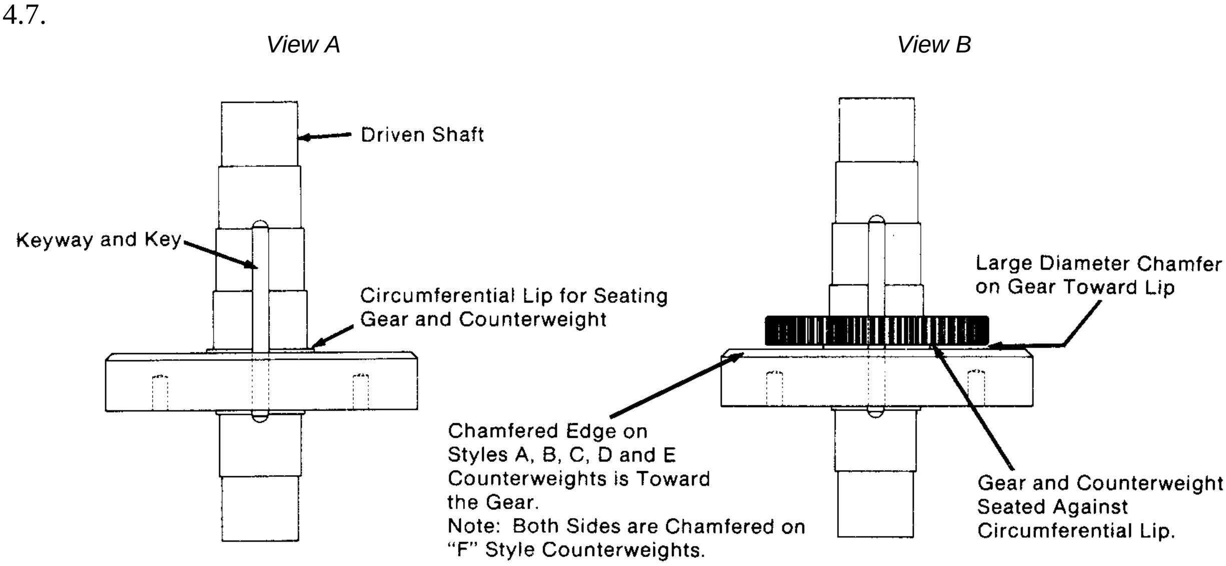


Figure 4.7 Installation of second counterweight and gear on driven shaft.

Remove the remaining gear from the heat source and assemble it on the driven shaft up against the circumferential lip on the shaft. Be sure to place the gear on the shaft so that the large chamfer in the gear bore is against the circumferential lip on the shaft.

Remove the remaining counterweight from the heat source and assemble it on the driven shaft, up against the shaft shoulder (View "A" Figure 4.8). Be sure that the chamfer is on the counterweight side toward the gear. See Item 1 for Style "F" counterweight exception.

Installation of the hot counterweights and gear on the driven shaft may have caused it to become heated up. Allow it to cool to room temperature before proceeding with bearing installation.

4.4.5 Assembling Gears, Counterweights and Bearings on Shafts (cont'd)

Using the installed eyebolt and a lifting device, lift the drive shaft and installed gear and counterweights, and place it on the table with the shaft horizontal and the larger portion of the two counterweights in the down position. Install one of the heated bearing inner races, along with the roller cage, on each end of the shaft with the identification numbers outward toward the near end of the shaft. See View "B" Figure 4.8. Bearing inner races must bear snugly against the shaft shoulders.

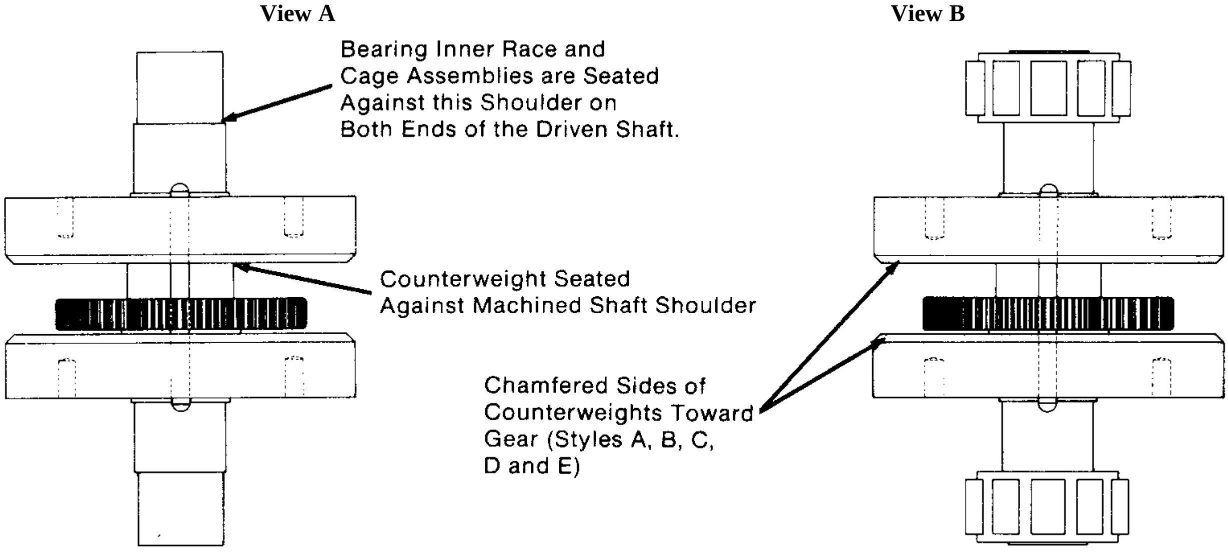


Figure 4.8 Installation of second counterweight and bearing inner races with roller cages on driven shaft.

4.4.6 Bearing Assembly in Mechanism Housing

Assemble the bearing outer races in the mechanism housing bores so that the lip of each race faces toward the outside of the housing (Figure 4.9). Coat the bore surfaces with a light oil or with micronised graphite to facilitate installation of the bearing races. Chilling the races before assembly will make installation easier.

CAUTION!

Use a rawhide hammer to tap the outer races into position in the housing bores. Pounding with a metal hammer can damage the race or housing fits.

CAUTION!

Component parts of each bearing - inner races and roller cages with outer races must be assembled together, as received.

DO NOT interchange bearing parts.

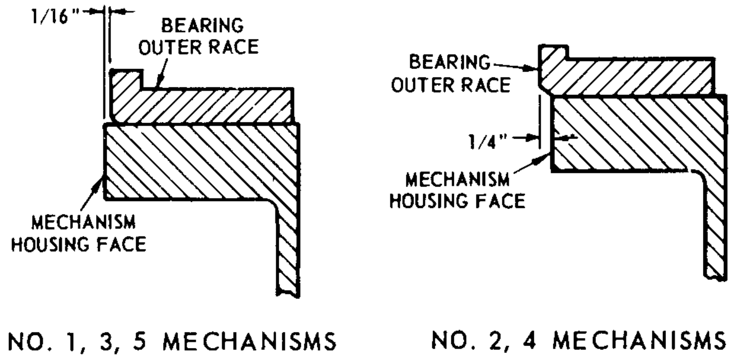


Figure 4.9 Position of bearing outer race in relation to mechanism housing face before assembling bearing caps.

Refer to Figure 4.9 for the correct location of bearing outer races with respect to the mechanism housing face. On No. 3, 5 and 5 1/2 mechanisms, tap the outer race into the housing bore, 1.5 mm beyond the housing face.

On No. 2 and 4 mechanisms, tap the outer race into the bore until the race projects 6 mm outside of the housing face when assembled in the housing. The bearing seal plate (3105-0) and bearing caps (3175-0 and 3150-0) will locate the bearing outer races in the correct position, and allow the required amount of end float for the shaft assembly in the bearings. Refer to Figure 4.1 for parts orientation.

4.4.7 Gasket for End Float

All mechanisms require 0.8mm thick gaskets (3160-0) between bearing caps (3175-0 and 3150-0) and bearing seal plate (3150-0) and the mechanism housing.

NOTE:

Always install new gaskets when re-assembling the mechanism.

4.4.8 Final Assembly Steps

1. Coat the groove in the bearing seal plate (3150-0) with a light paste-type gasket compound or shellac.
2. Install the drive shaft oil seal (3110-0) in the bearing seal plate (3105-0). Be sure that the knife edge of the oil seal faces toward the inside of the mechanism.

CAUTION!

Do not dent or otherwise damage the oil seal. Grease the seal surface before installing it over the drive shaft.

3. Assemble the bearing caps (3175-0 and 3150-0) to the housing half with the capped drive shaft and place the housing half on blocks in a horizontal position, with the capped side down.
4. Install the drive and driven shaft assemblies individually into the housing half. Be sure that the match lines on the side of the gear rim line up when the gears are meshed together (See Figure 4.10).

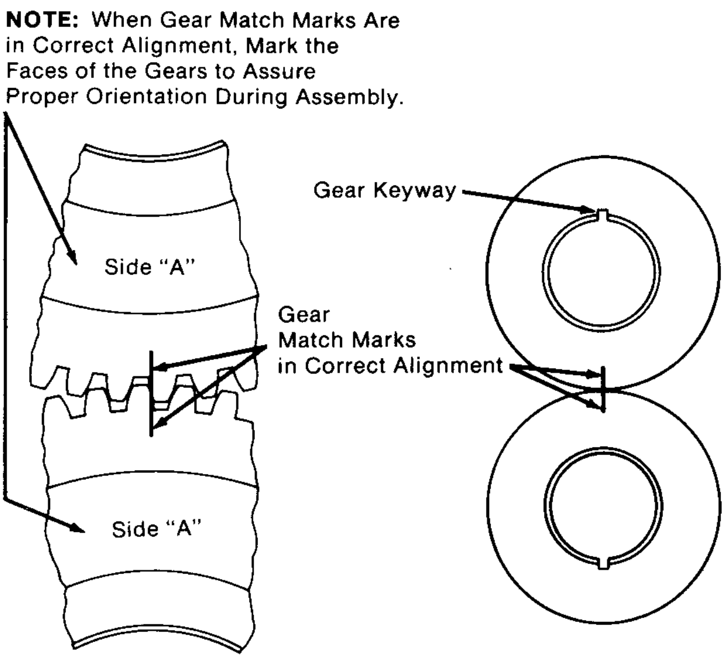


Figure 4.10 Match mark alignment of properly assembled gears.

5. Install a new 0.8 mm thick gasket on the housing half joint.
6. Assemble the other housing half over the shaft assemblies. Install roll pins (3012-0) in the designated locations (See Figure 4.2). Install housing joint bolts (3010-0) and draw them up tightly.
7. Assemble the bearing seal plate (3105-0) and caps (3175-0 and 3150-0) over the shaft ends, along with 0.8 mm gaskets for end float.

4.4.9 Check End Floats and Clearances

1. Insert an eyebolt into the tapped hole in the uncapped end of the drive shaft.
2. Tap the exposed shaft end with a rawhide hammer to make sure it is fully seated.
3. Install a dial indicator, positioned to check shaft travel and set the dial on zero. See Figure 4.11.
4. Lift the drive shaft as far as possible. At the same time, use the dial indicator to get a reading of the distance travelled by the shaft during the lifting operation. The distance travelled is the total end float for the drive shaft. Make a record of the reading.
5. Check for clearance of the rotating parts, with the drive lifted as far as possible, by rotating the shaft 360^{O}.
6. Lower the drive shaft and remove the lift and eyebolt, as well as the dial indicator.
7. Remove the bearing cap (3175-0) covering the end of the driven shaft.
8. Insert an eyebolt into the tapped hole in the driven shaft.
9. Tap the exposed end of the driven shaft with a rawhide hammer to make sure it is fully seated.
10. Install the dial indicator in a position to check shaft travel and set the dial on zero.
11. Lift the driven shaft as far as it will go. At the same time, use the dial indicator to get a reading of the distance travelled by the shaft during the lifting operation. This distance is the total end float for the driven shaft. Make a record of the reading.
12. Check for clearance of rotating parts, with the driven shaft lifted as far as possible, by rotating the shaft 360^{O}.
13. Lower the driven shaft and remove the lift and eyebolt, as well as the dial indicator.
14. Replace the bearing cap (3175-0) and gasket over the driven shaft.
15. Acceptable end float is in range 1.6 - 3.1mm.
16. If end float is less than 1.6mm on both shafts, install an additional gasket between the housing halves.
17. If end float is less than 1.6mm on one shaft only, install additional gasket between the housing and bearing caps (3175-0 and 3150-0) relating to that shaft only. In addition, it will be necessary to reposition the outer bearing race (3350-0) against the seal plate (3105-0) or bearing cap (3150-0 and 3175-0) depending on which side the extra gasket is installed. Consult Metso Minerals before proceeding.
18. After adding gaskets per Step 16 check end float again, as outlined above.
19. If end float is more than 3.1mm consult Metso Minerals immediately.

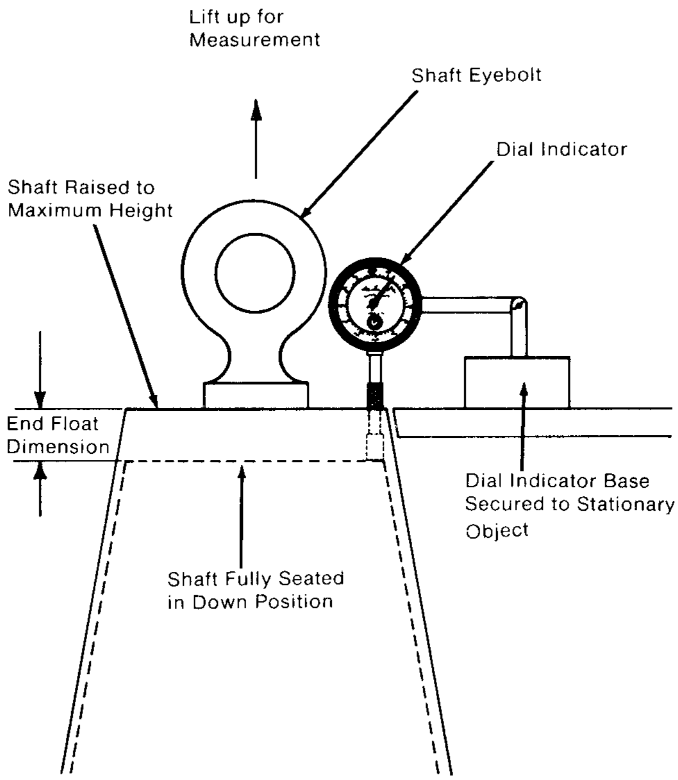


Figure 4.11 Dial indicator arrangement for checking shaft end float.

4.4.10 Mechanism Assembly on Screen

NOTE:
Before beginning the assembly operation, be sure that the mechanism support "face" is "true" and clean, so that the mechanism feet will have even bearing at all times.

Use a lifting device to place the mechanism on the mechanism support. The lifting mass is listed on the *General Arrangement* drawing provided.

If the support surface has been damaged due to operation with loose bolts and studs, it will be difficult to keep the replacement mechanism mounted tightly on the support.

As a temporary repair, use a paper shim 0.076 to 0.127 mm between the support and the mechanism feet, to obtain additional bearing surface. This is a short-term measure, and cannot be depended on for continuing service.

