DIGGING DEEP SERIES

OEM EXHAUST UPGRADE ESSENTIALS: PART 1

EXTENDED LIFECYCLE FOR LESS DOWNTIME

SEE PART 2 FOR AN OEM ALTERNATIVE

GIVE YOUR FLEET THE EDGE

EXHAUSTS

1/3

We build exhaust solutions that add value for our customers. Downtime is costly, and that's why we consider an exhaust system an investment in your productivity. Aletek OEM replacement exhausts are designed for extended product lifecycle and interchangeability with OEM parts.

WHAT IS AN OEM REPLACEMENT EXHAUST?

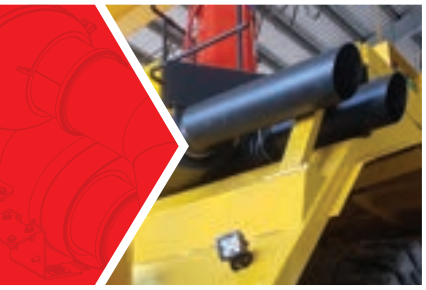
- Exhausts must suit a specific asset type and model
- Replicate the OEM exhaust path without modifications
- Compatible with OEM engines and bolt onto turbo outlets

THE KEY METRIC IS PRODUCTIVITY

The common goal in mining is productivity, fleet performance, and maintenance. Premature exhaust component or system failure results in unplanned downtime and increased TCO (*Total Cost of Ownership).

Aletek's OEM replacement exhaust range can help boost fleet productivity with:

- **Reliability** – less downtime and maintenance costs
- **Durability** – extended lifecycle (see our 793F case study)
- **Supply dependability** – key asset parts in stock
- **ROI** – strategic upgrade, ~30% TCO* cost savings



OEM REPLACEMENT EXHAUSTS GIVES YOU OPTIONS

OEM replacement exhausts offer you conveniences like the choice of suppliers, competitive pricing, and a contingency in the case of an OEM stock shortage. Most importantly, Aletek makes improvements for reliability, such as:

- Solid machined flanges to prevent cracking on engine pipe ends
- Vent ports on dual-wall pipes help prevent failure of inner pipe wall
- Parts improvements such as bellow upgrades and brackets

BUY THE BEST IN KIND, FOR PEACE OF MIND

When it comes to improving productivity for your fleet, investing in equipment and accessories that are best in class is a must. We believe an Aletek OEM replacement exhaust package is an investment in your productivity.

- **Choice** – an alternative to OEM with improvements
- **Compatibility** – interchangeable with OEM parts
- **Durability** – endurance in harsh environments
- **Convenience** – in-house engineering and manufacturing for hassle-free installs
- **Savings** – reduced total ownership costs
- **Guarantee** – 100% compatible with OEM exhaust systems
- **Quality** – Australian designed and manufactured

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Exhaust Essentials - Part 1
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HEAVY-DUTY EXHAUST ESSENTIALS: PART 2

SUPPLY & COST ISSUES? AN OEM ALTERNATIVE

SEE PART 3 & DOUBLE-DOWN WITH DUAL-WALLS

EXHAUSTS

GIVE YOUR FLEET THE EDGE

2/3

The reliable supply of mining equipment parts is critical to avoiding downtime. Our current economic climate is causing supply chain problems for some providers. How can your site mitigate this risk when it comes to exhaust parts supply?

OEM SUPPLY PROBLEMS? NO PROBLEMS HERE!

We've heard frequent reports from customers of disruptions within the supply chain for OEM-supplied exhaust products. As a leading supplier of premium Australian-made exhaust parts, Aletek is pleased to highlight our ability to deliver parts without delay. A reliable and viable OEM alternative, how? Please read on.

1. EXHAUST PARTS – OUR IN-STOCK COMMITMENT

Aletek has an in-stock commitment on select makes and models ready for dispatch. We're committed to helping you minimise downtime.

- OEM replacement engine pipes, mufflers and tailpipes
- Mounting brackets, engine pipe bellows
- Air intakes – rubber elbows, adapters, hoses, etc

We also stock a comprehensive range of universal components, including V-Band clamps, straps, gaskets, and install hardware.

2. OEM COMPATIBLE FOR DIRECT-FIT INTEGRATION

Aletek exhaust pipes and parts are interchangeable with OEM parts. That means you can choose and interchange between our parts and OEM branded.

- Exhaust parts interchangeable with OEM parts
- Genuine direct-fit (no pipe welding onsite)
- Jigs ensure pipes replicate OEM exhaust paths
- Supplier choice – why rely only on OEM parts?

100% COMPATIBLE					
Interchange with OEM parts	Direct-fit system	Extended product lifecycle	Australian made	Fatigue zones improved	Mitigate fire with blankets

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HEAVY-DUTY EXHAUST ESSENTIALS: PART 3

DUAL-WALLS – SUPERIOR THERMAL REDUCTION

SEE PART 2 FOR AN OEM ALTERNATIVE

DUAL-WALL

GIVE YOUR FLEET THE EDGE

3/3

A dual-walled exhaust system significantly reduces the risk of engine fires. Dual-wall pipes are insulated with a central silica layer to reduce external surface temperatures. Lowering the temperature of the outer wall below the fuel flashpoint improves safety and eliminates the need to cover engine pipes with blankets.

WHAT IS A DUAL-WALL EXHAUST?

- Dual-wall exhausts feature an inner and outer pipe layer
- A central silica layer adds insulation and aids MDG 15[1] compliance (150°C ext. surface temp.)
- Dual-walls are resistant to fuels and oil infiltration
- These systems connect directly to OEM turbo outlets
- Custom brackets and upgraded hardware are necessary for installation

DUAL-WALL EXHAUST DESIGN FEATURES

- Reinforced components such as solid machined flanges
- Flanges, clamps and mounts designed for minimal heat transfer
- Strategically located vent ports help prevent inner wall failure
- Flexible elements absorb stresses caused by heat differentials between inner and outer walls
- Compared to dual-walls with airgaps, silica insulation reduces temperatures more effectively
- Central layer options include thermal (insulated), acoustic (perforated) and non-insulated

FIRE MITIGATION – A ROBUST SETUP

A dual-wall exhaust system separates fuel and heat sources and reduces outer wall surface temperatures for less ignition risk. Adding an insulated silica layer between the two pipe walls can significantly lower external surface temperatures. Using dual-wall insulated engine pipes eliminates the need for thermal blankets on engine pipes while achieving MDG 15[1] compliance.