If bolt failure occurs, replace the mechanism support and return the mechanism to the factory for re-machining of the feet.

A ledge is machined on the lower edge of all mechanism supports to properly locate No. 2, 3, 4, 5 and 5 ½ mechanisms. A corresponding recess in the mechanism feet will facilitate assembling of mechanisms on supports.

4.4.11 Hold-Down Bolts

No. 2, 3 and 4 mechanisms are attached to the mechanism supports with four through bolts (3425-0) which fit into tapped holes in the mechanism housing feet. Hardened steel washers (3420-2 and 3425-2) are used with these bolts.

No.5 mechanisms are attached to the mechanism support with eight close-fitting through bolts (3420-2) and hardened steel washers (3425-2)

Holes are drilled in the mechanism supports for tap bolts provided 3.2 mm approx. clearance. See Figure 4.13. Hold-down bolts (3420-0) are high strength, made of alloy steel.

CAUTION!
Do not use standard bolts as a substitute for the specified high strength bolts.

1. Install through and tap bolts as shown in Figure 4.12 and Figure 4.13.
   Tap bolts are not used with No.5 and 5 ½ mechanisms

CAUTION!
Do not substitute bolt 3425-0 for 3420-0. It is not long enough.

In some installations, tap bolt (3425-0) requires two hardened steel washers (3425-2) instead of one to keep the tap bolt from bottoming out in the tapped hole. When reinstalling mechanism, use the same number of washers as is furnished with the bolts.

Tighten bolts and nuts, after installation, as follows:-

a) Place a short piece of bar stock between the side of No. 2, 3, and 4 mechanism housings and the flat of the nut (3420-1) to keep the nut from turning. On No.5 mechanisms use a socket wrench to keep the nut from turning.

b) Tighten the bolts with a socket wrench on the head of the bolt until 'snug-tight condition'.

c) Finally torque the bolts to the recommended torque value (Table 4.2) using suitable size torque multiplier.

NOTE:
Lubrication is not recommended on mechanism hold-down bolts.

Mech Size	Bolt Dia	Tightening torque (Nm)	
		UNC	UNF/12UN
No.2	1 ¼"	1410	1700
No.3	1 5/8"	2740	3290
No.4	1 7/8"	3850	4620
No.5	1 ¾"	3425	4110
No.5½	1 ¾"	3425	4110

Table 4.2 Hold-down bolt tightening torques.

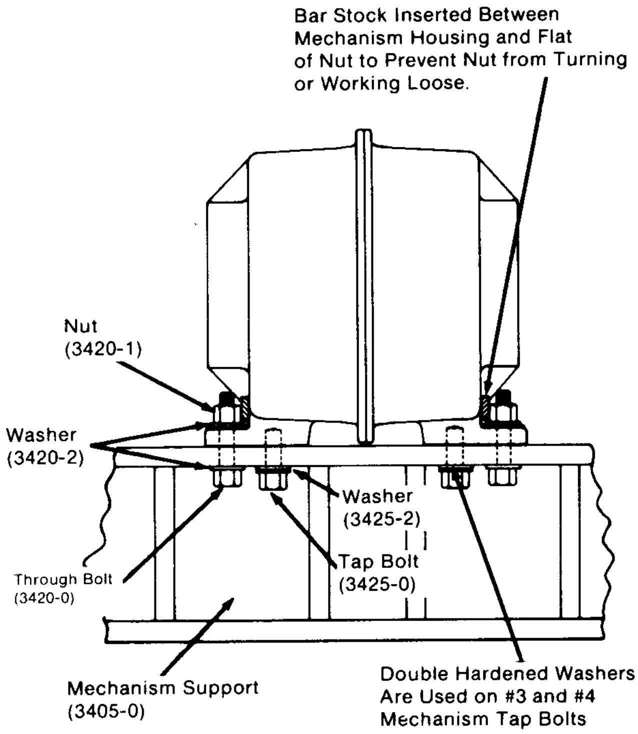


Figure 4.12 Mechanism mounting, No.2, No.3 and No.4.

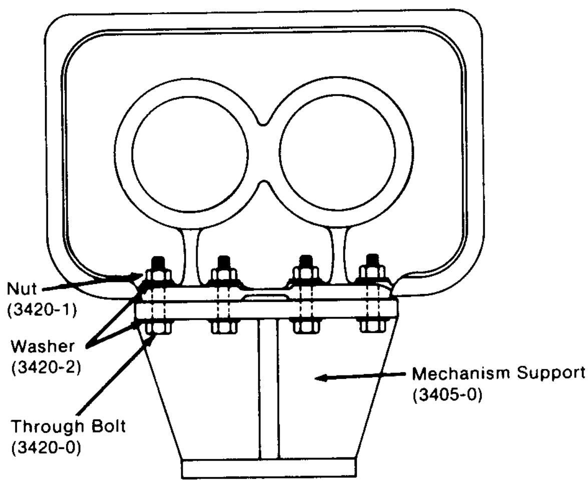


Figure 4.13 Mechanism mounting, No.5 only.

4.5 Multiple Mechanisms

To produce the amplitude required to perform the screening process, screens may be fitted with multiple mechanisms. This can be either twin or triple mechanism arrangement.

Multiple mechanisms must operate in synchronism to prevent induced torsional body stresses and premature screen failure

4.5.1 Twin Mechanism

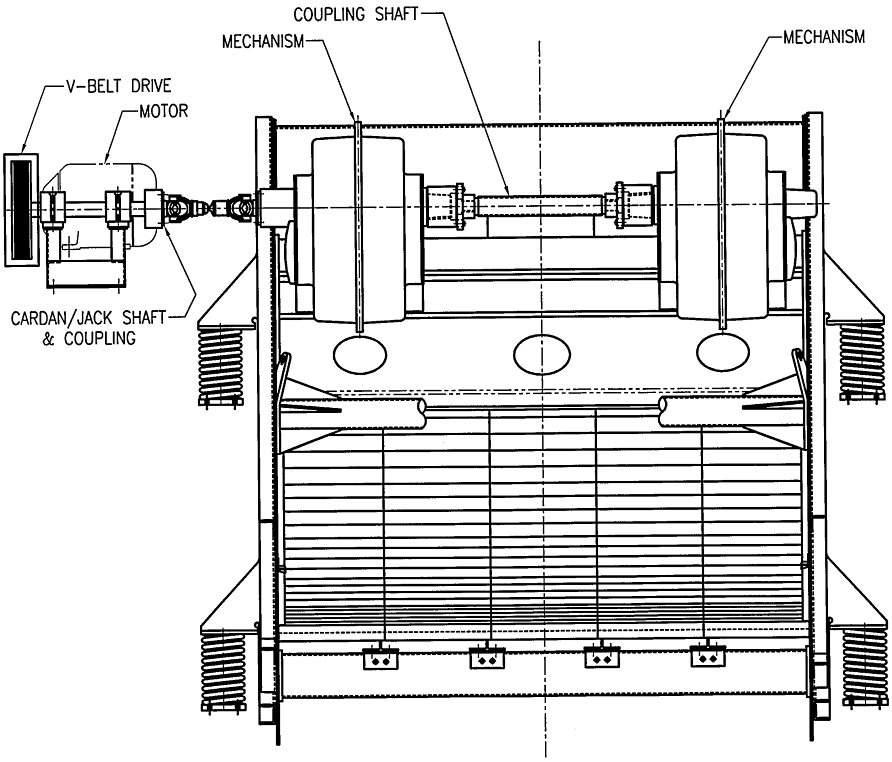
Procedure for fitting Twin mechanisms to mechanism beam.

1. Set mechanism beam in an upright position
2. Clean top face of mechanism beam ensuring there are no burrs on step or bolt holes.
3. Clean the underside of the mechanisms ensuring step and mating faces are free of paint and other contamination.
4. Fit mechanisms to mechanism beam ensuring that the step on the beam meets firmly with the step on the mechanism also ensuring the coupling faces are parallel.
5. Tighten mechanisms to required torque continually checking mechanism alignment and end float to ensure no movement during tightening.

4.5.2 Mechanism Gear Alignment

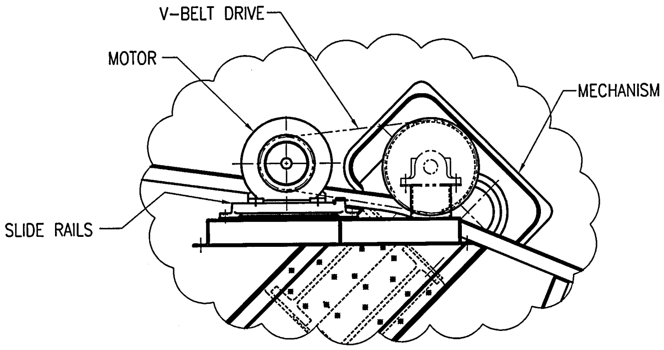
Refer to section 4.4 for information on aligning the driven shaft gear with the drive shaft gear in a mechanism. Installing the drive and driven shaft assemblies with gear match 'marks not in alignment will cause deviations in the screen motion angle from the standard 45 degrees.

When multiple mechanisms are used, misalignment in any of the mechanisms will cause the mechanisms to be out of phase with each other. This will produce a "couple", or torsional twist, to the screen body, which could result in premature mechanism support failure, and affect screen sideplates and other parts.



-TYPICAL SCREEN DRIVE ASSEMBLY-

TWIN No.5 MECHANISMS WITH OUTBOARD DRIVE



-PARTIAL SCREEN ELEVATION-

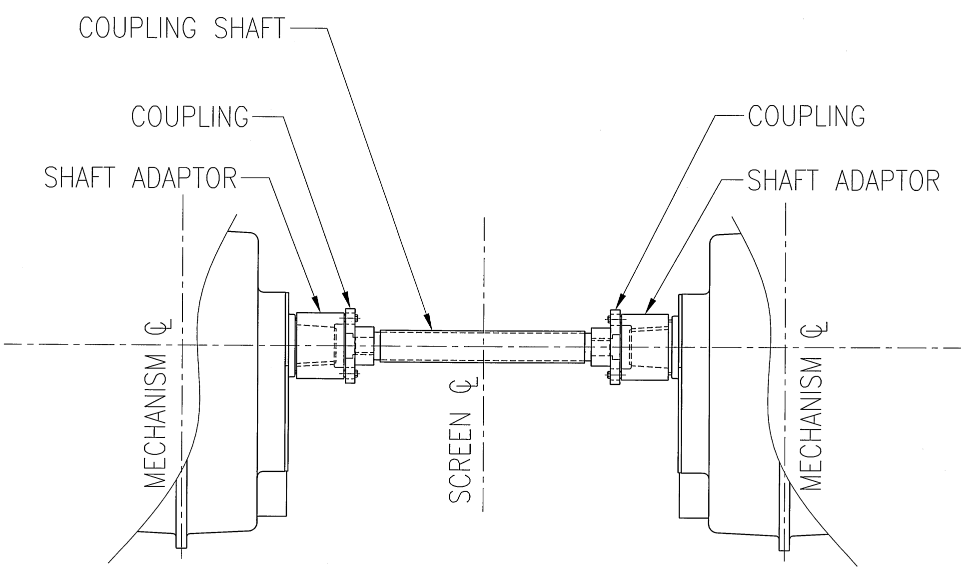
SHOWING DRIVE ARRANGEMENT

4.6 Outboard Drive

The following instructions apply to the shaft and couplings arrangement that transfer torque between twin mechanisms when they are to be driven from the outboard side of one of the mechanisms.

4.6.1 Connecting Shaft Assembly

1. Clean bore of shaft adaptors and fit onto drive shafts of mechanisms making sure they are pulled firmly onto taper.
2. Assembly Connecting Shaft to couplings as per Assembly Instructions on drawing in Section 5 on Manual.
3. Fit coupling bolts and torque to 88 Nm (65 ft/lbs).
4. Apply Loctite to all screw threads on final assembly.



–COUPLING SHAFT ASSEMBLY–

OUTBOARD DRIVE

4.6.2 Outboard Drive Assembly

1. Motor/Jackshaft and Pulley's will be supplied already pre-assembled onto Base Frame as per Outline Installation drawing shown in Section 5 of the Manual.
2. Clean bore of shaft adaptor and fit onto drive shaft of mechanism making sure it is pulled firmly onto taper.
3. Mount the pre-assembled Motor Mount and Base Frame onto the support structure.
4. Assembly the Universal Shaft as per the drawing in Section 5 of Manual.
5. Fit coupling bolts and torque to 88 Nm (65 ft/lbs).
6. Apply Loctite to all screw threads on final assembly.
7. Assemble Guard over Universal Shaft in to correct position and lock down with bolts supplied.

4.6.3 Installing a Replacement Mechanism

1. Fit mechanism to mechanism beam, see paragraph 4.5.1
2. Fit mechanism shaft adaptors using key, retaining washer and bolt
3. Push end-float in both mechanisms in the same direction and measure the distance Dim. "A" (refer to Section 5 for information from drawings supplied in regards to the required measurements for Dim "A") between both mechanism shaft adaptors.
4. Adjust the length of the shaft assembly to the dimension measured in step 2 (Dim. 'A') using spacer washers.
5. After a suitable combination of spacer washers (to produce Dim. 'A') has been found, the coupling key can be fitted; followed by excess spacer washers, retaining washers, and bolt.
6. Push end-float in one mechanism so as to maximise Dim.'A', then fit the connecting drive shaft to the shaft adaptors using coupling bolts and washers.
7. Check end-float of total assembly as detailed on Page 4-19

5 Drawings

5.1 Drawings and Vendor Data

5.1.1 Drawings

SCREEN A7640 & A7641

OUTLINE INSTALLATION:	26-Z57-640	
GENERAL ARRANGEMENT:	26-A52-589	SERIAL NO.: A7640
GENERAL ARRANGEMENT:	26-A52-590	SERIAL NO.: A7641
OUTBORAD DRIVE ARRANGEMENT:	26-A31-204	PAGE 1 OF 2
OUTBORAD DRIVE ARRANGEMENT:	26-A31-204	PAGE 2 OF 2
CONNECTING SHAFT ASSEMBLY:	26-A41-697	PAGE 1 OF 2
CONNECTING SHAFT ASSEMBLY:	26-A41-697	PAGE 2 OF 2
SCREEN SURFACE ASSEMBLY:	26-A52-600	

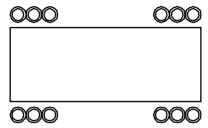
SPRING IDENTIFICATION TABLE

SPRING LOCATION	FREE LENGTH	OUTSIDE DIAMETER	WIRE DIAMETER	TOTAL No OF COILS	PART No	MK
FEED END OUTER	470	242	32	10.875	99-A40-001	009
FEED END INNER	390	166	24	11.125	99-A40-001	010
DISCHARGE END OUTER	470	242	32	10.875	99-A40-001	009
DISCHARGE END INNER	390	166	24	11.125	99-A40-001	010

150mm CLEARANCE ABOVE SCREEN REQUIRED FOR SPRING REMOVAL.

SPRING LOCATION DIAGRAM

FEED END
THE TWO SPRING SETS MUST HAVE SAME DEFLECTION WITHIN 3mm.



DISCHARGE END
THE TWO SPRING SETS MUST HAVE SAME DEFLECTION WITHIN 3mm.