- **Superior fire strategy** – a purpose-engineered solution for ongoing fire mitigation
- **Endurance** – less risk of premature component failure and downtime by improving on OEM designs
- **Integrated insulation** – a longer lifespan with insulated pipes (no engine pipe blankets required)
- **Simplified maintenance** – no need to inspect and reinstall lagging after servicing (no blankets on pipes)

Install thermal blankets on turbos, manifolds, and junctions for a comprehensive fire mitigation approach.

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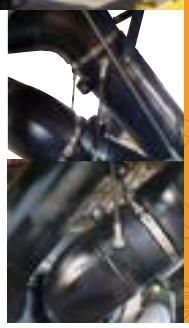
HEAVY-DUTY EXHAUST ESSENTIALS: PART 3

DUAL-WALLS – SUPERIOR THERMAL REDUCTION

SEE PART 2 FOR AN OEM ALTERNATIVE

DUAL-WALL EXHAUST STRATEGY – CONSIDERATIONS



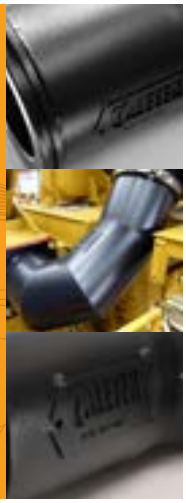
Engineers and maintenance crews should consider the following factors when implementing dual-wall systems.

Design considerations

- Check machine availability – dual-wall systems are only available for select assets
- Longterm investment – increased upfront cost compared to exhaust and blankets setup; TCO[2] should factor in blanket replacement costs
- Space constraints – assess clearances to ensure that larger pipes and bends will fit
- OEM integration – space restrictions may prevent replication of the OEM exhaust path. When commissioning a custom solution, ensure replacement parts are available.

Implementation considerations

- Additional weight – dual-wall pipes significantly heavier than single-wall and blanket setups
- Bracket and clamp replacement – dual-walls require new hardware for larger pipe diameters
- Initial installation – new installs require experienced fitters; Aletek can assist



DUAL-WALLS EXCEL FOR DRILL RIGS, ULTRA CLASS & SOUND

Experience has shown that dual-wall exhausts are an excellent consideration for the following applications:

Rotary Blasthole Drills

- Protection for workers from exposed mufflers and exhaust pipes
- Enhanced fire mitigation and asset protection
- Popular solutions: (Atlas Copco) Epiroc DML60, PV235 & PV275

Large equipment (Ultra Class Trucks & Excavators)

- Purpose-built systems for increased uptime and maximum productivity
- Durability and engine fire protection (add turbo, manifold and junction blankets)
- Less ongoing service requirements, no blanket-related maintenance on engine pipes
- Popular solutions: Cat 6040, 6060 & 794AC, Komatsu 830E-AC, Liebherr T282 & R996B

Sound Suppression solutions

- Dual-wall utilised for engine pipes, silencers, tailpipes, etc
- Custom dual-wall systems help realise acoustic benefits
- Options for central insulation (MDG 15[1]) or acoustic-lined inner wall
- Solutions include: Cat 785B/C & 793D, Komatsu 830E-AC, Liebherr T282

[1] MDG 15 Guideline (NSW Australia) [2] TCO: Total Ownership Costs

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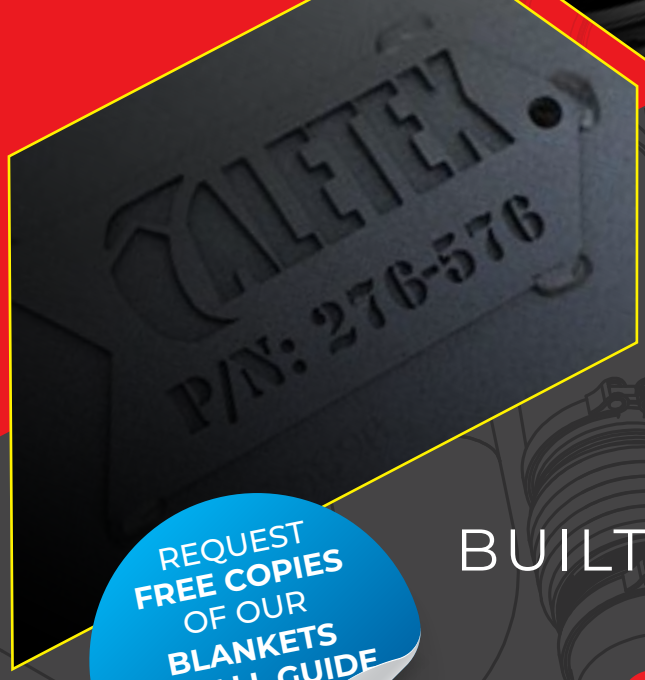
EXHAUSTS
BELLOWS
ENGINE PIPES
MUFFLERS

EXHAUSTS

INSTALLATION & USER GUIDE

- EXHAUST INSTALLATION
- TAKE 5 CHECKLIST
- WORKSHOP GUIDE: GOOD FITMENT
- MAINTENANCE GUIDELINES
- PRODUCT WARRANTY



AUS MADE • OEM UPGRADES • DUAL-WALL •

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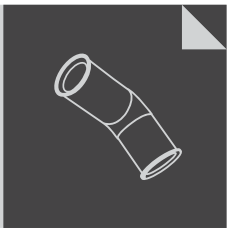


Introduction

EXTENDED PRODUCT LIFECYLES

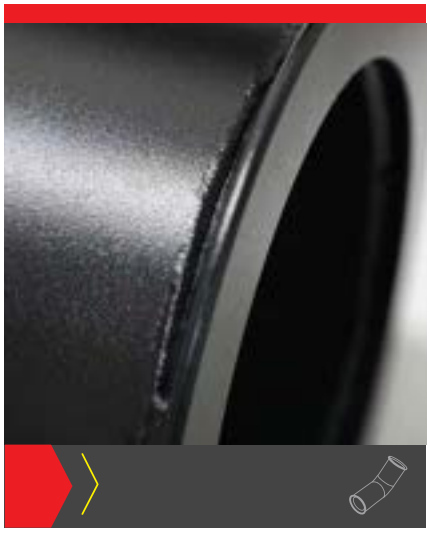
Thank you for choosing an Aletek exhaust system! Designed with long-term cost savings in mind, our exhausts are Australian-made and precision engineered. Aletek OEM replacement exhausts guarantee the perfect match. For a winning fire mitigation strategy, combine OEM replacement exhausts with thermal blankets for reduced exhaust surface temperatures and less risk of burns.

We offer exhaust and blanket installation guides and fitting cheat sheets for your crew. Download these sheets and add them to your job packs and training resources from **www.aletek.com.au/resources/**

PURPOSE OF THIS HANDBOOK

All personnel using, maintaining, and managing exhausts should read this User Handbook. Exhausts should be fitted by experienced personnel. It is essential that the install order and techniques are followed. This guide provides general principles for popular machines and models. The underlying principles are typically universal and should be read and translated to suit your specific equipment and application.

Exhaust Systems Overview



A strategic upgrade

OEM COMPATIBLE EXHAUSTS

Downtime is costly, so we consider exhaust systems an investment in your productivity. We build class-leading exhaust upgrades that improve productivity and reduce TCO (Total Cost of Ownership). We provide tangible value to our customers through extended product lifecycles and interchangeable OEM parts.

Our OEM upgrades deliver strategic advantages:

- Reduced machine downtime (an investment in productivity)
- Savings on TCO (Total Cost of Ownership)
- Best in class and built to last

Extreme durability

DUAL-WALL EXHAUST UPGRADES

A dual-wall exhaust system is a strategic upgrade designed to solve specific problems. A few of these issues include reducing fire risks, enhancing durability, and simplifying maintenance. Installing dual-wall exhausts on an asset can reduce engine fire risks, increase longevity, and streamline maintenance.

Advantages of dual-wall systems:

- Reduce fire risk with integrated insulation (no blankets on pipes)
- Extreme durability drives productivity
- Reduce life of ownership costs

Australian built

SUPPRESSION EXHAUSTS & ATTENUATION

Our noise-compliance approach solves many problems. We excel at project management, improving engine bay access, and reducing weight. We're reliable for spare parts and post-install support. Using our modular approach, we can offer you multi-stage packages for incremental attenuation.

What makes us a sound choice?

- Achieve noise compliance for non-compliant fleets
- We improve maintenance access and serviceability
- Save time on installation and maximise asset availability

1

EXHAUST INSTALLATION

1.1 Pre-Installation

TOOLS REQUIRED

TOOLS REQUIRED

Step	Task/Activity
1.	Safety glasses (A), gloves (B), tape measure (C), Allen keys (D), adjustable shifter (E), metric and imperial spanner or socket set (F), long and short nose pliers (G), Phillips and flat-head screw drivers (H), box cutter (I), hammer or mallet (J), and a rattle gun (K).

1.1 Commissioning Checklist

EXHAUST INSTALLATION

Customer:		**Job No.**
Machine Unit No.	**Machine Serial No.**	**Exhaust Group Part No.**
Questions	**Answers**	**Initials (by Fitter)**
Asset parked, fundamentally stable?		
Machine Isolated from starting?		
Work order matches task?		
Competent to complete works?		
Have access equipment?		
Tools required for works?		
Do I need lifting assistance?		
Am I working at heights?		
Correct drawing for task?		
All parts checked off?		
Old parts removed, put in scrap bin?		
New parts fitted as per drawing?		
Connections tightened?		
Mounts refitted?		
Check mount points, fit for purpose?		
Documentation filled out?		
Remove isolation?		
Run machine to temperature (and allow time to cool)		
Isolate machine from starting		
Re-check connections and mounts		
Check for signs of exhaust leaks		
Comments		

1.1 Pre-Installation

TAKE 5 CHECKLIST

PRE-INSTALL CHECKLIST

Step	Task/Activity
1	Identify and avoid pinch points, and wear gloves to avoid sharp edges. When vehicles are raised on a hoist, ensure it is positioned correctly and locked in place. Ensure the vehicle is secure and chocked. Check for rusty and decayed components before removing parts.
2	To prevent electric shock or sudden vehicle movement during installation, apply the hand brake and isolate with a battery isolator. Apply a personal lock and hasp. Use wheel chocks when necessary and follow the site-specific park safe protocols.
3	Wear safety glasses, gloves, a respirator and coveralls. Exhaust parts reach extreme temperatures and harmful particle deposits may be present. Always abide by site specific PPE rules and use this document as a bare minimum reference.
4	Allow the engine and exhaust systems to cool before removing thermal blankets or exhaust components. Use dedicated devices to ensure surface temperatures are within site tolerances before handling exhausts. Wear gloves for safe handling.
5	Pipes can weigh over 10 kg, work within individual limits, and use mechanical aids as required. To prevent dust or soot from dislodging, avoid bumping the OEM system.

1.2 Exhaust Components

COMMON PARTS

COMPONENT OVERVIEW

Aletek exhaust packages will involve a range of different components. Learning to identify these parts will assist in the fitment process. Below are common components that will be shipped as an exhaust package.

Standard V-band clamp

U-bolt clamp

Bellows

Split V-band clamp

Flanged pipes

Clamp covers (dual-walls)

Gaskets

Slip-join pipes

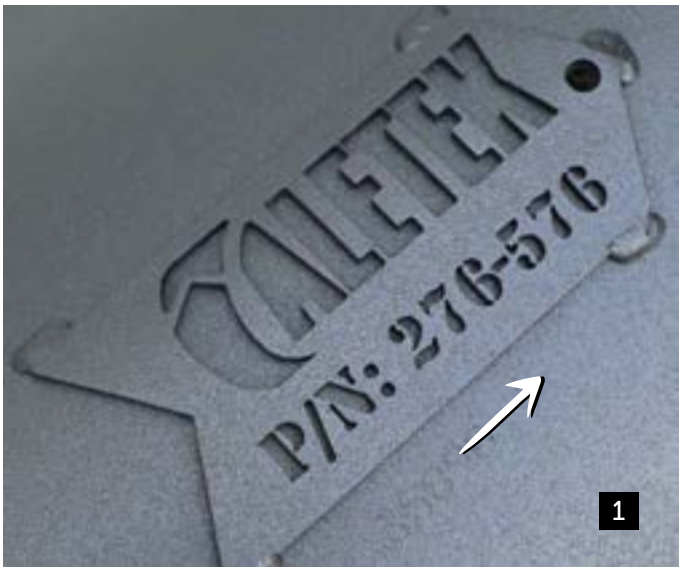
Brackets

1.3 Techniques

FLOW DIRECTION / V-BAND CLAMPS

FLOW DIRECTION

Step	Task/Activity
1.	The shape of the Aletek Badge indicates the flow direction. Ensure the badge corresponds with the exhaust exit flow direction before final install tightening.



V-BAND CLAMPS

Step	Task/Activity
2.	Ensure anti-seize is used on V-band clamp threads and NPT fittings. Tighten both nuts equally on split V-band clamps to provide a proper seal. As V-band clamps undergo many heat cycles, we recommend using new clamps when installing new sections.