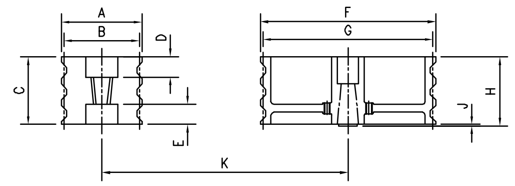
FAILURE TO ACHIEVE THIS COULD RESULT IN PREMATURE FAILURE OF SCREEN.

DRIVE PULLEY				
A	B	C	D	E
ø310.0	ø300.0	111.0	11.0	11.0

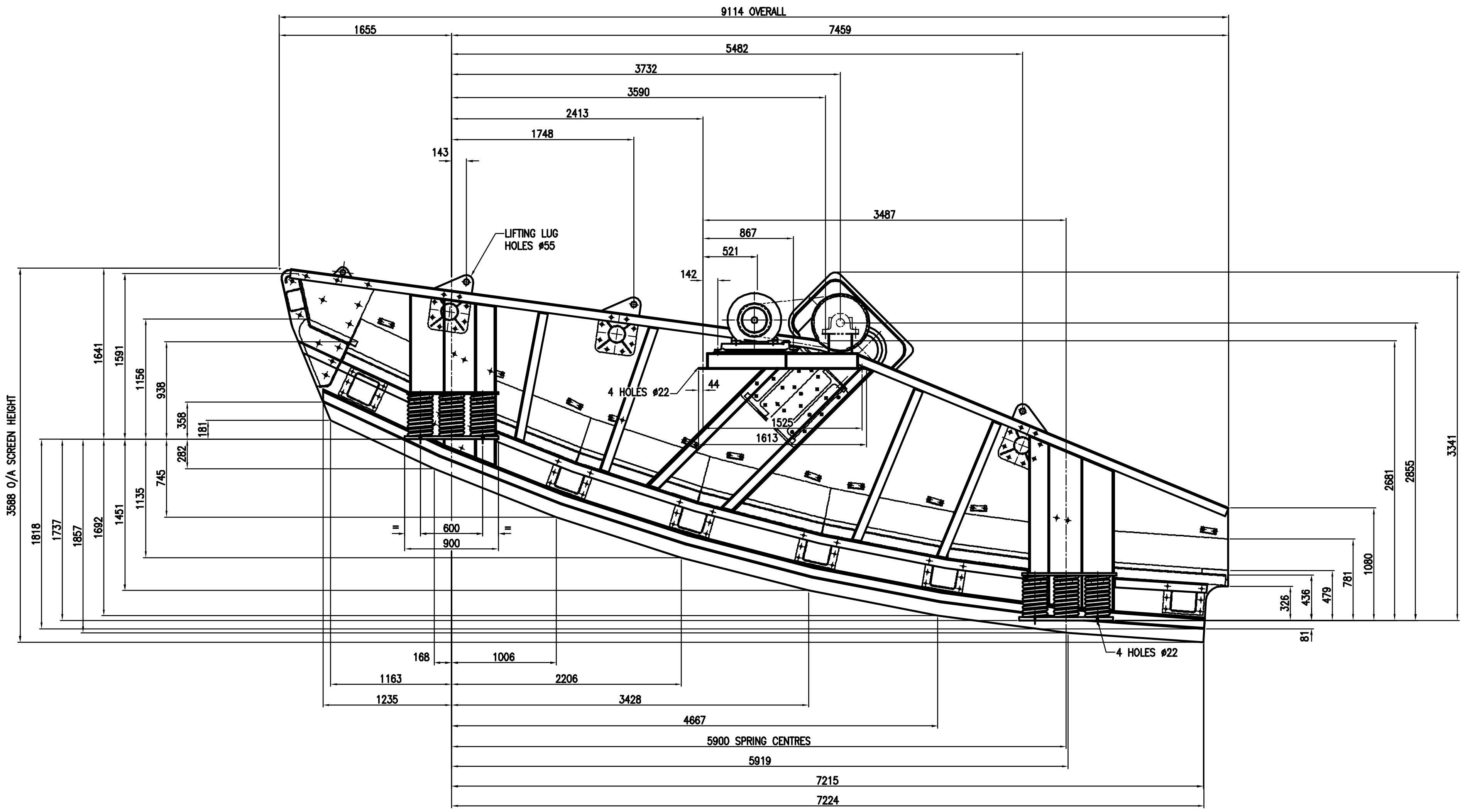
DRIVEN PULLEY				
F	G	H	J	K
ø540	ø530.0	111.0	N/A	790

MOTOR		
POWER	FRAME	SPEED
45kW	D225M	1495

VEE BELTS	
NUMBER	TYPE
4	C2900



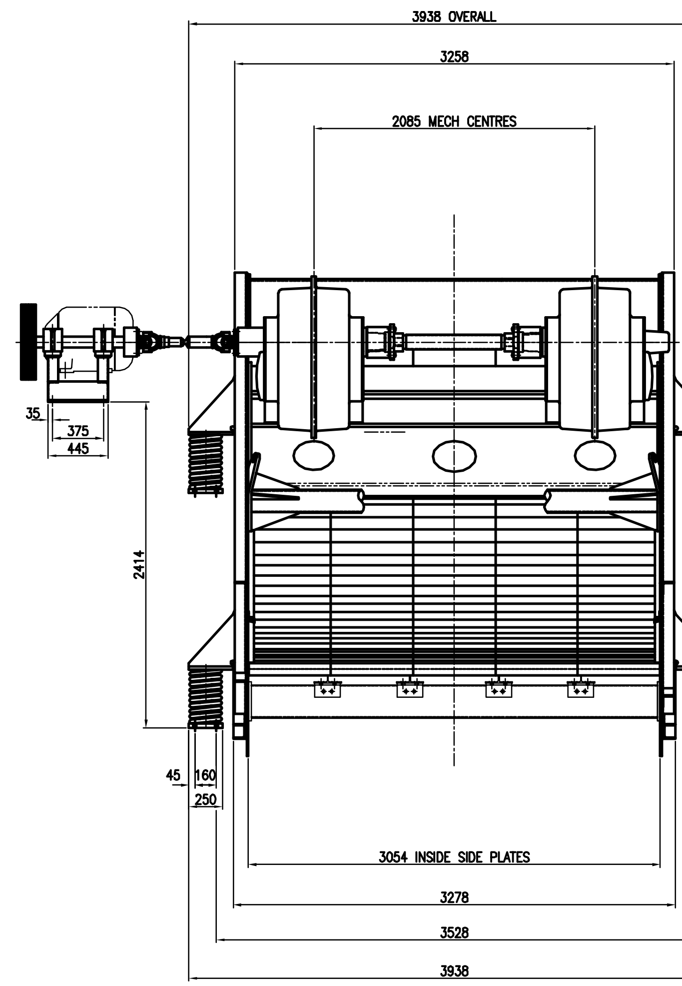
DRIVE DETAILS



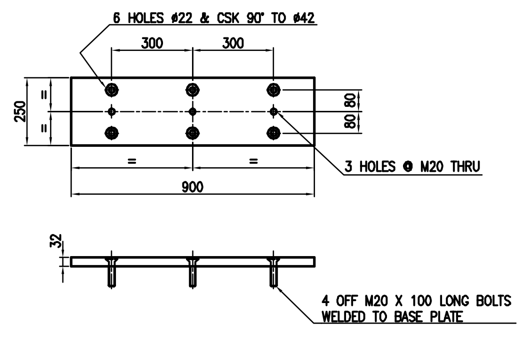
-ELEVATION-

4630kg STATIC WEIGHT PER CORNER

4560kg STATIC WEIGHT PER CORNER



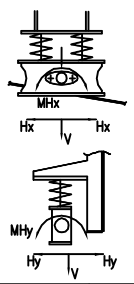
-END ELEVATION-



-SPRING BASE PLATE DETAIL-
SCALE 1:10

DYNAMIC FORCES PER CORNER
VALUES DO NOT INCLUDE SAFETY FACTORS OR MATERIAL LOADS.

DESCRIPTION		FEED END OPERATING CONDITION	FEED END TRANSIENT CONDITION	DISCHARGE END OPERATING CONDITION	DISCHARGE END TRANSIENT CONDITION
VERTICAL (NEWTONS)	V	2662 N	27246 N	2662 N	27246 N
HORIZONTAL (NEWTONS)	Hx	1351 N	9098 N	1351 N	9098 N
LATERAL (NEWTONS)	Hy	MINIMAL	4367 N	MINIMAL	4367 N
MOMENTS (NEWTON-METRE)	MHx	554 Nm	3729 Nm	555 Nm	3738 Nm
MOMENTS (NEWTON-METRE)	MHy	MINIMAL	1790 Nm	MINIMAL	1794 Nm
SPEED	RPM	850	122	850	123



TOTAL SCREEN LIVE WEIGHT = 17,440 KG

CUSTOMER NOTES
4) OPERATOR NOTE – BEFORE INITIAL START UP OF MACHINE REFER TO OPERATOR'S MANUAL FOR LUBRICATION OF MECHANISM / VIBRATOR DETAILS.
3) HAND OF DRIVE DETERMINED BY STANDING AT FEED END OF SCREEN LOOKING IN THE DIRECTION OF MATERIAL FLOW.
2) 75mm CLEARANCE REQUIRED BETWEEN ALL STATIONARY OBJECTS AND SCREEN BODY.
1) REFER TO ENGINEERING DATA SHEET 26x6673-05 FOR CALCULATING SUPPORT STRUCTURE.

04	15.02.06 DRT	DRIVE CHANGED FROM INBOARD TO OUTBOARD CARDAN/JACK SHAFT DRIVE. GUARD DETAIL REMOVED.
03	07.12.05 S.P	DRIP ANGLES REMOVED SIDEPL EXTENDED 150mm DE CROSS-TIE MOVED F.E. STIFFENERS MOVED
02	06.12.05 DRT	C.O.G. SUPRESSED. SPRING BASE PLATE DETAIL ADDED. DRIVE GUARD DETAIL ADDED.
01	05.12.05	

CERTIFIED FOR
X-STRATA MIM
MT ISA
YOUR ORDER: 11001962 OUR ORDER: 2602-A7640/41
MACHINE: 3.0 x 8.5 SD MULTI-FLOW SCREEN
SERIAL No: A7640/41
Metso Minerals Limited. ACN 000197428
PER: S. Hickey DATE: 05.12.05

DO NOT SCALE
IF IN DOUBT, ASK
DIMENSIONS IN MILLIMETRES
3rd ANGLE PROJECTION

TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	6.3 UNLESS OTHERWISE STATED	

DRAWN S.P SCALE 1 : 20
CHECKED D.R.T. SHEET 1 of 1
APPROVED S.HICKEY ASSY DRG
SIMILAR TO

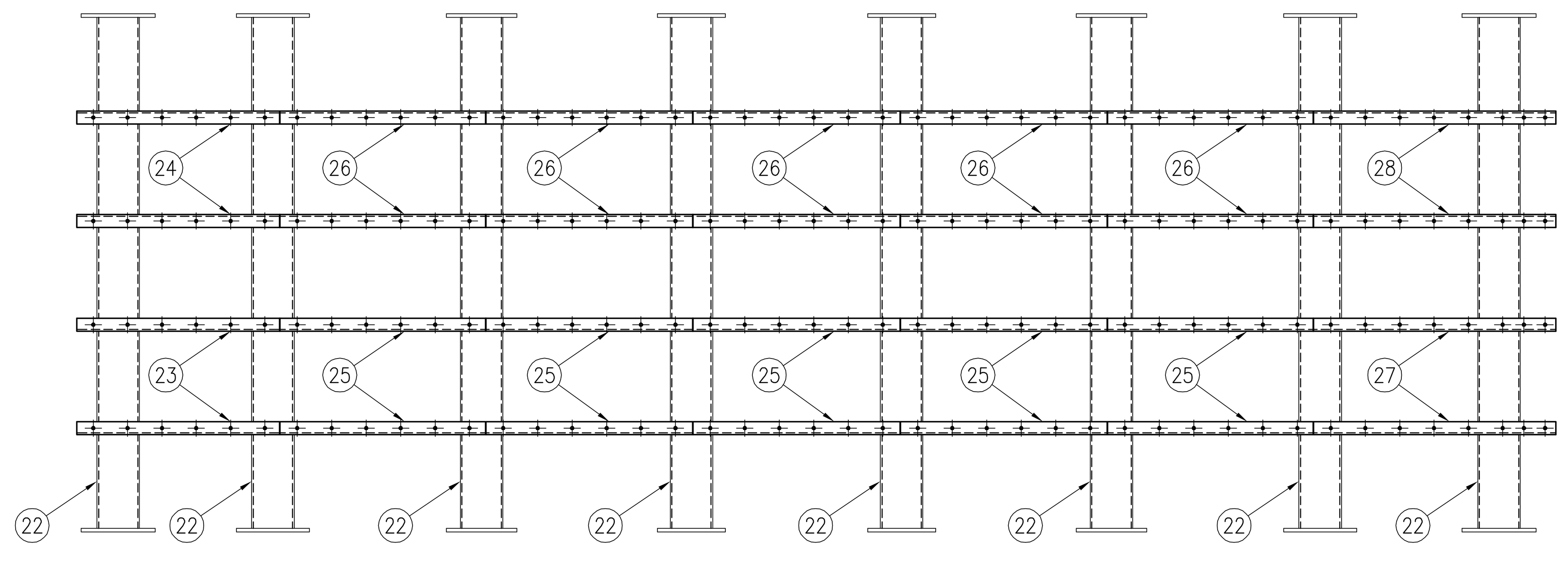
metso minerals

TITLE CERTIFIED OUTLINE 3.0 x 8.5 SD MULTI-FLO SCREEN TWIN No. 5-3-F MECHS
SIZE A0 DRG No 26-Z57-640 ISSUE 04

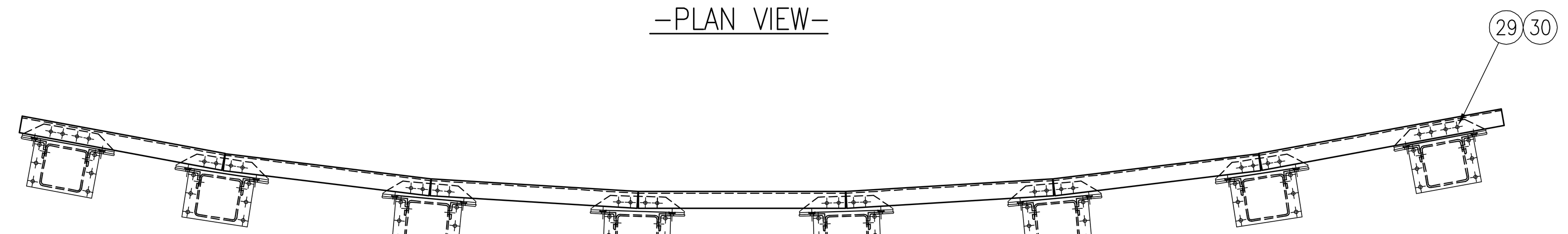
NOTE: THE FOLLOWING ITEMS ARE LISTED ON DRAWING INDEX 26-A02-073-401

4	A	SPRING BASE PLATE	26-A32-211	801
6	B	COMPRESSION SPRING F.E. - OUTER	99-A40-001	009
6	C	COMPRESSION SPRING F.E. - INNER	99-A40-001	010
6	D	COMPRESSION SPRING D.E. - OUTER	99-A40-001	009
6	E	COMPRESSION SPRING D.E. - INNER	99-A40-001	010
1	F	MOTOR TOSHIBA - D225M 4 POLE 45 KW	99-A20-055	762
1	G	VEE BELT DRIVE GUARD	26-A42-484	803
1	H	JACK SHAFT DRIVE GAURD	26-A32-233	801
1	J	BOILER BOX	TBA	
1	K	DRIVE ARRANGEMENT	26-A31-204	807
1 PAIR	L	SLIDE RAILS	99-A20-083	004

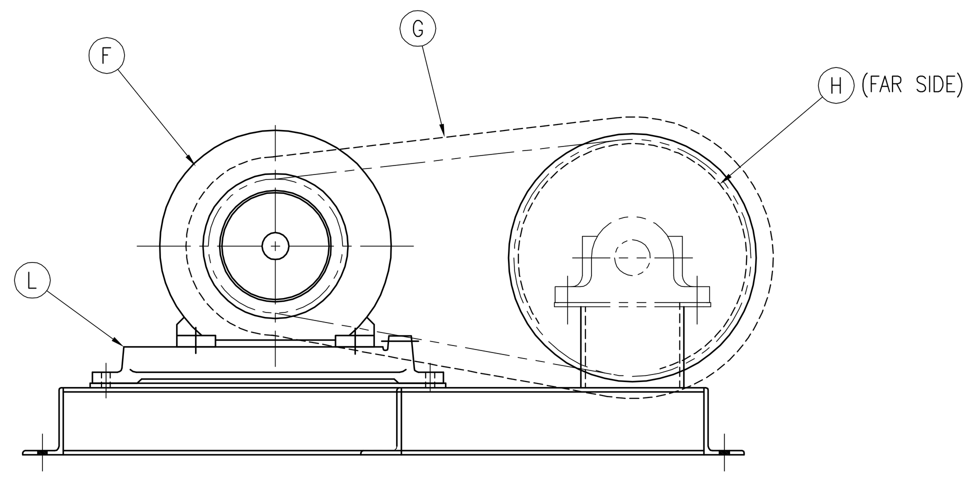
MARK No								ITEM	DESCRIPTION	PART NUMBER		MASS EA kg	
							801			DRG No.	MK	RGH	FIN
							X	1	GENERAL ARRANGEMENT	26-A52-589	801		
						X	1	2	SIDE PLATE ASSEMBLY RH	26-A52-594	801		
					X		1	3	SIDE PLATE ASSEMBLY LH	26-A52-594	802		
						1		4	IDENTIFICATION ASSEMBLY	26-A10-888	802		
					6	6		5	SPRING GUIDE ASSEMBLY	26-A11-077	801		
							3	6	CROSS TIE WELDMENT. - 3.0 WIDE	26-A32-117	504		
				X			1	7	FEED BOX ASSEMBLY	26-A43-587	801		
				1				8	FEED BOX WELDMENT	26-A43-587	502		
				1				9	PP40 x 631 x 731 LG (RH)	26-A43-587	012		
				1				10	PP40 x 631 x 731 LG (LH)	26-A43-587	013		
				1				11	PP40 x 433 x 1483 LG (RH)	26-A43-587	014		
				1				12	PP40 x 433 x 1483 LG (LH)	26-A43-587	015		
				16				13	BOLT M20 X 50 LG	65-611-197	369		
				16				14	NUT M20	65-631-011	016		
				32				15	WASHER M20	65-659-046	020		
			X				1	16	MECH. SUPPORT BEAM ASSEMBLY	26-A51-441	801		
			1					17	MECH. SUPPORT BEAM WELDMENT	26-A51-441	501		
			20					18	NUT HEX. M20	65-631-011	020		
			20					19	BOLT HEX. HD. M20 x 80 LG.	65-611-197	375		
			16					20	MECH BOLT ASSEMBLY	26-A10-099	801		
		X					1	21	SUPPORT FRAME ASSEMBLY	26-A52-597	801		
		8						22	CROSS MEMEBER WELDMENT	26-A43-098	510		
		2						23	LONGITUDINAL - FE - RH	26-A32-346	001		
		2						24	LONGITUDINAL - FE - LH	26-A32-346	002		
		10						25	LONGITUDINAL - INT - RH	26-A32-346	003		
		10						26	LONGITUDINAL - INT - LH	26-A32-346	004		
		2						27	LONGITUDINAL - DE - RH	26-A32-346	005		
		2						28	LONGITUDINAL - DE - LH	26-A32-346	006		
		128						29	HUCK BOLT ø20 GRIP No. 12 (14/21)	99-A20-086	004		
		128						30	HUCK COLLAR ø20 - FLANGED	99-A20-086	055		
							2	31	MECHANISM 5-3F	26-103-497	502		
							1	32	CONNECTING SHAFT ASSEMBLY	26-A41-697	813		
							1	33	DECALS	26-A50-005	801		
							1	34	SCREEN SURFACE ASSEMBLY - ELASTOLOK	26-A52-600	801		
							10	35	HUCK BOLT ø20 GRIP No.16 (21.0/27.5)	99-A20-086	002		
							112	36	HUCK BOLT ø20 GRIP No.20 (27.0/34.0)	99-A20-086	003		
							6	37	HUCK BOLT ø20 GRIP No.24 (33.5/40.5)	99-A20-086	014		
							76	38	HUCK BOLT ø20 GRIP No.28 (40.0/47.0)	99-A20-086	022		
							12	39	HUCK BOLT ø20 GRIP No.32 (46.5/53.0)	99-A20-086	037		
							216	40	HUCK COLLAR ø20. (FLANGED)	99-A20-086	055		



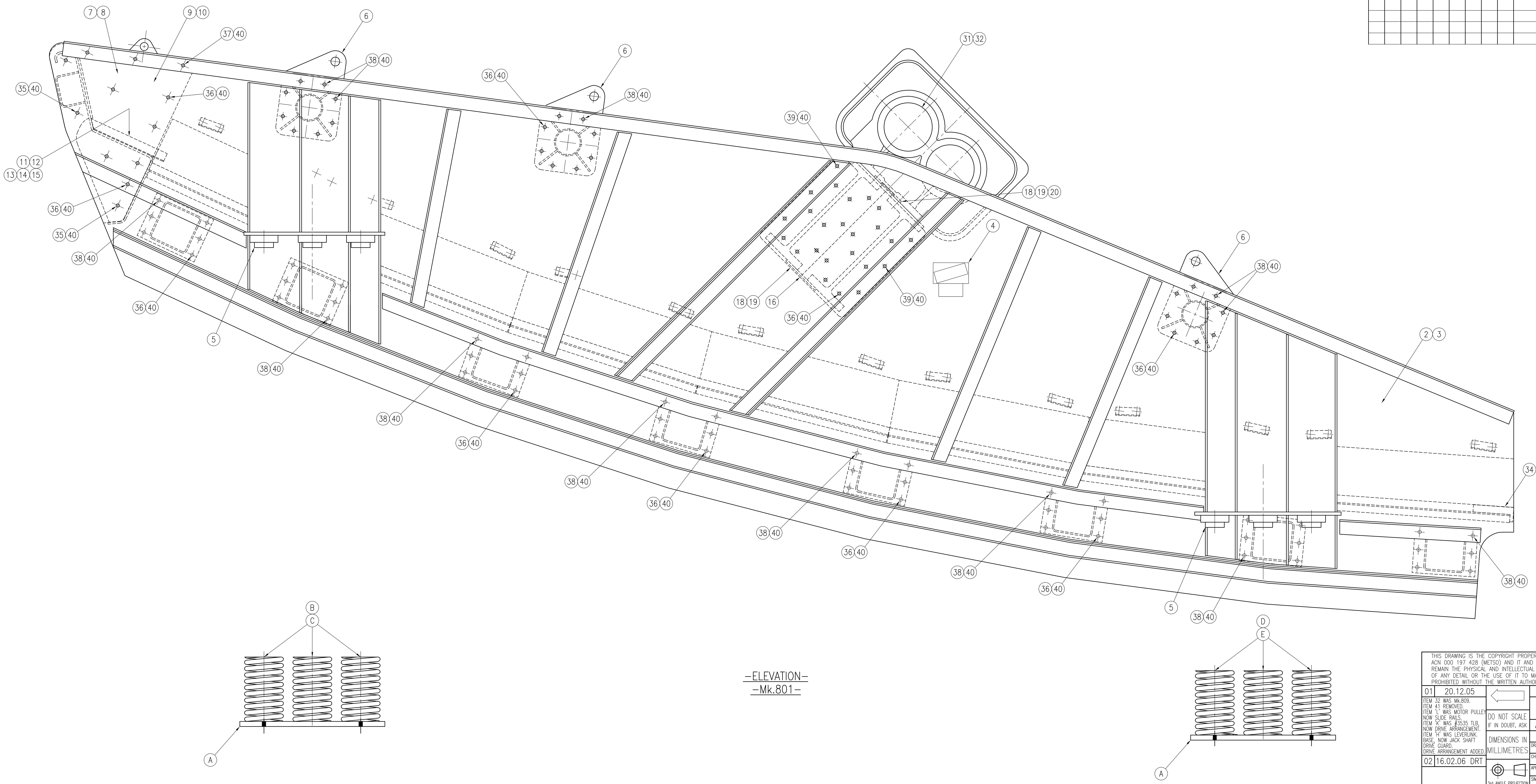
-PLAN VIEW-



-END VIEW-
-SUPPORT FRAME ASSEMBLIES ITEM 021-
N.T.S.



-DRIVE ARRANGEMENT-
-ITEM 'K'-



-ELEVATION-
-Mk.801-

01	20.12.05
ITEM 32 WAS Mk.809. ITEM 41 REMOVED. ITEM 'L' WAS MOTOR PULLEY NOW SLIDE RAILS. ITEM 'K' WAS #3535 TLB, NOW DRIVE ARRANGEMENT. ITEM 'H' WAS LEVERLINK. BASE, NOW JACK SHAFT DRIVE GUARD. DRIVE ARRANGEMENT ADDED.	
02	16.02.06 DRT

DO NOT SCALE
IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	6.3 UNLESS OTHERWISE STATED	

DRAWN	S.P	SCALE	1 : 10
CHECKED	S.H.	SHEET	1 of 1
APPROVED	S.HICKEY	ASSY DRG	.
SIMILAR TO	.		

metso minerals

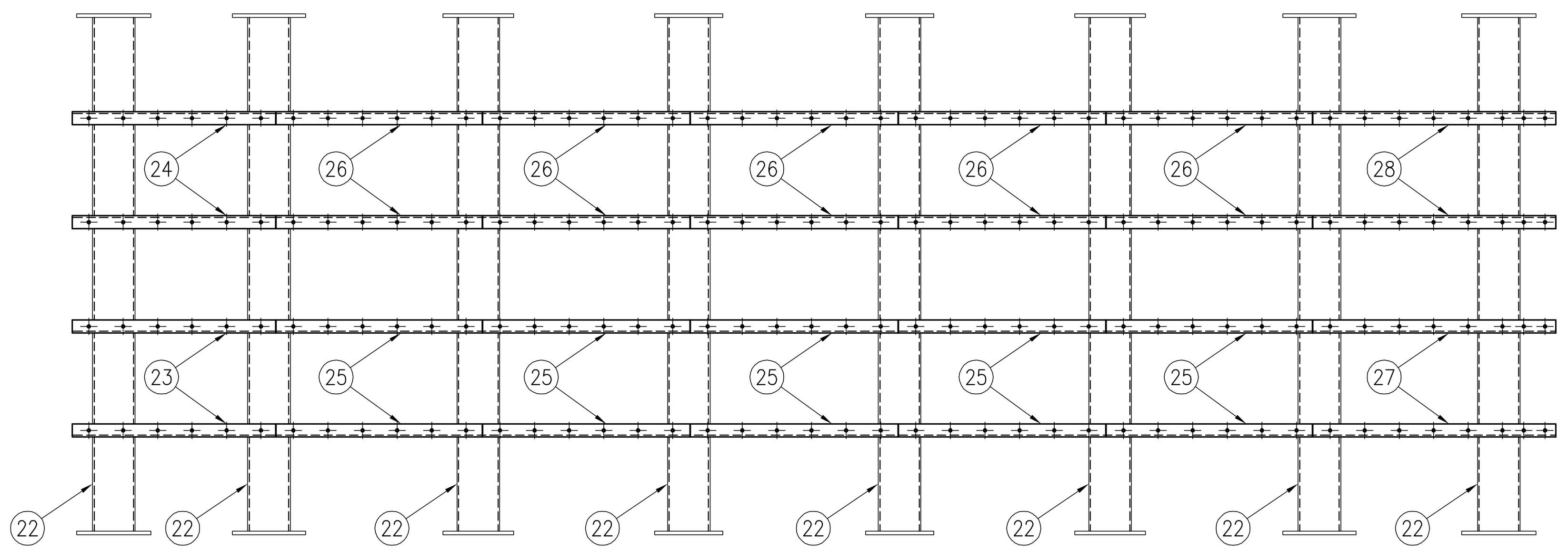
TITLE GENERAL ARRANGEMENT
3.0 x 8.5 SD MULTI-FLO
X-STRATA MIM
A7640

SIZE A0 DRG No 26-A52-589 ISSUE 02

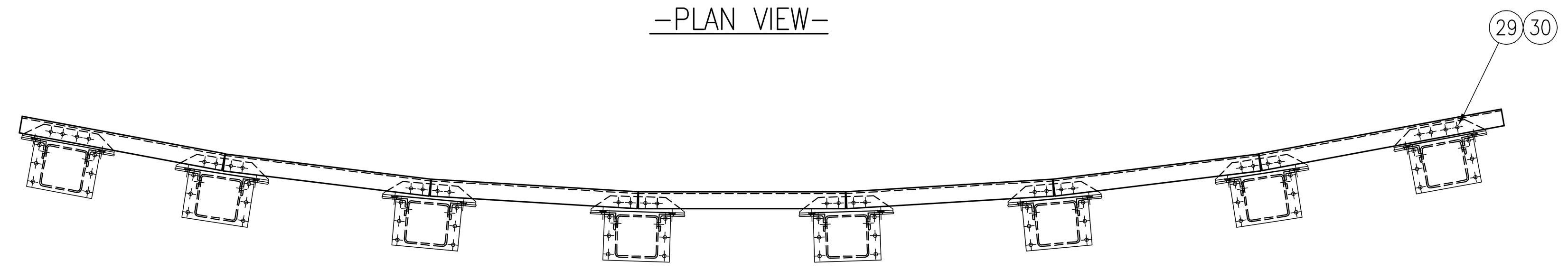
NOTE: THE FOLLOWING ITEMS ARE LISTED ON DRAWING INDEX 26-A02-074-401

4	A	SPRING BASE PLATE	26-A32-211	801
6	B	COMPRESSION SPRING F.E. - OUTER	99-A40-001	009
6	C	COMPRESSION SPRING F.E. - INNER	99-A40-001	010
6	D	COMPRESSION SPRING D.E. - OUTER	99-A40-001	009
6	E	COMPRESSION SPRING D.E. - INNER	99-A40-001	010
1	F	MOTOR TOSHIBA - D225M 4 POLE 45 KW	99-A20-055	762
1	G	VEE BELT DRIVE GUARD	26-A42-484	803
1	H	JACK SHAFT DRIVE GAURD	26-A32-233	801
1	J	BOIL BOX	TBA	
1	K	DRIVE ARRANGEMENT	26-A31-204	807
1 PAIR	L	SLIDE RAILS	99-A20-083	004