BRACKET DETAILS

Brackets have slots that allow adjustment during the tightening process. Check if the machine has been modified before proceeding with the installation.

1.3 Techniques

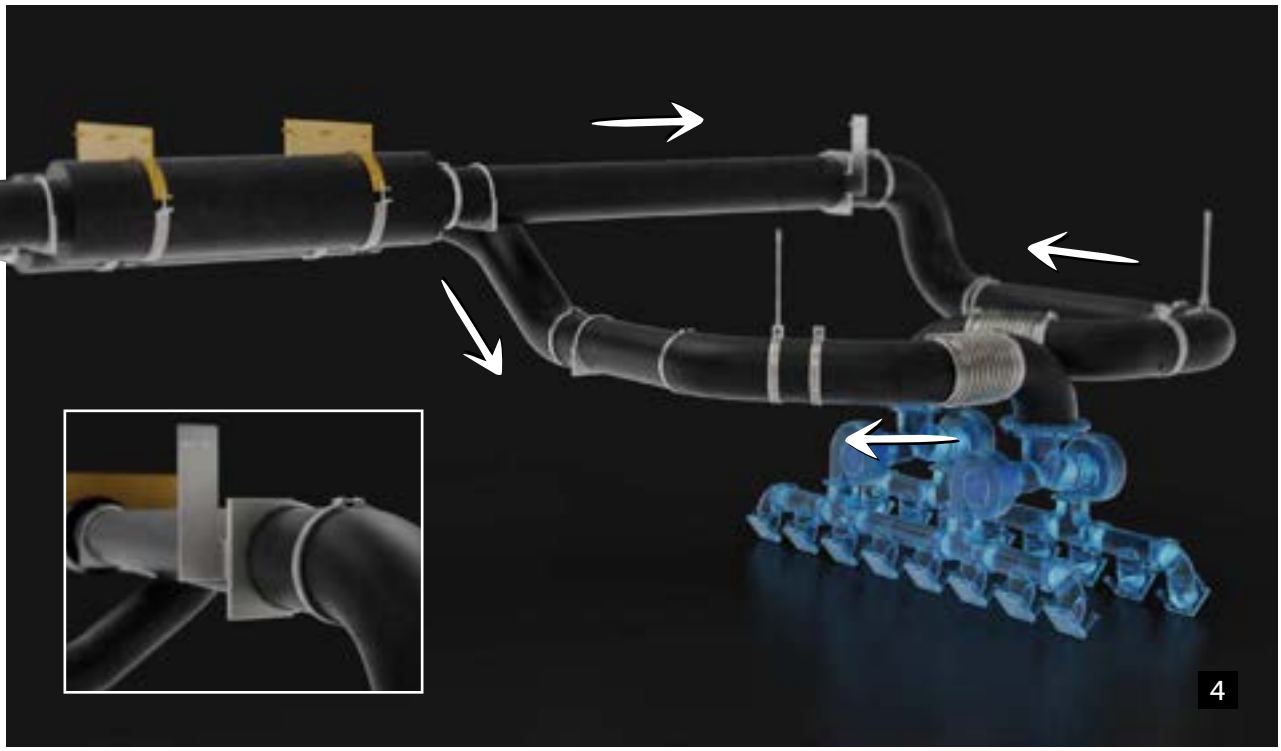
ENGINE PIPE ALIGNMENT

SECTION OVERLAPS

Step	Task/Activity
3.	Ensure an adequate overlap depth is reached. The marked slots should cover the slip-join completely.

ENGINE PIPE ALIGNMENT

Step	Task/Activity
4.	Leave all parts loose during assembly. Once parts are aligned, tighten all fixtures. It is often best to work inwards from each end of the system and join in the middle.

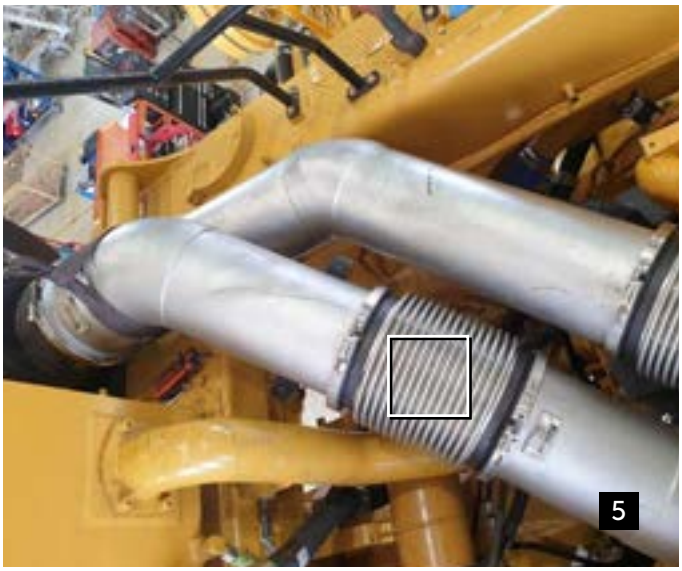


1.3 Techniques

ENGINE BELLOWS / CLAMP COVERS

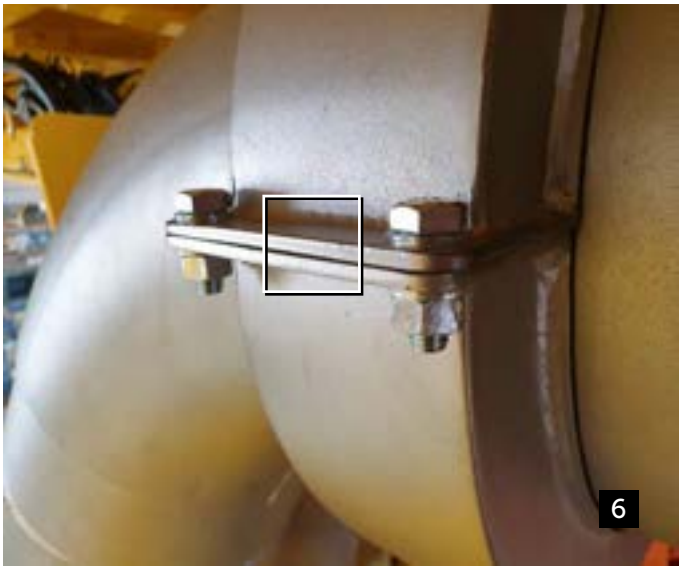
EXHAUST BELLOWS

Step	Task/Activity
5.	Ensure bellow convolutions are parallel to guarantee correct alignment. There should be no load on the bellows, and no straining or stretching. Bellows are not designed to correct misalignment issues.