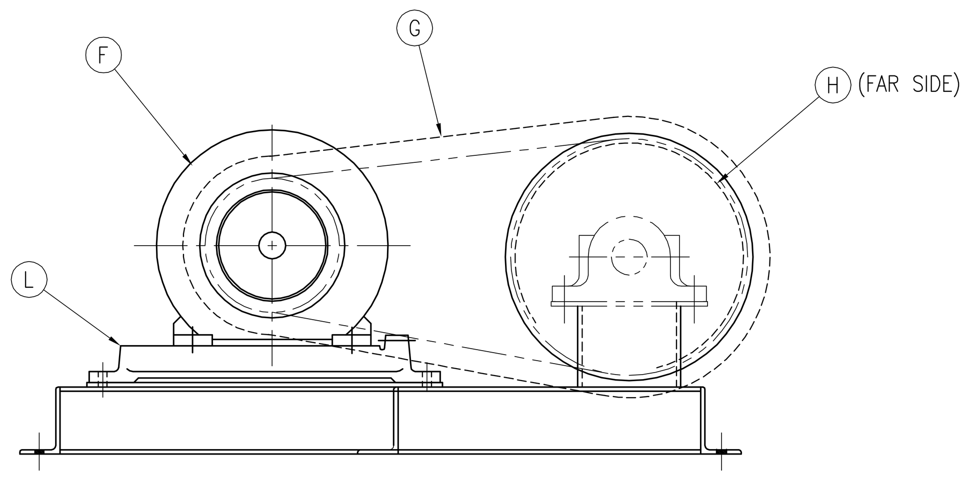
MARK No							801	ITEM	DESCRIPTION	PART NUMBER DRG No.	MK	MASS EA kg RGH	FIN
							X	1	GENERAL ARRANGEMENT	26-A52-590	801		
						X	1	2	SIDE PLATE ASSEMBLY RH	26-A52-594	801		
					X		1	3	SIDE PLATE ASSEMBLY LH	26-A52-594	802		
						1		4	IDENTIFICATION ASSEMBLY	26-A10-888	802		
					6	6		5	SPRING GUIDE ASSEMBLY	26-A11-077	801		
							3	6	CROSS TIE WELDMENT. - 3.0 WIDE	26-A32-117	504		
				X			1	7	FEED BOX ASSEMBLY	26-A43-587	801		
				1				8	FEED BOX WELDMENT	26-A43-587	502		
				1				9	PP40 x 631 x 731 LG (RH)	26-A43-587	012		
				1				10	PP40 x 631 x 731 LG (LH)	26-A43-587	013		
				1				11	PP40 x 433 x 1483 LG (RH)	26-A43-587	014		
				1				12	PP40 x 433 x 1483 LG (LH)	26-A43-587	015		
				16				13	BOLT M20 X 50 LG	65-611-197	369		
				16				14	NUT M20	65-631-011	016		
				32				15	WASHER M20	65-659-046	020		
			X				1	16	MECH. SUPPORT BEAM ASSEMBLY	26-A51-441	801		
			1					17	MECH. SUPPORT BEAM WELDMENT	26-A51-441	501		
			20					18	NUT HEX. M20	65-631-011	020		
			20					19	BOLT HEX. HD. M20 x 80 LG.	65-611-197	375		
			16					20	MECH BOLT ASSEMBLY	26-A10-099	801		
		X					1	21	SUPPORT FRAME ASSEMBLY	26-A52-597	801		
		8						22	CROSS MEMEBER WELDMENT	26-A43-098	510		
		2						23	LONGITUDINAL - FE - RH	26-A32-346	001		
		2						24	LONGITUDINAL - FE - LH	26-A32-346	002		
		10						25	LONGITUDINAL - INT - RH	26-A32-346	003		
		10						26	LONGITUDINAL - INT - LH	26-A32-346	004		
		2						27	LONGITUDINAL - DE - RH	26-A32-346	005		
		2						28	LONGITUDINAL - DE - LH	26-A32-346	006		
		128						29	HUCK BOLT ø20 GRIP No. 12 (14/21)	99-A20-086	004		
		128						30	HUCK COLLAR ø20 - FLANGED	99-A20-086	055		
							2	31	MECHANISM 5-3F	26-103-497	502		
							1	32	CONNECTING SHAFT ASSEMBLY	26-A41-697	809		
							1	33	DECALS	26-A50-005	801		
							1	34	SCREEN SURFACE ASSEMBLY - ELASTOLOK	26-A52-600	801		
							10	35	HUCK BOLT ø20 GRIP No.16 (21.0/27.5)	99-A20-086	002		
							112	36	HUCK BOLT ø20 GRIP No.20 (27.0/34.0)	99-A20-086	003		
							6	37	HUCK BOLT ø20 GRIP No.24 (33.5/40.5)	99-A20-086	014		
							76	38	HUCK BOLT ø20 GRIP No.28 (40.0/47.0)	99-A20-086	022		
							12	39	HUCK BOLT ø20 GRIP No.32 (46.5/53.0)	99-A20-086	037		
							216	40	HUCK COLLAR ø20. (FLANGED)	99-A20-086	055		



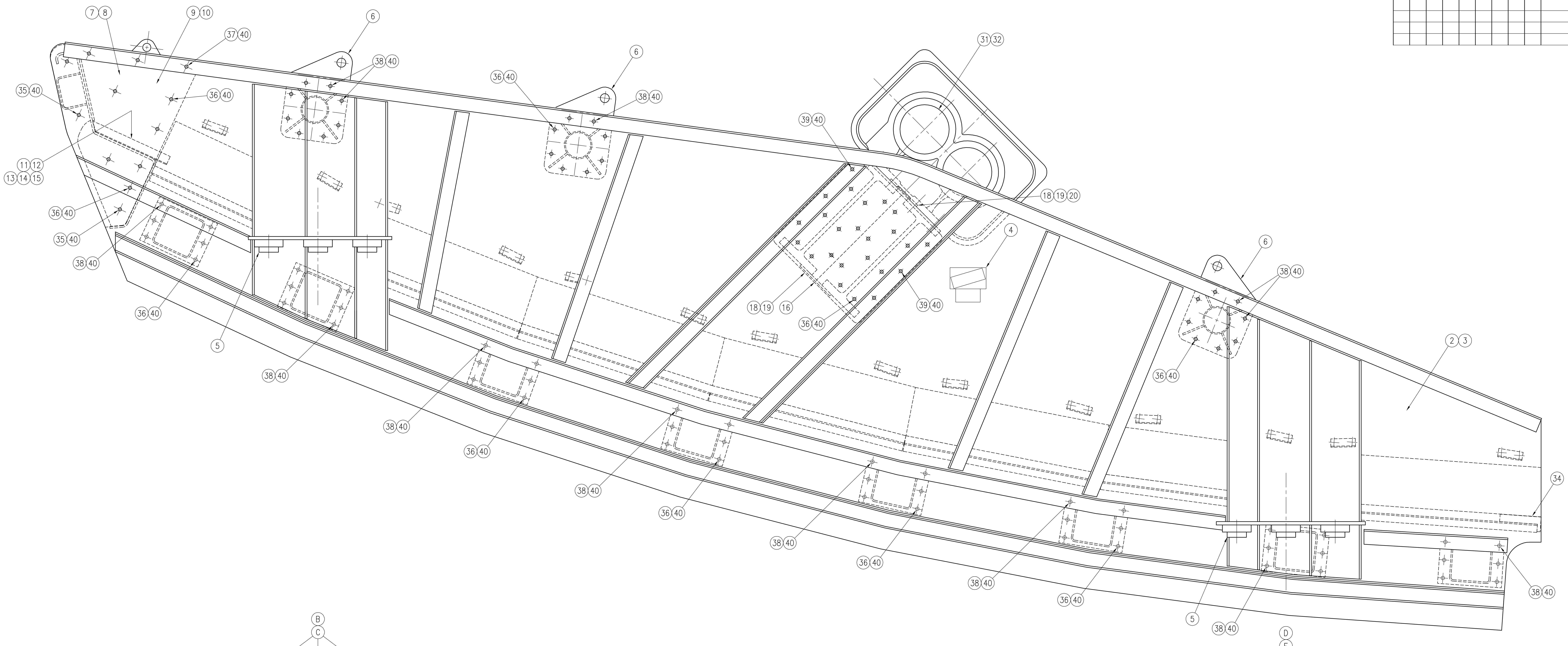
-PLAN VIEW-

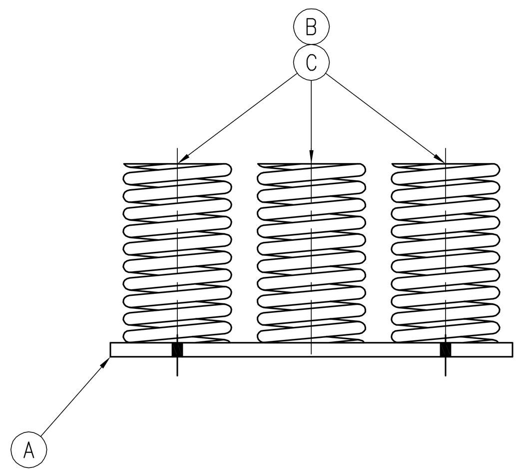


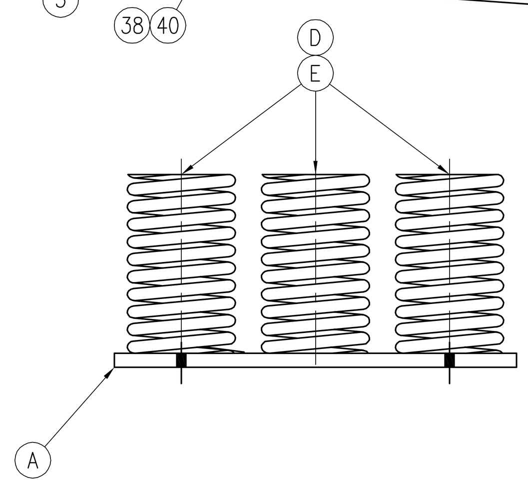
-END VIEW-
-SUPPORT FRAME ASSEMBLIES ITEM 021-
N.T.S.



-DRIVE ARRANGEMENT-
-ITEM 'K'-







-ELEVATION-
-Mk.801-

01	23.12.05
ITEM 32 WAS Mk.809. ITEM 41 REMOVED. ITEM 'L' WAS MOTOR PULLEY NOW SLIDE RAILS. ITEM 'K' WAS #3535 TLB, NOW DRIVE ARRANGEMENT. ITEM 'H' WAS LEVERLINK. BASE, NOW JACK SHAFT DRIVE GUARD. DRIVE ARRANGEMENT ADDED.	
02	16.02.06 DRT

DO NOT SCALE
IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

TOLERANCES AND FINISH

LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	6.3 UNLESS OTHERWISE STATED	

DRAWN	S.P	SCALE	1 : 10
CHECKED	S.H.	SHEET	1 of 1
APPROVED	S.HICKEY	ASSY DRG	.
SIMILAR TO	.		

metso minerals

TITLE
GENERAL ARRANGEMENT
3.0 x 8.5 SD MULTI-FLO
X-STRATA MIM
A7641

SIZE A0 DRG No 26-A52-590 ISSUE 02

		MARK No							ITEM	DESCRIPTION	MATERIAL	PART NUMBER		MASS EA kg	
		807	806	805	804	803	802	801				DRG No.	MK	RGH	FIN
							1		1	BASE FRAME WELDMENT		26-A42-482	501		
								1	2	MOTOR PULLEY – 224 PCD		99-A20-068	001		
								1	3	DRIVEN PULLEY – 375 PCD		99-A20-067	001		
								1	4	TAPER LOCK BUSH		99-A40-002	066		
		1	1	2	1	1	2	2	5	TAPER LOCK BUSH		99-A40-002	111		
		1	1	1	1	1	1	1	6	PLUMMER BLOCK		99-A20-019	004		
		1	1	1	1	1	1	1	7	PLUMMER BLOCK		99-A20-019	005		
		1	1		1	1	1	1	8	JACK SHAFT		26-A21-001	001		
								4	9	VEE BELT – SPC 2500		99-A30-015	305		
		1	1	1	1	1	1	1	10	UNIVERSAL SHAFT		99-A20-018	005		
		1	1	1	1	1	1	1	11	COUPLING (UNI SHAFT TO JACK SHAFT)		26-A31-106	001		
		1	1	1	1	1	1	1	12	COUPLING (UNI SHAFT TO MECHANISM)		26-A31-107	001		
		1	1	1	1	1	1	1	13	KEY 1.06" x 0.75" x 3.88" LG		00-677-061	906		
		1	1	1	1	1	1	1	14	RETAINING WASHER		26-A10-476	001		
		1	1	1	1	1	1	1	15	BOLT 1.25" x 2.5" LG		07-150-029	001		
		16	16	16	16	16	16	16	16	BOLT HEX. SOCK HD M8 x 1.25 x 30 LG		26-A10-477	002		
		2	2	2	2	2	2	2	17	KEY x 22 x 14 x 75 LG	99-A30-021-008	99-A30-023	020		
								1	18	BASE FRAME		26-A21-096	501		
					1	1	1	1	19	MECHANISM COUPLING		26-A21-093	802		
		4	4	4	4	4	4	4	20	BOLT M20 x 70 LG HEX. HD.		65-611-197	373		
		4	4	4	4	4	4	4	21	NUT M20 NYLOC		65-633-075	020		
		4	4	4	4	4	4	4	22	WASHER ø20		65-659-046	020		
		4		4	4	4	4		23	VEE BELT – C2900		99-A30-028	325		
				1			1		24	MOTOR PULLEY – 265 PCD		99-A30-016	238		
				1			1		25	DRIVEN PULLEY – 500 PCD		99-A30-016	293		
		1	1	1	1	1			26	TAPER LOCK BUSH		99-A40-002	072		
		1				1			27	MOTOR PULLEY – 300 PCD		99-A30-016	248		
		1	1		1	1			28	DRIVEN PULLEY – 530 PCD		99-A30-016	298		
									29						
		1	1		1	1			30	BASE FRAME WELDMENT		26-A42-482	502		
					1				31	MOTOR PULLEY – 315 PCD		99-A30-016	253		
								X	32	DRIVE ARRANGEMENT		26-A31-204	801		
							X		33	DRIVE ARRANGEMENT		26-A31-204	802		
						X			34	DRIVE ARRANGEMENT		26-A31-204	803		
					X				35	DRIVE ARRANGEMENT		26-A31-204	804		
				X					36	DRIVE ARRANGEMENT		26-A31-204	805		
				1					37	BASE FRAME		26-A43-651	501		
				1					38	GUARD – VEE BELTS		26-A43-652	001		
				1					39	GUARD – VEE BELTS		26-A43-652	002		
				1					40	HARDWARE– VEE BELTS GUARDS		26-A43-652	801		
				1					41	JACK SHAFT		26-A21-001	002		
			X						42	DRIVE ARRANGEMENT		26-A31-204	806		
			1						43	MOTOR PULLEY – 250 PCD		99-A30-016	233		
			4						44	VEE BELT – SPC 2800		99-A30-015	307		
		1	1		1	1			45	TAPER LOCK BUSH – 4040 ø80 BORE		99-A40-002	128		
		X							46	DRIVE ARRANGEMENT		26-A31-204	807		
									47						
									48						
									49						
									50						
									51						
									52						
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									67						
									68						
									69						
									70						

14 30.01.06 DRT Mk.807 ADDED.
15 15.02.06 DRT
11 15-11-04 SH GUARD HARDWARE ADDED ITEM 40 MK 805.
12 16-01-06 SH ITEM 8 DELETED MK 805 ITEM 41 ADDED MK 805 MK 806 ADDED
13 23-01-06 SH ITEM 45 ADDED. ITEM 43 ADDED Mk.806/804/803, QTY ITEM 5 WAS 2 OFF.
01 27-11-84
08 1-7-03 MAH MK 804 ADDED. REDRAWN ON CAD.
09 24-7-03 MAH ITEM 29 DELETED. MK 803 & 804 ITEM 5 QTY 2 WAS 1.
10 4-2-04 MAH MK 805 ADDED. ITEMS 37, 38, 39 ADDED.