CLAMP COVERS (DUAL-WALL SYSTEMS ONLY)

Step	Task/Activity
6.	Exposed exhaust components will need to be equipped with Aletek thermal blankets or 'clam shell' covers. This typically applies to dual-wall joints. Direct-fit, single-wall systems may require thermal blankets to reduce surface temperatures.



V-BAND TIPS

Ensure V-band clamps don't bottom out when tightening. Maintain a 5 mm gap between the bolt housing and clamp body. Tighten split V-band clamps equally to ensure an even seal.

1.4 Installation

PRE-INSTALL / OEM REMOVAL / BRACKETS

PRE-INSTALL CHECK

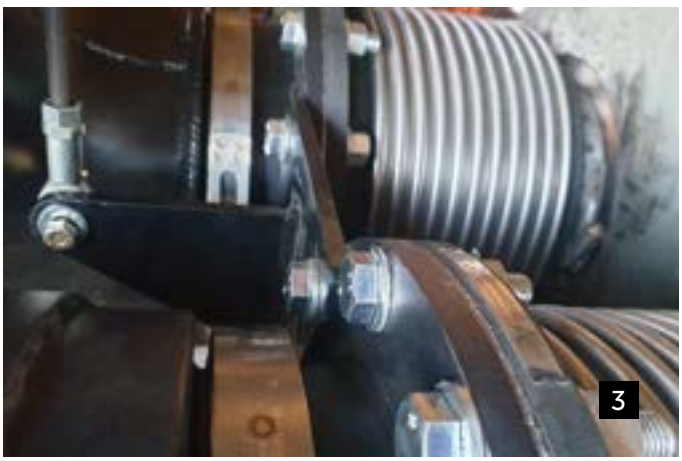
Step	Task/Activity
1.	Complete the Commissioning and Pre-Install checklists (Section 1.1) and read through the install techniques (Section 1.3) before starting work.

REMOVE OEM SYSTEM

Step	Task/Activity
2.	Safely remove any thermal blankets and exhaust components from the vehicle. Be sure to use all required PPE and abide by site safety checklists.

INSTALL BRACKETS

Step	Task/Activity
3.	Install the supplied Aletek brackets, keep the bolts semi-loose to allow for adjustments as you proceed.



1.4 Installation

MUFFLERS / INTAKES / TIGHTENING

MUFFLER INSTALL

Step	Task/Activity
4.	Install the mufflers to designated bracket mounts. Use jigs as required. This will assist in lining up components as the install proceeds. For perfect fitment, the flow badges in Step 1 of the Install Techniques (Section 1.3) should face up at 12 o'clock.

INTAKE INSTALL

Step	Task/Activity
5.	Install the main components for the intake side of the exhaust (turbo back). After the first pipes are installed, work towards the turbo from the already installed mufflers. Mount the pipes to exhaust hangers then fill in the gaps with non-mountable pipes.

TIGHTENING

Step	Task/Activity
6.	As mentioned, leave all parts semi-loose during assembly. Once parts and flow badges are aligned, tighten all fixtures and clamps to spec.

1.4 Installation

ENGINE PIPE REPLACEMENT

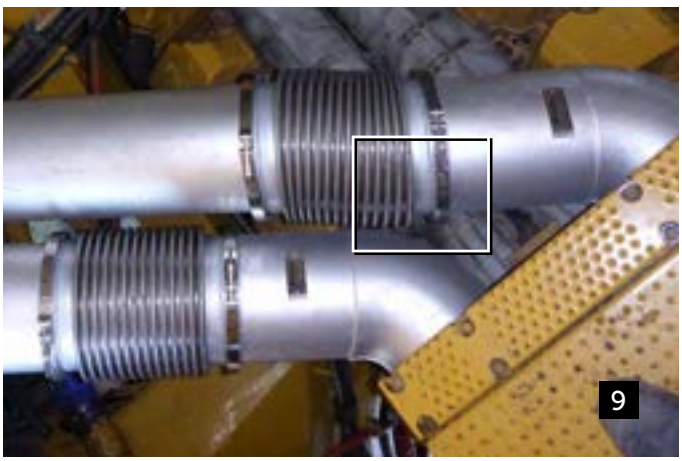
ENGINE PIPE REPLACEMENT

Step	Task/Activity
7.	Loosen brackets and clamps at either end of the pipes. Remove damaged or old pipe sections. Loosen the next pipes in the sequence to allow for alignment. Prepare the new section of pipe.

Step	Task/Activity
8.	Install the new section. Tighten either side until correct alignment is achieved. Be sure to check the flow badge direction before installation.

REPLACEMENT TIPS

Step	Task/Activity
9.	It is important that engine pipes and replacement parts are correctly implemented. As shown in the picture, if these steps are not followed, the exhaust sections will be misaligned.



1.5 Finalising Installation
CHECKLIST

FINAL INSPECTION

It is vital to conduct a final exhaust inspection and sign-off before allowing the machine to return to work.

- ☐ Ensure all pipes are fitted correctly with the flow badges upwards
- ☐ Ensure no gaps are present
- ☐ Check all bolts and clamps have been tightened to spec
- ☐ Ensure all mounting points are secured and tightened
- ☐ Review the Commissioning Checklist (see Section 1.1)
- ☐ Take photos of the correctly installed system

EXHAUST CHECKS

Visually inspect exhaust systems at regular service intervals for deterioration, movement, black soot, and wet areas (see Section 4.2.5). Also check periodically for normal exhaust operation when the engine is running (see Section 4.2.6).

SCHEDULED SERVICING

Exhaust systems, when fitted and maintained correctly, will provide years of service. Mistreatment and third-party product exposure may shorten the product lifespan.

Inspect exhaust systems on a systematic basis to ensure maximum service life is attained. Aletek recommends a monthly visual condition inspection (see 4.1 Service Checklist)

Aletek can provide you with detailed fleet audit reports ranging from an individual machine through to a full fleet analysis. We will highlight products and solutions that can offer improvements for machine aspects such as safety, efficiency, and durability. Contact Aletek for more information on our fleet audit services.

INSTALLATION PROBLEMS?

Should your team experience exhaust fitting problems phone your Aletek Account Manager for assistance. To receive the best advice, email or send photos first to sales@aletek.com.au and then phone Aletek to discuss.

2

WORKSHOP GUIDE: ASSEMBLY

2.1 Exhaust Assembly Examples

OEM REPLACEMENT – CAT 793F (C175-16)

A ENGINE PIPES

INSTALL TIPS

- Ensure Aletek arrow badge points in flow direction and in the 12 o'clock position
- Fit engine pipes loosely without tightening brackets or clamps until all in position
- When installing a full kit, work inwards from each end for best alignment

OEM IMPROVEMENTS

- Solid machined flanges prevent pipe ends cracking
- Vent ports prevent failure of inner pipe wall

B ENGINE PIPE BELLOWS

INSTALL TIPS

- Ensure bellow convolutions are parallel to guarantee correct alignment
- There should be no load on the bellows, no straining or stretching present
- Not designed to correct misalignment issues

OEM IMPROVEMENTS

- Convoluted steel for increased durability
- No alignment tool required for installation
- Designed to extend product durability with simplified installation

C TURBO & MANIFOLD BELLOWS

INSTALL TIPS

- Orientate bellow in correct flow direction (arrows marked outside)

OEM IMPROVEMENTS

- Shorter length allows the bellow to slip into place and secure with V-band clamps
- No need to compress bellows before installing
- No compression tool required
- Extended product durability with simplified installation

E

G

G

SEE BELLOW DRAWING ALE-5570

C

2.1 Exhaust Assembly Examples

OEM REPLACEMENT – CAT 793F (C175-16)

D MUFFLERS

INSTALL TIPS

- Ensure Aletek arrow badge points in flow direction and in the 12 o'clock position
- Sit mufflers loosely in bracket and secure straps then tighten once aligned

OEM IMPROVEMENTS

- 3mm steel construction, high temp powder-coated

E TAILPIPES

INSTALL TIPS

- Fit tailpipe end over the top of muffler outlet spigot with approx. 60mm overlap
- Ensure tailpipes face down in correct position (8 o'clock)
- Fasten HDC Clamp once all parts are aligned

OEM IMPROVEMENTS

- Direct-fit replacement for OEM, no changes

F V-BAND CLAMPS

INSTALL TIPS

- Use anti-seize on clamp threads and NPT fittings
- Ensure clamp doesn't bottom out when tightening, leave a 5mm gap between bolt housing and clamp body (do not tighten completely flat).

OEM IMPROVEMENTS

- Direct-fit replacement for OEM, no changes

G BRACKETS & STRAPS

2.1 Exhaust Assembly Examples

OEM REPLACEMENT – CAT D11T (C32)

A ENGINE PIPES

INSTALL TIPS

- Ensure Aletek arrow badge points in the flow direction
- Fit engine pipes loosely with tightening brackets or clamps until all in position
- When installing a full kit, work from the turbo to the muffler and review pipe alignment

POINTS OF DIFFERENCE

- Solid machined flanges prevent pipe ends cracking
- Vent ports prevent failure of the inner pipe wall

B MUFFLERS

INSTALL TIPS

- Ensure the venturi sits at the bottom of the muffler
- Sit mufflers loosely in bracket and secure straps then tighten once aligned

POINTS OF DIFFERENCE

- 3mm steel construction, high temp powder-coated

2.1 Exhaust Assembly Examples

OEM REPLACEMENT – CAT D11T (C32)

C TAIL PIPE & RAIN CAP

INSTALL TIPS

- The tail pipe slides over the muffler outlet pipe
- Use M12 bolts and washers to fix the tail pipe in place
- Rain cap press fit and firm tighten with bolt

POINTS OF DIFFERENCE

- Direct-fit replacement for OEM, no changes

D V-BAND CLAMPS

INSTALL TIPS

- Use anti-seize on clamp threads and NPT fittings
- Ensure clamps don't bottom out when tightening, leave a 5mm gap between bolt housing and clamp housing

POINTS OF DIFFERENCE

- Direct-fit replacement for OEM, no changes

E BRACKETS

INSTALL TIPS

- Brackets have slots that allow adjustment during the tightening process
- When installing brackets, keep the bolts semi-loose to allow for adjustments during the install

3

WORKSHOP GUIDE: GOOD FITMENT

3.1 Exhaust Showcase

HAUL TRUCK – KOMATSU

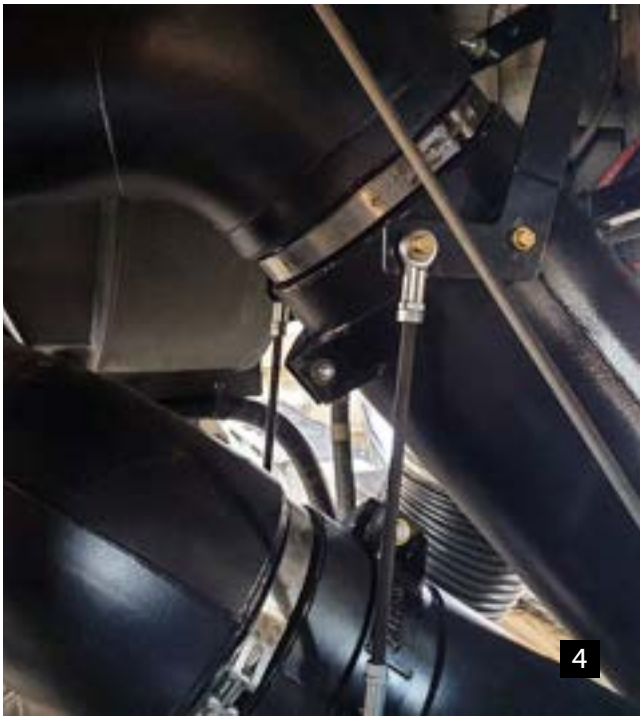
KOMATSU 830E-AC DUAL-WALL

ABOVE Komatsu 830E-AC dual-wall exhaust system, engine pipe and mounting details.

3.1 Exhaust Showcase

HAUL TRUCK – LIEBHERR

LIEBHERR T282C DUAL-WALL



ABOVE Liebherr T282C dual-wall exhaust system, engine pipe and mounting details. Thermal blankets installed on turbos.

3.1 Exhaust Showcase

DRILL RIG – ATLAS COPCO (EPIROC)

ATLAS COPCO PV275 DUAL-WALL

ABOVE Atlas Copco PV275 dual-wall exhaust system, muffler, engine pipe and mounting details.

4

MAINTENANCE GUIDELINES

4.1 Proactive Maintenance

MAINTENANCE GUIDELINES

MAINTENANCE BEST PRACTICE

Regarding the maintenance and care of your Exhaust system, it is critical that the following guidelines are adhered to.