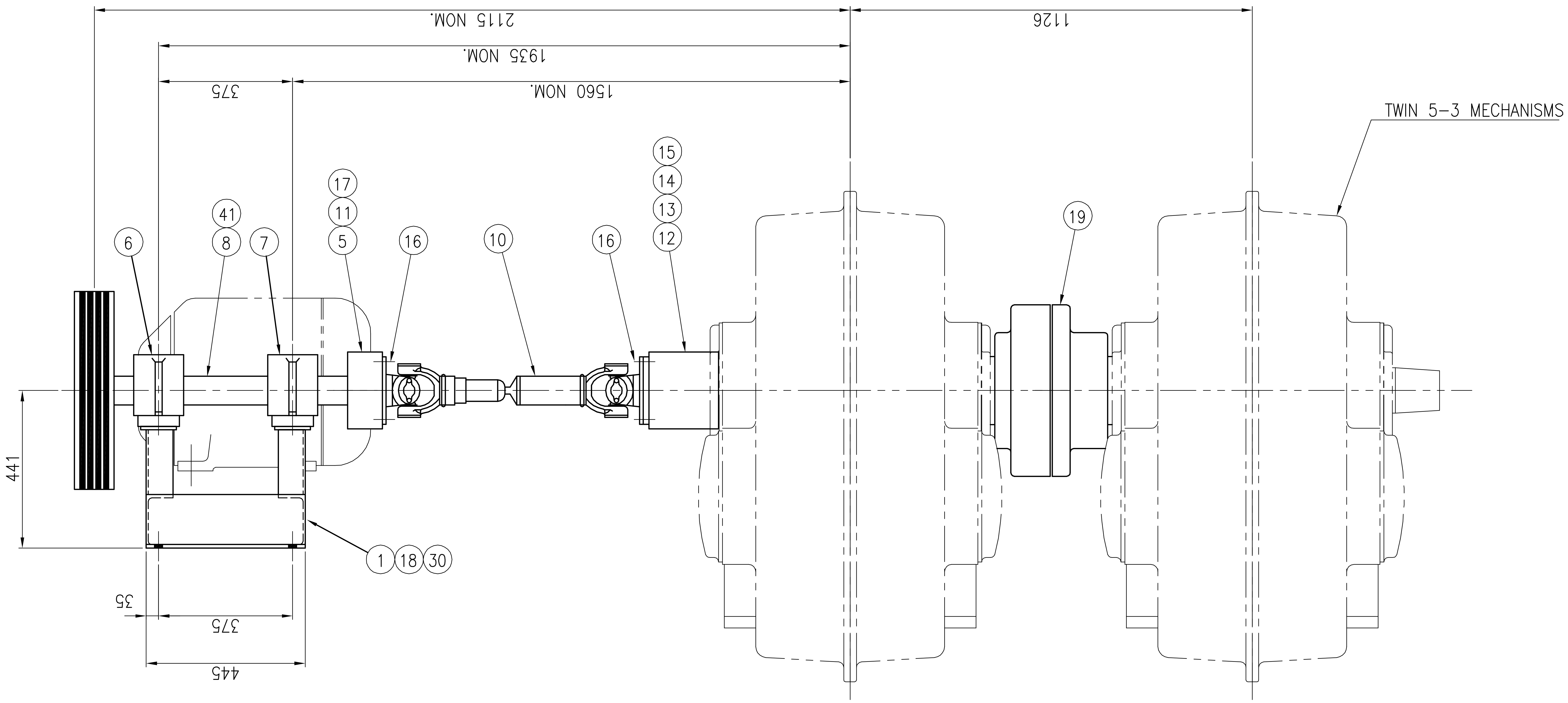
DO NOT SCALE
IF IN DOUBT, ASK
DIMENSIONS IN MILLIMETRES
3rd ANGLE PROJECTION

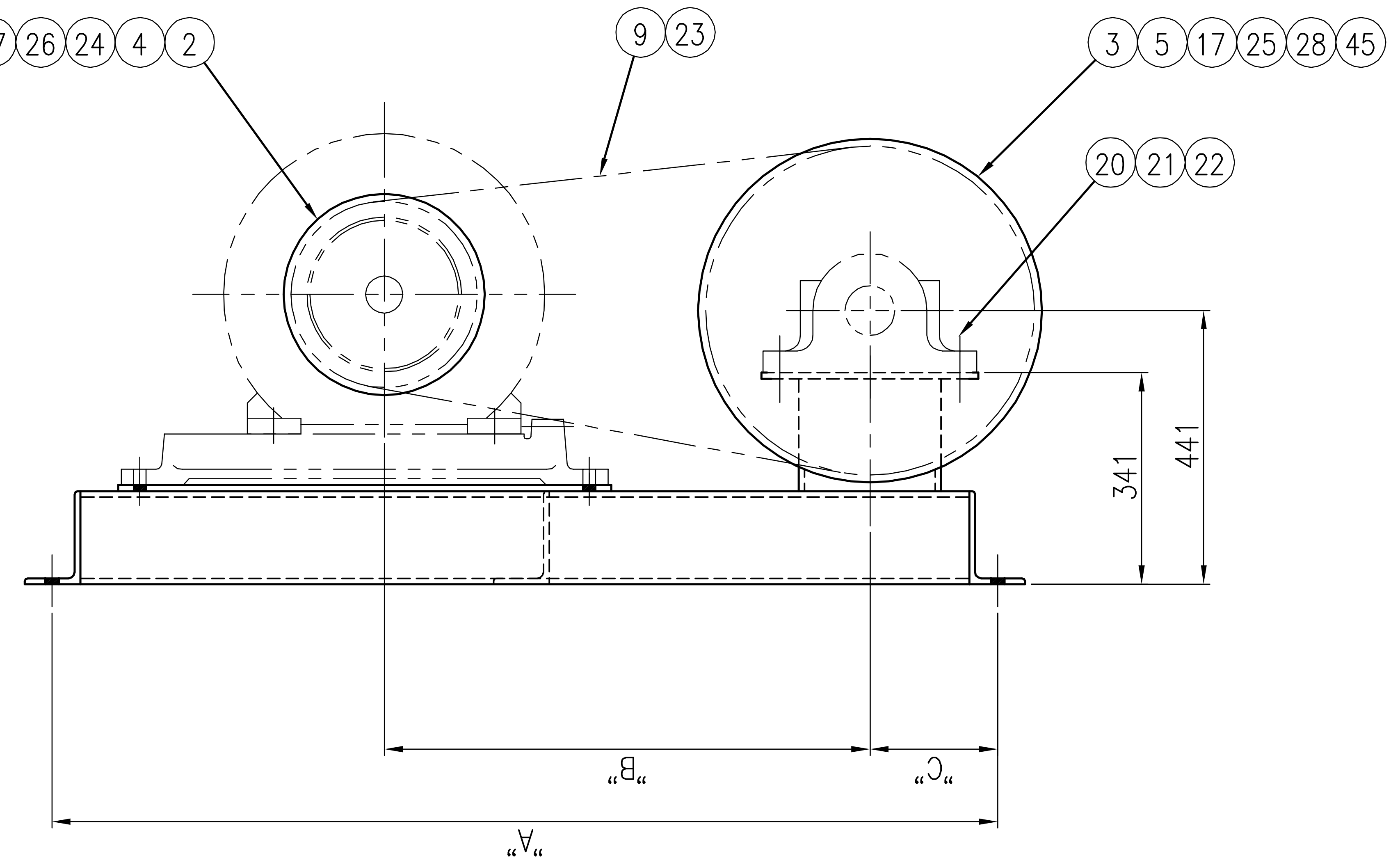
TOLERANCES AND FINISH
LINEAR: WHOLE NUMBER ±1.5; ONE DECIMAL PLACE ±0.5
ANGULAR: ALL ANGLES ±0.5
FINISH: 6.3 UNLESS OTHERWISE STATED

DRAWN MAH
CHECKED S.H.
APPROVED S.HICKEY
SIMILAR TO
SCALE N/A
SHEET 1 of 2
ASSY DRG

metso minerals

TITLE DRIVE ARRANGEMENT OUTBOARD JACK SHAFT 5–3 LOWHEAD MECHANISMS
SIZE A2 DRG No 26–A31–204 ISSUE 15





MK No.	"A"	"B"	"C"
801	1410	776	240
802	1525	841	206
803	1525	790	206
804	1525	779	206
805	N/A	N/A	N/A
806	1525	775	206
807	1525	790	206

FOR BEARING ASSEMBLY DETAILS REFER TO DRAWING 26-A42-507

01	27-11-84	

DO NOT SCALE
IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

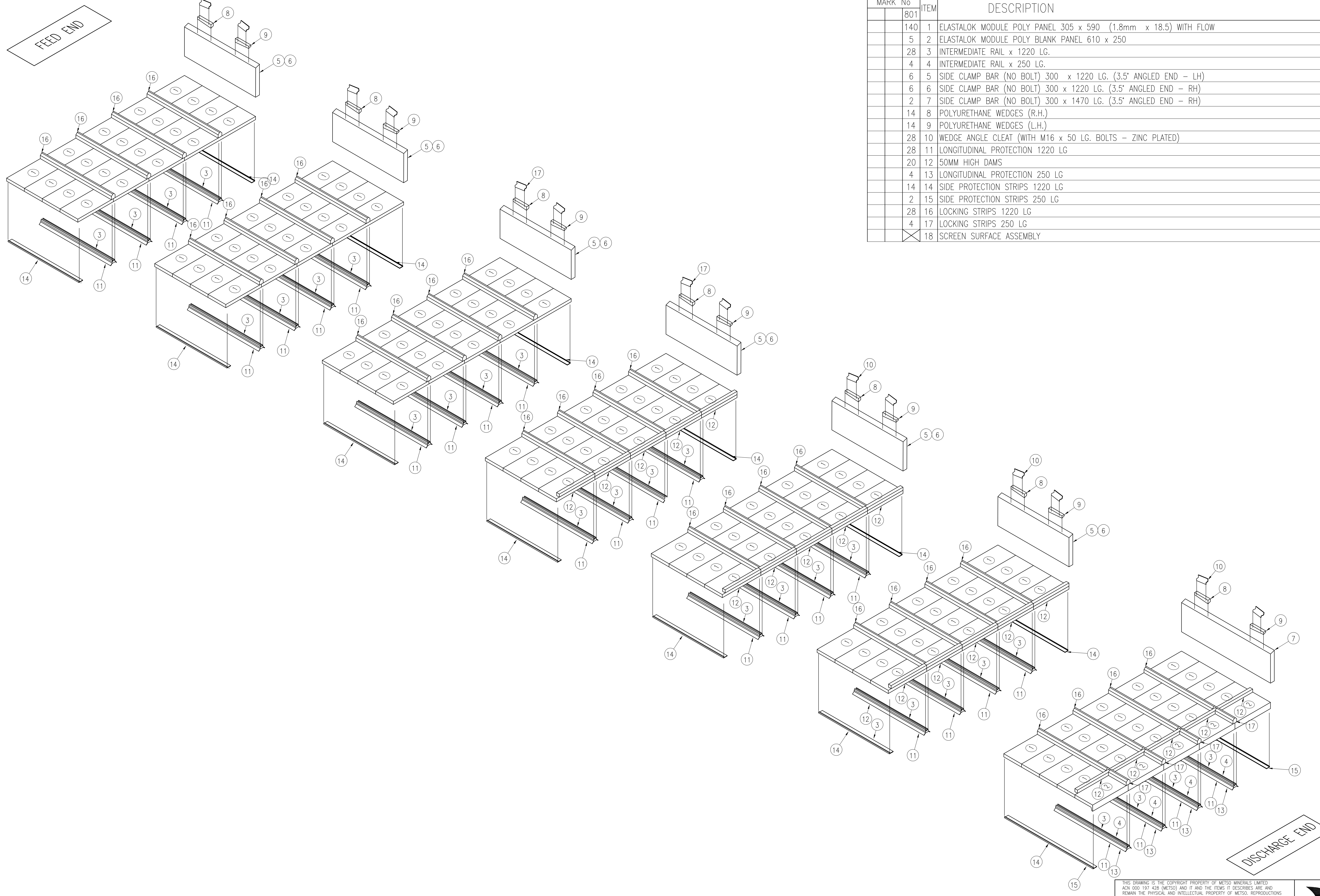
TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	6.3 UNLESS OTHERWISE STATED	

DRAWN	MAH	SCALE	N/A
CHECKED	S.H.	SHEET	2 of 2
APPROVED	S.HICKEY	ASSY DRG	
SIMILAR TO			

metso minerals

TITLE
DRIVE ARRANGEMENT
OUTBOARD JACK SHAFT
5-3 LOWHEAD MECHANISMS

SIZE A2 DRG No 26-A31-204 ISSUE 15



MARK No		ITEM	DESCRIPTION	PART NUMBER		MASS EA kg	
	801			DRG No.	MK	RGH	FIN
	140	1	ELASTALOK MODULE POLY PANEL 305 x 590 (1.8mm x 18.5) WITH FLOW	26-A52-600	001		
	5	2	ELASTALOK MODULE POLY BLANK PANEL 610 x 250	26-A52-600	002		
	28	3	INTERMEDIATE RAIL x 1220 LG.	26-A52-600	003		
	4	4	INTERMEDIATE RAIL x 250 LG.	26-A52-600	004		
	6	5	SIDE CLAMP BAR (NO BOLT) 300 x 1220 LG. (3.5° ANGLED END - LH)	26-A52-600	005		
	6	6	SIDE CLAMP BAR (NO BOLT) 300 x 1220 LG. (3.5° ANGLED END - RH)	26-A52-600	006		
	2	7	SIDE CLAMP BAR (NO BOLT) 300 x 1470 LG. (3.5° ANGLED END - RH)	26-A52-600	007		
	14	8	POLYURETHANE WEDGES (R.H.)	26-A52-600	008		
	14	9	POLYURETHANE WEDGES (L.H.)	26-A52-600	009		
	28	10	WEDGE ANGLE CLEAT (WITH M16 x 50 LG. BOLTS - ZINC PLATED)	26-A52-600	010		
	28	11	LONGITUDINAL PROTECTION 1220 LG	26-A52-600	011		
	20	12	50MM HIGH DAMS	26-A52-600	012		
	4	13	LONGITUDINAL PROTECTION 250 LG	26-A52-600	013		
	14	14	SIDE PROTECTION STRIPS 1220 LG	26-A52-600	014		
	2	15	SIDE PROTECTION STRIPS 250 LG	26-A52-600	015		
	28	16	LOCKING STRIPS 1220 LG	26-A52-600	016		
	4	17	LOCKING STRIPS 250 LG	26-A52-600	017		
	X	18	SCREEN SURFACE ASSEMBLY	26-A52-600	801		

XSTRATA MIM SCREEN 3.0 X 8.5 SD MULTI-FLO

NOTE-
SIDE CLAMPS & WEDGES SHOWN ONE SIDE ONLY FOR CLARITY.