- Regular engine maintenance is required and should comply with OEM directives
- Engine performance WILL be adversely affected by faulty components, such as:
  - Faulty injectors
  - Faulty turbochargers
  - Leaking components causing ingress of coolant, lube oil or diesel into the combustion chamber or exhaust stream
- Over fueling, overfilling lube oil, excessive lube oil consumption and coolant in the exhaust stream WILL irreversibly impact exhaust performance (check with OEM for maximum limits)
- Ensure air filters are replaced at minimums recommended by the OEM; blocked air filters result in soot production
- It is vital that fuel, lube oil and coolant consumption is measured and recorded
- It is important that exhaust serial numbers are recorded against vehicle IDs in a register and records are updated
- Should engine issues occur Aletek strongly recommend an inspection of the exhaust system

ALETEK RECOMMENDATIONS

Aletek does not recommend reversing the flow direction of pipes, as this will result in severe safety and operating implications. Exhaust failure will reduce uptime and Aletek recommend replacing damaged engine pipes before engine failures occur. The system replacement cost is equivalent to the minimal, compared to a few hours of truck downtime. Acting on exhaust faults and proactively replacing sections will facilitate extended machinery lifecycles.

Aletek firmly believes that the adoption of proactive maintenance is the key to efficiently maintaining exhaust systems. Aletek provide training services to sites, and highly recommended engaging our team to learn more about training sessions to ensure your install procedures reach their full potential. Aletek also provides installation and maintenance services. If you wish to learn more about these services please contact your Account Manager or visit our website.

4.1 Proactive Maintenance

SERVICE CHECKLIST

SERVICE CHECKLIST – MONTHLY

Aletek recommend a monthly visual inspection (see 4.2.7 for additional checks)

- ☐ Examine exhaust for damage (cracks, dents and holes)
- ☐ Inspect exhaust for flammable fluids
- ☐ Check exhaust mounting points are securely tightened
- ☐ Ensure gaskets aren't leaking (look for visible soot marks)
- ☐ Check V-band clamps are tightened
- ☐ Take exhaust condition report photos

Service Actions

- ☐ Replace damaged exhaust sections
- ☐ Assess contaminated sections (by flammable fluids) – clean or replace
- ☐ Tighten loose bolts and mounts
- ☐ Replace leaking gaskets

⚠ **Safety notice**

- ☐ Protect staff against hexavalent chromium Cr(VI) yellow/white dust, wear suitable PPE
- ☐ If Cr(VI) is identified safely dispose of contaminated blankets, clean* and replace

Aletek recommend an annual fleet audit report to assess heat critical engine and exhaust components. Make a booking with your Account Manager.

MAINTENANCE CAUTIONS

- Avoid walking on or applying excess pressure to the installed exhaust system
- High pressure cleaners may cause surface damage to exhaust coating or gaskets
- Report any spillages of oil or grease during servicing and maintenance
- Caution: Avoid starting machines with wet exhausts as excessive steam may appear and create the illusion of an engine fire
- Avoid cleaning exhausts with degreasers as some may have flammable properties

THERMAL BLANKET REPLACEMENT

Exhaust components may have thermal blankets fitted. When replacing thermal blankets wear the required PPE including gloves, safety glasses and a dust mask. If blankets are soaked in oil, diesel or coolant it is next to impossible to remove all traces of contaminants. Aletek recommends replacement to avoid a fire ignition hazard.

- Damaged and excessively worn thermal blankets should be replaced
- When a blanket can no longer serve its intended purpose it should be replaced
- If oil, diesel or coolant pipes leak or burst and contaminate the blankets a thorough inspection should be conducted before clearing the machine for work

Refer to the Aletek Blankets Install & User Guide for detailed instructions.

* Clean infected areas (ie wet methods or HEPA vacuuming), replace with new Cr(VI) free blankets

4.2 Maintenance Best Practice

MAINTENANCE PROCEDURES

4.2.0 GENERAL SAFETY

The following safety procedures should be considered as the minimum requirements for the operation, maintenance, and safe use of exhaust systems.

Note: The information in this guide shall not be construed to waive or modify any obligation imposed by the Work Health and Safety Act, Regulations, Australian Standards, Codes of Practice, or site safety procedures.

- Before start up, complete all sections of the pre-start inspection
- Pre-inspect the exhaust for cracks, worn parts, exhaust leaks, damage, clamp or flange damage, and any other potential defects and damage to the exhaust, clamps, or mounting system (see Section 4.2.5)
- Report defects to your supervisor immediately, don't operate if it's unsafe
- Keep exhausts clean from grease, oils, and other flammable substances
- Ensure gloves are used anytime an exhaust system is touched
- Never touch or place anything on a hot exhaust surface
- Never directly breathe, inhale or swallow exhaust gas or soot
- Ensure the engine is isolated prior to entering exhaust areas

4.2.1 RISK ASSESSMENT

Employees performing maintenance or repairs to exhaust systems must complete a Take 5 hazard and risk assessment (refer to 1.1 Take 5 Checklist). Challenge any work that needs to be completed off the ground to eliminate working at height risks. Follow all site requirements for working at heights.

4.2.2 MAINTENANCE SAFETY

If you need to disconnect, dismantle, or repair exhaust systems, follow these steps:

- Park the vehicle fundamentally stable
- Isolate machine using site requirements, test system for DEAD
- Protect the work area from unauthorised entry by using barriers
- Ensure you have all the correct replacement parts
- Always wear the necessary Personal Protective Equipment
- Re-test the system after repair or maintenance

4.2 Maintenance Best Practice

MAINTENANCE PROCEDURES

4.2.3 GENERAL MAINTENANCE

When maintaining exhaust systems, personnel should observe the following safety procedures as a minimum:

- The exhaust system must be installed by qualified personnel and comply with all site safety procedures
- Make sure the installation personnel are familiar with and follow the product safety procedures relating to exhausts
- Make sure all isolation and tag-out procedures are followed before exhaust system maintenance
- Prior to maintenance work on the system, engine and exhaust heat must be checked and risk assessed
- Before working, make sure the machine is on level ground, locked out, and fundamentally stable.
- Ensure all exhaust mounts are correctly fitted to the machine
- Before you start working, make sure all the required components are available
- Ensure dirt and debris are not introduced when replacing or repairing parts
- Do not stand on, or walk on exhaust components

4.2.4 CLAMPS AND MOUNTS

Inspect mounting fixtures and clamps before repairing or replacing parts.

Mounts Checklist

- Ensure there is no corrosion or cracking in exhaust mounts
- Visually inspect brackets back to the frame or chassis that will take the load
- Ensure all locking nuts are tight
- Knuckles and joints must be in a serviceable condition
- Confirm mounts have not worn the exhaust due to movement
- Pipes are not crushed due to over-tensioning

Clamps Checklist

- Ensure clamps are not corroded
- Clamps should be tight and fit for purpose
- Clamping bolts cannot rub other parts of the equipment

4.2 Maintenance Best Practice

MAINTENANCE PROCEDURES

4.2.5 ROUTINE EXHAUST INSPECTION

Examine exhaust systems visually at regular service intervals for the following:

- Cracked or loose pipes or mounts
- Look for rust stains showing movement, cracks or fatigue
- Bent or misaligned parts
- Black soot escaping from joints or welds (inspect thermal blankets for soot)
- Grease falling onto or near the exhaust system
- Wet areas indicating the presence of a fluid on the exhaust
- Clamps are fitted and visually appear to be tight

4.2.6 OPERATIONAL EXHAUST CHECKS

Check periodically for normal exhaust operation with a few simple checks. When moving around an asset with an engine running, follow these safety precautions:

Loose Parts

Listen for any rattles and vibrating parts from the exhaust area, including the exhaust exiting the tailpipe (internal baffle issue).

Excessive Black Smoke

Backpressure symptoms include reduced engine power and excessive exhaust soot. There may be exhaust blockages caused by excessive engine oil consumption or collapsing muffler internals blocking the exhaust path.

4.2.7 MONTHLY GENERAL INSPECTION

- Inspect all clamps, mounts, flanges, and brackets; examine any movement, and replace, tighten or repair affected areas
- Check for exhaust soot on or around the exhaust system; inspect for leaks, identify the source and replace, tighten or repair
- Check for excessive structural rust, and repair or replace parts
- Challenge and assess off-ground works to remove any working at height risks; follow all site requirements for working at heights
- Check for interactions between exhaust systems and other components; remove, realign, and adjust to remove interactions
- Look for grease falling onto or near exhaust systems
- Check for wet areas on the exhaust that indicate fluid presence

4.3 Exhaust Troubleshooting

MAINTENANCE CHECKLIST

Section	Problem	Possible Reason	Solution
Engine Pipes	**Doesn't Fit**	Direction or position	Check flow direction on Aletek badge. Loosen parts before and after to allow movement in remainder of exhaust system.
		Wrong part	Compare drawing and physical component part numbers and confirm these match.
		Wrong side of engine	Check drawing and part number to confirm which side of engine the pipe belongs to.
		Wrong engine	Pipes should match the engine in your asset. Also, be aware some assets have multiple engine types.
		Damage	Check for damage further away in the exhaust system.
		Mounts	Ensure mounts are not modified or bent.
		Modified	Check if the removed part has been modified.
	Leaking	Joint loose	Check and tighten flanges and clamps.
		Gasket damaged	Identify missing gaskets by looking for remnants.
		Cracks	Cracked pipes should be repaired or replaced.
		Rust	If pipes are corroded, exhaust air may leak and not exit the tailpipe as intended.
	Damaged	Rocks	Assess if guarding is possible, look at operation practices to remove risk of rocks striking parts.
		Exhaust mounts	Check mounts are in good condition and unmodified.
		Clamps	Ensure clamping is not loose or overtightened.
		Engine movement	Check engine mounts for excessive engine movement.
		Old	Metal fatigues over time, a simple weld repair may not overcome the fatigued metal. Replace old parts.
Mufflers	**Doesn't Fit**	Direction or position	Check flow direction on Aletek badge. Loosen parts before and after to allow movement in remainder of exhaust system.
		Wrong part	Compare drawing and physical component part numbers and confirm these match.
		Wrong side of engine	Check drawing and part number to confirm which side of engine the muffler belongs to.
		Wrong engine	Mufflers should match the engine in your asset. Also, be aware some assets have multiple engine types.
		Damage	Check for damage further away in the exhaust system.
		Mounts	Ensure mounts are not modified or bent.
		Modified	Check if the removed part has been modified.

4.3 Exhaust Troubleshooting

MAINTENANCE CHECKLIST

Section	Problem	Possible Reason	Solution
Mufflers	**Leaking**	Joint loose	Check and tighten flanges and clamps.
		Gasket damaged	Identify missing gaskets by looking for remnants.
		Cracks	Cracked mufflers should be repaired or replaced.
		Rust	If the muffler is corroded, exhaust air may leak and not exit the tailpipe as intended.
	Damaged	Rocks	Assess if adding guards is possible, look at operational practices to remove risk of rocks striking parts.
		Exhaust mounts	Check mounts are in good condition and unmodified.
		Clamps	Ensure clamps are not loose or overtightened.
		Old	Metal fatigues over time, a simple weld repair may not overcome the fatigued metal. Replace old parts.
Tail Pipes	**Doesn't Fit**	Direction or position	Check flow direction on Aletek badge. Loosen parts before and after to allow movement in remainder of exhaust system.
		Wrong part	Compare drawing and physical component part numbers and confirm these match.
		Wrong side of engine	Check drawing and part number to confirm which side of engine the tail pipe belongs to.
		Wrong engine	Tail pipes should match the engine in your asset. Also, be aware some assets have multiple engine types.
		Damage	Check for damage further away in the exhaust system.
		Mounts	Ensure mounts are not modified or bent.
		Modified	Check if the removed part has been modified.
	Leaking	Joint loose	Check and tighten flanges and clamps.
		Gasket damaged	Identify missing gaskets by looking for remnants.
		Crack	Cracked tail pipes should be repaired or replaced.
		Rust	If tail pipes are corroded, exhaust air may leak through the corrosion.
	Damaged	Rocks	Assess if adding guards is possible, look at operational practices to remove risk of rocks striking parts.
		Exhaust mounts	Check mounts are in good condition and unmodified.
		Clamps	Ensure clamps are not loose or overtightened.
		Engine movement	Check engine mounts for excessive engine movement.
		Old	Metal fatigues over time, a simple weld repair may not overcome the fatigued metal. Replace old parts.
Mounts/ Brackets	**Damaged**	Rocks	Assess if adding guards is possible, look at operation practices to remove risk of rocks striking parts.
		Clamps	Ensure clamps are not loose or overtightened.
		Engine movement	Check engine mounts for excessive engine movement.
		Old	Metal fatigues over time, a simple weld repair may not overcome the fatigued metal. Replace old parts.

5

PRODUCT WARRANTY

5.1 Product Warranty

WARRANTY FORM

We provide a 12-month warranty on manufacturing defects and a direct-fit replacement guarantee on OEM replacement systems. For warranty claims fill in and submit the form on the Aletek website at **www.aletek.com.au/about-us/warranty-form**

Australia
1300 886 628

Indonesia
+62 (542) 300 0018

USA
510.488.5529

Chile
+57 (313) 4855769

Peru
+57 (313) 4855769

Colombia
+57 (313) 4855769