01 31-10-05

DO NOT SCALE IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	6.3 UNLESS OTHERWISE STATED	

DRAWN S.H. SCALE N.T.S.
CHECKED S.H. SHEET 1 of 1
APPROVED S.HICKEY ASSY DRG
SIMILAR TO 26-A43-526

metso minerals

TITLE SCREEN SURFACE ASSEMBLY 3.0 x 8.5 SD MULTI-FLO SCREEN - ELASTALOK

SIZE A0 DRG No 26-A52-600-801 ISSUE 01

	MARK No																	ITEM	DESCRIPTION	MATERIAL	PART NUMBER		MASS EA kg	
818	817	816	815	814	813	812	811	810	809	808	807	806	805	804	803	802	801				DRG No.	MK	RGH	FIN
																	X	1	DRIVE SHAFT AND COUPLING ASSEMBLY.		26-A41-697	801		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	DRIVE SHAFT COUPLING.		26-A30-985	801		
2	2		1		2	1	1	2	1	2	1	1	2	1	1		2	3	MECHANISM SHAFT ADAPTOR.		26-A30-851	801		
																1	1	4	DRIVE SHAFT ASSEMBLY.		26-A41-695	501		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	KEY 18 x 11 x 60 LG.-FORM'C' 0.4 CHAMFER.	99-A30-021-006	99-A30-023	001		
16	16	16	16		16	16	16	16	16	16	16	16	16	16	16	16	16	6	BOLT HEX HD. 0.5" U.N.C. x 2.5 " LG.		00-611-314	556		
16	16	16	16		16	16	16	16	16	16	16	16	16	16	16	16	16	7	WASHER HARDENED, CLIPPED 0.5"		00-659-045	299		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8	BOLT HEX HD. M20 x 50 LG.		65-611-197	369		
2	2		2		2	2	2	2	2	2	2	2	2	2	2		2	9	RETAINING WASHER.		00-651-001	584		
2	2		2		2	2	2	2	2	2	2	2	2	2	2		2	10	KEY 0.75" x 1.062" x 3.88" LG.	99-A30-020-046	00-677-061	906		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	11	SPRING WASHER ø20.		65-655-021	020		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	12	SPACER WASHER.		26-A20-923	801		
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	13	RETAINING WASHER.		07-142-795	001		
2	2		2		2	2	2	2	2	2	2	2	2	2	2		2	14	BOLT HEX HD. 1.25" U.N.C. x 2.5" LG.		07-150-029	001		
YES	YES		YES			YES	YES	YES		YES						YES		15	DRIVE SHAFT ASSEMBLY INSTRUCTIONS.		26-A41-697	401		
			1			1	1		1		1	1		1	1			16	INBOARD MECHANISM SHEAVE.		26-A30-969	801		
															1			17	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-695	503		
														1				18	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-695	504		
													1					19	DRIVE SHAFT ASSEMBLY.		26-A41-695	505		
												1						20	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-695	507		
10ml			10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	10ml	21	LOCTITE - SCREWLOCK No.222 (ASSY NOTE 6.)		26-A41-697	021		
											1							22	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-695	508		
										1								23	DRIVE SHAFT ASSEMBLY.		26-A41-695	510		
										X								24	DRIVE SHAFT ASSEMBLY. (OUTB'D DRIVE)		26-A41-697	808		
		1		1					1									25	DRIVE SHAFT ASSEMBLY.		26-A41-695	511		
									X									26	DRIVE SHAFT AND COUPLING ASSEMBLY.		26-A41-697	809		
								1										27	DRIVE SHAFT ASSEMBLY.		26-A41-695	512		
								X										28	DRIVE SHAFT ASSEMBLY. (OUTB'D DRIVE)		26-A41-697	810		
							1											29	DRIVE SHAFT AND COUPLING ASSEMBLY.		26-A41-695	513		
							X											30	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-697	811		
						1												31	DRIVE SHAFT (SOLID SHAFT)		26-A21-456	002		
						X												32	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-697	812		
					1													33	DRIVE SHAFT AND COUPLING ASSEMBLY.		26-A41-695	514		
					X													34	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-697	813		
				X														35	DRIVE SHAFT ASS'Y (WITHOUT MECH SHEAVE & ADAPTOR)		26-A41-697	814		
			X															36	DRIVE SHAFT ASSEMBLY. (INBOARD DRIVE)		26-A41-697	815		
			1															37	DRIVE SHAFT		26-A41-695	515		
		X																38	DRIVE SHAFT AND COUPLING ASSEMBLY. PARTIAL		26-A41-697	816		
	1																	39	DRIVE SHAFT		26-A41-695	516		
	X																	40	DRIVE SHAFT AND COUPLING ASSEMBLY		26-A41-697	817		
X																		41	DRIVE SHAFT AND COUPLING ASSEMBLY		26-A41-697	818		
1																		42	DRIVE SHAFT		26-A41-695	517		

MK 801 OUTBOARD DRIVE ASSEMBLY 10'-0" WIDE
MK 802 SPARE SHAFT ASSEMBLY SPECIAL 10 x 20 DD TAHMOOR
MK 803 INBOARD DRIVE ASSEMBLY 10'-0" WIDE
MK 804 INBOARD DRIVE ASSEMBLY 12'-0" WIDE
MK 805 OUTBOARD DRIVE ASSEMBLY 12'-0" WIDE
MK 806 INBOARD DRIVE ASSEMBLY 3.6M WIDE
MK 807 INBOARD DRIVE ASSEMBLY 10'-0" WIDE
MK 808 OUTBOARD DRIVE ASSEMBLY 12'-0" WIDE
MK 809 INBOARD DRIVE ASSEMBLY 3.0M WIDE
MK 810 OUTBOARD DRIVE ASSEMBLY 3.6m WIDE
MK 811 INBOARD DRIVE ASSEMBLY 3.6m WIDE
MK 812 INBOARD DRIVE ASSEMBLY 2.4m WIDE
MK 813 OUTBOARD DRIVE ASSEMBLY 3.0m WIDE
MK 815 INBOARD DRIVE ASSEMBLY 4.2m WIDE
MK 817 OUTBOARD DRIVE ASSEMBLY 4.2m WIDE
MK 818 OUTBOARD DRIVE ASSEMBLY; TRIPLE MECH'S 4.2m WIDE

MK.	DIM. 'A'	DIM. 'B'
801	1894 - 1906	1682 - 1694
802	1894 - 1906	1682 - 1694
803	1816 - 1828	1604 - 1616
804	2426 - 2438	2214 - 2226
805	2504 - 2516	2292 - 2304
806	1598 - 1610	1386 - 1398
807	988 - 1000	776 - 788
808	1675 - 1687	1463 - 1475
809	867 - 879	654 - 666
810	1555 - 1567	1343 - 1355
811	1477 - 1489	1264 - 1276
812	258 - 270	45 - 57
813	945 - 957	733 - 745
814		
815	2087 - 2099	1874 - 1886
817	2166 - 2179	1953 - 1965
818	512 - 524	300 - 312

ASSEMBLY INSTRUCTIONS WHEN CHANGING MECHANISM

1. FIT MECHANISM SHAFT ADAPTORS (ITEM 3) USING KEY, RETAINING WASHER AND BOLT (ITEMS 10,9 & 14).
2. PUSH END FLOAT IN BOTH MECHANISMS IN SAME DIRECTION AND MEASURE DIM. 'A' (DISTANCE BETWEEN MECHANISM SHAFT ADAPTORS).
3. ADJUST LENGTH OF SHAFT ASSEMBLY TO DIM. 'A' USING SPACER WASHERS (ITEM 12). AFTER WASHER COMBINATION TO PRODUCE DIM. 'A' IS FOUND, KEY (ITEM 5) CAN BE FITTED FOLLOWED BY EXCESS SPACER WASHERS, RETAINING WASHERS, LOCKWASHER & BOLT (ITEMS 12,13,8 & 11).
4. PUSH END FLOAT IN ONE MECHANISM SO AS TO MAXIMISE DIM. 'A' THEN FIT CONNECTING SHAFT ASSEMBLY TO MECHANISM ADAPTORS USING BOLTS AND WASHERS (ITEM 6 & 7).
5. CHECK END FLOAT OF TOTAL ASSEMBLY (END FLOAT SPEC. 0.8-3.2mm).

ASSEMBLY INSTRUCTIONS WHEN CHANGING BELTS

1. REMOVE COUPLING BOLTS (ITEM 6).
2. REMOVE SHAFT ASSEMBLY.
3. CHANGE BELTS.
4. REPLACE SHAFT ASSEMBLY ENSURING TIMING MARKS ON MECHANISM ADAPTORS (ITEM 3) OR PULLEY (ITEM 16) ARE IN LINE.
5. REPLACE COUPLING BOLTS (ITEM 6) AND TORQUE TO 65 FT/LBS.
6. APPLY LOCTITE (ITEM 21) TO ALL SCREW THREADS ON FINAL ASSEMBLY.

MK 816 ADDED.
21 30/09/03 SH
MK 817 ADDED.
22 26-10-05 SH
MK 818 & ITEM 42 ADDED.
23 18.01.06 DRT

ITEM 31 ADDED. MK 812 ADDED.
17 28-4-98 MAH
ITEM 32 ADDED. MK 813 ADDED.
18 03-06-99 TG
MK 814 ADDED.
19 29-03-01 SH
ITEM 37 ADDED. MK 815 ADDED.
20 17/5/02 MAH

01 07-10-81
MK.809 ADDED. ITEMS 25 & 26 ADDED. DRAWING REDRAWN.
14 12-01-94 PJW
MK.810 ADDED. ITEMS 27 & 28 ADDED.
15 02-05-94 PCW
MK.811 ADDED. ITEMS 29 & 30 ADDED.
16 07-02-97 T.G.

DO NOT SCALE IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

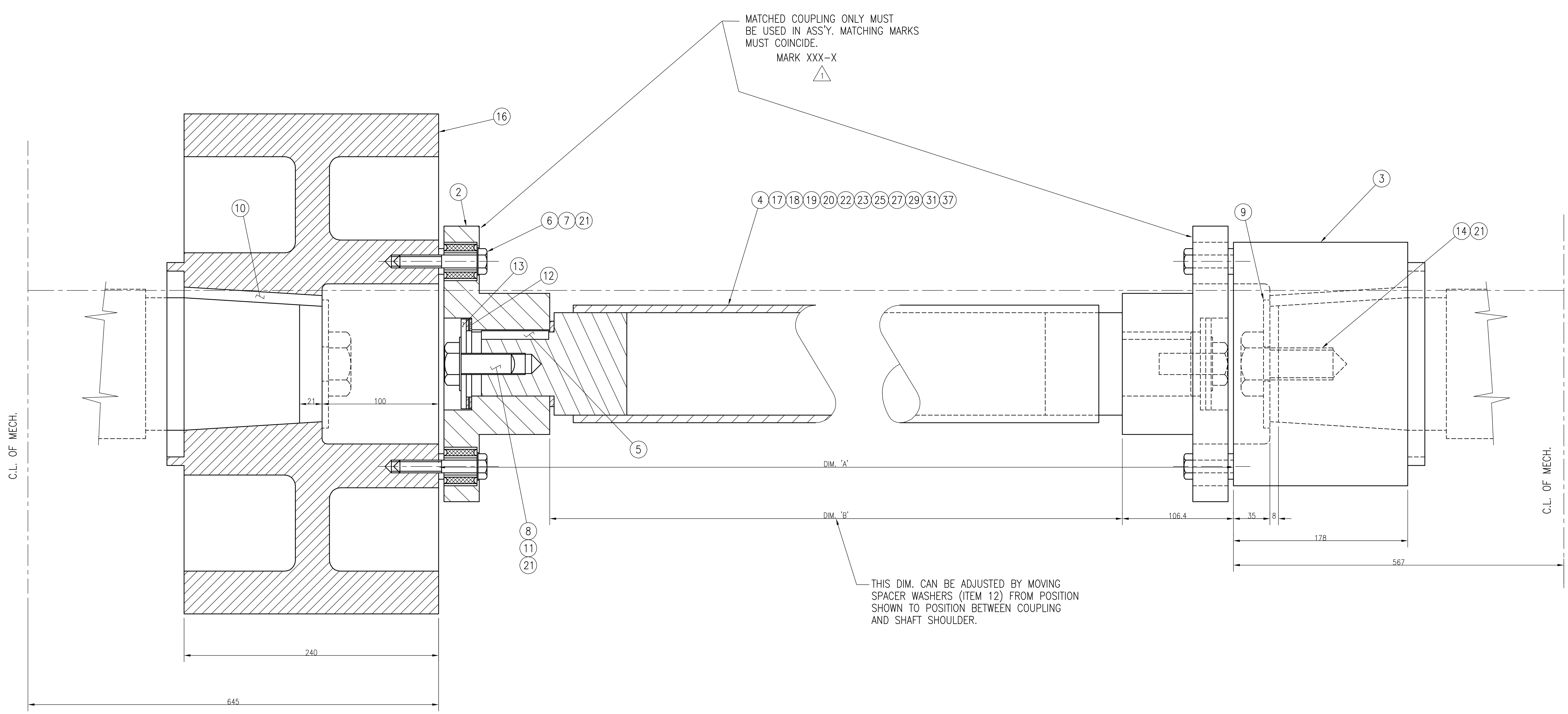
TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	UNLESS OTHERWISE STATED	

DRAWN ASH | SCALE N.T.S.
CHECKED MWH | SHEET 1 of 2
SIMILAR TO
ASSY DRG

SVEDALA

TITLE CONNECTING SHAFT & COUPLING ASSEMBLY. TWIN 5-3 MECHANISMS LOW HEAD SCREEN

SIZE A1 DRG No 26-A41-697 ISSUE 23



MK 816 ADDED.		ITEM 31 ADDED. MK 812 ADDED.	
21	30/09/03 SH	17	28–4–98 MAH
MK 817 ADDED.		ITEM 32 ADDED. MK 813 ADDED.	
22	26–10–05 SH	18	03–06–99 TG
MK 818 & ITEM 42 ADDED.		MK 814 ADDED.	
23	18.01.06 DRT	19	29–03–01 SH
		ITEM 37 ADDED. MK 815 ADDED.	
		20	17/5/02 MAH

01	07–10–81
MK.809 ADDED. ITEMS 25 & 26 ADDED. DRAWING REDRAWN.	
14	12–01–94 PJW
MK.810 ADDED. ITEMS 27 & 28 ADDED.	
15	02–05–94 PCW
MK.811 ADDED. ITEMS 29 & 30 ADDED.	
16	07–02–97 T.G.

DO NOT SCALE
IF IN DOUBT, ASK

DIMENSIONS IN MILLIMETRES

3rd ANGLE PROJECTION

TOLERANCES AND FINISH		
LINEAR	WHOLE NUMBER	±1.5
	ONE DECIMAL PLACE	±0.5
ANGULAR	ALL ANGLES	±0.5
FINISH	UNLESS OTHERWISE STATED	
DRAWN ASH	SCALE	N.T.S.
CHECKED MWH	SHEET	2 of 2
SIMILAR TO		
ASSY DRG		

SVEDALA

TITLE CONNECTING SHAFT & COUPLING ASSEMBLY. TWIN 5–3 MECHANISMS LOW HEAD SCREEN

SIZE A1 DRG No 26–A41–697 ISSUE 23

6 Appendices

Revision History	
14 December 2004	W. Lewington Created from previous editions. Re-formatted styles. Minor changes to paragraphs in various sections.
10 January 2006	W. Lewington, G Lockwood, G Carlyle Altered " …– Metric Grade 8.8" to "…– Metric Class 8.8"
16 January 2006	Added headers and footers. Preparation for changeover to NC.

6.1 Appendix A

6.1.1 Throw Card Master Sheet

Use this page as a master to make additional copies of these throw cards.

Machine		Machine	
Serial Number	Date	Serial Number	Date
Level		Level	
Line		Line	
Level		Level	
Line		Line	
Feed End Left Side		**Feed End Right Side**	

Machine		Machine	
Serial Number	Date	Serial Number	Date
Level		Level	
Line		Line	
Level		Level	
Line		Line	
Discharge End Left Side		**Discharge End Right Side**	

6.2 Appendix B – Pre-Commissioning

6.2.1 Pre-Commissioning Checks

Pre-commissioning checks are of vital importance to ensure safe, effective and efficient operation of the equipment.

Metso Minerals (Australia) has a trained field service team available to ensure that installation and commissioning procedures are completed satisfactorily. Make the following general checks before operating the screen.

If installation and commissioning is not performed / supervised by Metso Minerals field personnel, please ensure that the Commissioning/Audit Checklist (attached) are completed, signed and sent to Metso Minerals for review and approval – before putting the equipment into service

Check sheets should be faxed to the nearest Metso office as detailed in the covering pages of this manual.

CAUTION

Any action taken to rectify a non-conformance before completing and submitting the installation/commissioning checks (for review by Metso Engineers) will seriously jeopardise warranty available on the equipment and can result in premature structural failure of the equipment.

6.2.2 Commissioning/Audit Check List For Screens and Feeders

COMMISSIONING / AUDIT CHECK LIST FOR SCREENS AND FEEDER

Customer	Serial Number	Date
Site	Location	
Machine Description		
Any comments – deviations from standards set by METSO including visual damage		

ENGINEERING DESIGN	ACTUAL ON SITE
1. Design Speed rpm …………… Design Rotation …..………………. ☐ With Flow ☐ Contra Flow ☐ Counter Rotation ☐ (Vibrator motors, V Vibrators – for linear motion)	Recorded Speed ………….RPM Recorded Rotation ……………………. With Flow Contra Flow Counter Rotation
2. End Float Feed End ………………………mm Discharge end ………………………mm	Recorded End Float Feed End ……………………… mm Discharge end ………………………mm
3. Design Frequencies Vertical ………….. cpm Horizontal ………….. cpm Longitudinal ………….. cpm	Recorded Frequencies Vertical ………….. cpm Horizontal ………….. cpm Longitudinal ………….. cpm
4. Design Throw Left Hand Feed …………mm Right Hand Feed …………mm Left Hand Discharge …………mm Right Hand Discharge …………mm Comments…………………………………………	Recorded Throw Left Hand Feed …………mm Right Hand Feed …………mm Left Hand Discharge …………mm Right Hand Discharge …………mm Comments…………………………………………
5. Design Spring Configuration (per corner) Feed End ……..inner ……….outer Discharge End ……..inner ……….outer Design Spring Heights (no live load) Feed End ………..mm Discharge End …………mm Gap between Spring Base and friction check plate (13 mm nom) Springs vertical in both planes (front / end) Yes….. No…	Recorded Spring Configuration Feed End ……………..inner ……….outer Discharge End ……………..inner ……….outer Recorded Spring Heights Feed End RH……..mm LH………….mm Discharge End RH……..mm LH………….mm …………mm
6. Clearances around Machine Design (Vert. & Horizontal 75 mm min Design 25 mm min	Recorded Clearances Under pan ……….mm Feed Box ……….mm Spray Pipe ……….mm Other (Specify) ……….mm
Oil Level Checked yes…. No…. Mechanism Breather fitted (low head) yes…. No……	

7. Vee Belt Drive Tension -Satisfactory ☐ Requires Adjustment ☐ Alignment -Satisfactory ☐ Requires Adjustment ☐	
Design Criteria Prepared by ………………………. Date	Checked By ………………………………. Field Service Rep.
We have examined this report and will retain a copy, to the best of our knowledge it is correct. ………………… ………….. ……………………….. Customer By Date MANAGER FIELD SERVICE ………………………………………………………..DATE…………………………………	

6.3 Appendix C – Bolts Tightening Procedure

6.3.1 General

Successful operation of a machine depends upon good maintenance.

WARNING!
Machinery must be inspected frequently to insure that all bolts are tight.

Check the tightness of all bolts after the first few hours of initial operation of the machine. During the first week of operation, check the bolts for tightness daily and then periodically thereafter. This procedure also applies to parts and components that have been disassembled and reassembled during normal maintenance periods.

6.3.2 Procedure for Tightening Bolts

1. Deburr all bolt holes be for assembly to ensure a tight fit between parts being fastened together.
2. Contact surface of the parts attached with bolts must be free of dirt, oil, rust, loose scale, etc.
3. Use two hardened washers per bolt, one under the bolt head and one under the nut. See figure 1
4. Use the Proper size and grade of bolt for the job. The “Bolt Torque Value” chart lists the size, grade and head marking of the bolt, and provides a minimum and maximum torque value for each size and grade of bolt in “kilogram metres” and “foot pounds" (in parentheses).
5. Tighten bolts to the recommended torque value with a torque wrench.

6.3.3 If Torque Wrench Is Not Available

1. Install sufficient fitting-up bolts and tighten as required to bring the parts together.
2. Install bolts in the balance of holes. Tighten the nuts by the "turn of nut" method. This requires that bolts be brought to a snug-tight condition to insure at the joint material is properly compacted before the nut is rotated through the specified turn. "Snug-tight" is defined as
"The tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench".
When using an impact wrench, snug condition is readily noticeable as that point at which the wrench starts impacting solidly.
3. Give nuts an additional 1/2 to 2/3 turn.
4. Tighten nuts on fitting-up bolts to "snug-tight" condition and then give these nuts an additional 1/2 to 2/3 turn.

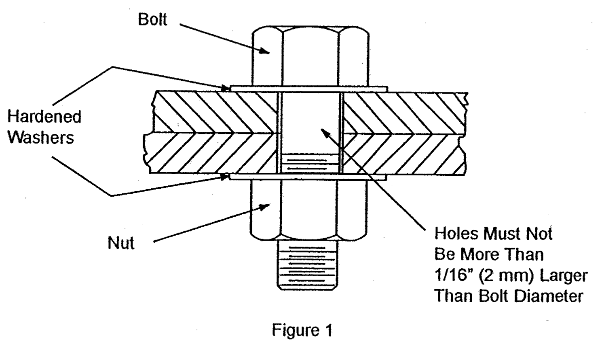


Figure 1: Cross section showing layout of bolts, washers and nuts

6.4 Process for Tightening Bolts (Friction Grip) Unplated.

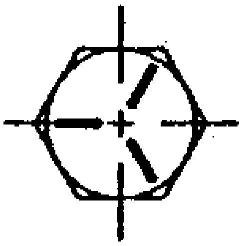
WARNING!
Not to be used for bolting low head mechanisms to mechanism support beams.

Contact surface of parts attached with bolts must be free of dirt, oil, loose scale etc.

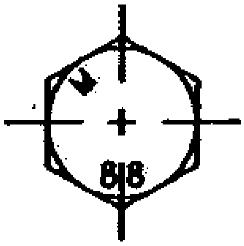
Use two hardened washers (for high strength bolts only) per bolt, one under the head and one under the nut.

Hand tighten bolts using a 300mm long spanner; check the gap between the plates with a feeler gauge. The maximum gap which allows contact with the shank of the bolt is 0.lm.

Bolts are to be tightened with a torque wrench within the range as tabulated below.



Imperial - grade 5 S.A.E. or structural



Metric - class 8.8

6.4.1 Tightening Torques – Grade 5 S.A.E. Or Structural

SIZE	THREAD	TIGHTENING TORQUE	
		MAX.	MIN.
3"/8"	U.N.C.	56 Nm. (41.5 lbs.ft.)	54 Nm. (40 lbs.ft.)
7/16	U.N.C.	89 Nm. (66 lbs.ft.)	86 Nm. (*63* lbs.ft.)
1"/2"	U.N.C.	137 Nm. (101 lbs.ft.)	130 Nm. (96 lbs.ft.)
5"/8"	U.N.C.	271 Nm. (200 lbs.ft.)	258 Nm. (190 lbs.ft.)
3"/4"	U.N.C.	480 Nm. (354 lbs.ft.)	456 Nm. (337 lbs.ft.)
7"/8"	U.N.C.	772 Nm. (569 lbs.ft.)	734 Nm. (541 lbs.ft.)
1"	U.N.C.	1169 Nm. (862 lbs.ft.)	1111 Nm. (819 lbs.ft.)
1 ¼"	U.N.C.	1871 Nm. (1380 lbs.ft.)	1778 Nm. (1311 lbs.ft.)
1 ½"	U.N.C.	3954 Nm. (2920 lbs.ft.)	3760 Nm. (2773 lbs.ft.)
1 5/8"	U.N.C.	5450 Nm. (4020 lbs.ft.)	5178 Nm. (3820 lbs.ft.)
1 ¾"	U.N.C.	6890 Nm. (5080 lbs. ft.)	6546 Nm. (4828 lbs. ft.)

6.4.2 Tightening Torques – Metric Class 8.8

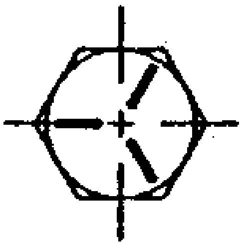
SIZE	TIGHTENING TORQUE	
	MAX.	MIN.
M10	67 Nm. (49 lbs. ft.)	64 Nm. (47 lbs. ft.)
M12	118 Nm. (88 lbs. ft.)	112 Nm. (84 lbs. ft.)
M16	292 Nm. (215 lbs. ft.)	277 Nm. (204 lbs. ft.)
M20	572 Nm. (422 lbs. ft.)	544 Nm. (401 lbs. ft.)
M24	985 Nm. (726 lbs. ft.)	934 Nm. (690 lbs. ft.)
M30	2020 Nm. (1491 lbs. ft.)	1920 Nm. (1417 lbs. ft.)
M36	3534 Nm. (2606 lbs. ft.)	3358 Nm. (2476 lbs. ft.)
M42	5648 Nm. (4156 lbs. ft.)	5366 Nm. (3957 lbs. ft.)
M48	8462 Nm. (6242 lbs. ft.)	8039 Nm. (5930 lbs. ft.)

Based on 100% to 95% of proof load for plated bolts refer to sheet 2

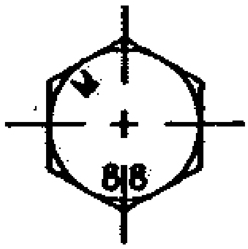
6.5 Process For Tightening Bolts (Friction Grip) Plated

(NOT TO BE USED FOR BOLTING LOW HEAD MECHANISMS TO MECHANISM SUPPORT BEAMS).

1. Contact surface of parts attached with bolts must be free of dirt, oil, loose scale etc.
2. Use two hardened washers (for high strength bolts only) per bolt, one under the head and one under the nut.
3. Hand tighten bolts using a 300mm long spanner; check the gap between the plates with a feeler gauge. The maximum gap which allows contact with the shank of the bolt is 0.lm.
4. Bolts are to be tightened with a torque wrench within the range as tabulated below.



Imperial - grade 5 S.A.E. or structural



Metric – class 8.8

6.5.1 Tightening Torques – Grade 5 S.A.E. Or Structural

SIZE	THREAD	TIGHTENING TORQUE	
		MAX.	MIN.
3/8"	U.N.C.	39 Nm. (29 lbs.ft.)	38 Nm. (28 lbs.ft.)
7/16	U.N.C.	63 Nm. (46 lbs.ft.)	60 Nm. (44 lbs.ft.)
1/2"	U.N.C.	96 Nm. (71 lbs.ft.)	91 Nm. (68 lbs.ft.)
5/8"	U.N.C.	190 Nm. (140 lbs.ft.)	180 Nm. (133 lbs.ft.)
3/4"	U.N.C.	336 Nm. (248 lbs.ft.)	319 Nm. (236 lbs.ft.)
7/8"	U.N.C.	540 Nm. (398 lbs.ft.)	513 Nm. (378 lbs.ft.)
1”	U.N.C.	818 Nm. (603 lbs.ft.)	777 Nm. (573 lbs.ft.)
1 ¼”	U.N.C.	1310 Nm. (966 lbs.ft.)	1245 Nm. (918 lbs.ft.)
1 ½”	U.N.C.	2772 Nm. (2042 lbs.ft.)	2634 Nm. (1942lbs.ft.)
1 5/8”	U.N.C.	3816 Nm. (2814 lbs.ft.)	3625 Nm. (2673 lbs.ft.)
1 ¾”	U.N.C.	4822 Nm. (3556 lbs. ft.)	4581 Nm. (3378 lbs. ft.)

6.5.2 Tightening Torques – Metric Class 8.8

SIZE	TIGHTENING TORQUE	
	MAX.	MIN.
M10	47 Nm. (35 lbs. ft.)	45 Nm. (33 lbs. ft.)
M12	83 Nm. (61 lbs. ft.)	79 Nm. (58 lbs. ft.)
M16	204 Nm. (150 lbs. ft.)	194 Nm. (143 lbs. ft.)
M20	400 Nm. (295 lbs. ft.)	380 Nm. (280 lbs. ft.)
M24	689 Nm. (508 lbs. ft.)	655 Nm. (483 lbs. ft.)
M30	1414 Nm. (1043 lbs. ft.)	1344 Nm. (991 lbs. ft.)
M36	2747 Nm. (1825 lbs. ft.)	2351 Nm. (1734 lbs. ft.)
M42	4536 Nm. (3365 lbs. ft.)	4335 Nm. (3197 lbs. ft.)
M48	5923 Nm. (4368 lbs. ft.)	5623 Nm. (4150 lbs. ft.)

Based on 100% to 95% of proof load for unplated bolts refer to sheet 1

6.6 Appendix D – Trouble-Shooting Log Sheets

6.7 Appendix E – Maintenance Log Sheets