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Purpose of the Document

This Guidance Note document provides assistance or clarification on a given procedure, work instruction or form.

Document References

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1 Introduction and Scope

This guidance note has been produced to assist Patrolmen and Track Inspectors in correctly identifying the various types of rail mounted lubricators and their defects that are in use on LU infrastructure. Guidance is also given to aid in determining whether the lubricator output is too high or too low.

When reporting defects, correctly identifying the type of lubricator makes it easier for the maintainer to schedule staff with the correct competence to attend to the defect and to take the correct tools and spare parts with them.

Being able to visually identify and report correctly if a lubricator output is too high or too low makes it easier for the maintainer to make the correct intervention to address the situation and maintain friction levels in the acceptable range. Reliable information in real time on grease output allows the system to be restored to the correct balance before instances of brake contamination and wheel flats occur or dry rails develop leading to excessive rail wear, "snow" and associated blockjoint failures.

These are all failures of safe systems that as well as adversely affecting the operations of the railway create considerable disruption for our customers.

2 Guidance

What the standards say

E8404 lays down the timescales for responding to defects that are reported in the lubrication system and the relevant sections are copied below.

E 8404 A4 May 2007		Track geometry and condition standards						
Attachment 3								
13. Lubrication		(All values in millimetres unless stated otherwise)						Notes
		Tolerance for track category				Minimum action		
		Standard	A	B	C	D		
13.1 Rail lubricators - fixing		SS Level 3	Defective/missing/loose fixings, unit insecure			Rectify within 36 hours		
Maximum number of defective fixings to sleepers or rails.		ML Level 2	Missing/loose fixings, unit secure			Inspect daily and rectify within 8 weeks		
13.2 Rail lubricators - effectiveness		SS Level 3	No grease/oil being supplied to the rail running face			Apply grease manually until rectified. Rectify within 1 week		(1)
Lubricator not working effectively.		SS Level 3	Too much grease/oil being supplied			Adjust lubricator or disconnect within 24 hours		(2)
		ML Level 2	Grease/oil only partly covering distance required			Apply grease manually until rectified. Rectify within 8 weeks		(3)
		(1) Rail running face dry with no trace of fresh grease/oil (2) Grease covering head of rail (3) Grease being spread less than 100 metres from lubricator						

Lubrication System

The lubrication system is designed to either apply lubricant to the high side running rail on curves or the inner face of a check rail on checked curves. The lubricant used in the system is cream coloured, biodegradable and specifically manufactured for this application. This lubricant is called XP1099 and is manufactured by Clare (this lubricant can be seen Figure 2).

- Note: Any lubricators observed emitting heavy black grease at the Grease Distribution Unit (GDU) should be reported for attention as it possible they are still loaded with Texaco 904 grease that is no longer environmentally acceptable to use. If grey coloured grease is being emitted from the GDU it is likely that there is a mix of the two types of grease and this does not need reporting.

Most lubricators in use on the network consist of three principal assemblies. The reservoir stores the grease and is usually installed in the four foot in an empty bed between sleepers. The plunger block is clamped to the non-gauge face of the rail and is activated by each passing wheel. The grease distribution units clamped to the running edge of the rail deliver the lubricant. These assemblies are connected by a series of flexible hoses.

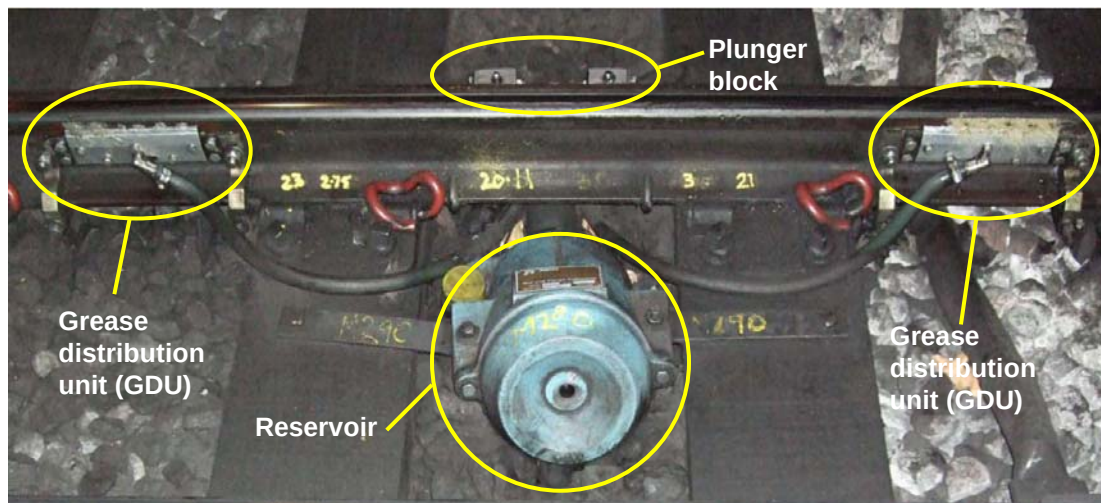


Figure 1 – Location of typical rail lubricator components

- Note: If the plunger assembly or the grease distribution units is not a snug fit to the rail or the clamps holding them in place are loose or missing, report as a defect.

These lubricators, generally referred to as P&M lubricators or Portec lubricators, operate like a giant grease gun. Grease is stored in the reservoir in the four foot, which is filled through a non-return valve. When the barrel is full a spring loaded piston applies pressure on the grease causing it to flow through the pipe work to the plunger block. This is resisted within the plunger block housing where a plunger in the raised position is blocking the free flow of the grease. The passage of a train wheel over the plunger causes the plunger to descend and pump grease through to the exit port and emit grease at the GDU. Some lubricators may be fitted with plunger assemblies and GDU from another supplier (see Figure 8). The photographs later in this guidance note will help you to identify the manufacturer.

- Note: Any excessive build up of grease in the bed that the barrel is located in would suggest a failure of the non-return valve, the seals in the barrel assembly or a failure of the connecting hose. This should be reported as a fault.

In the situation described above a failure of the hose would see the entire contents of the lubricator barrel discharged into the bed in approximately 12 hours.

Plungers are set to a specific height above the railhead to ensure contact with the wheel flange and the correct amount of depression to deliver the desired grease output from that lubricator during the course of a week. The plungers are maintained every 14 days in the tunnel, 28 days in the open section and there are concessions in place to extend this time further in a few places. These should not be adjusted or tampered with by anybody other than the competent lubricator maintenance staff. **In no circumstances should any patroller strike the plungers with a keying hammer to see if they are operating.** Striking the plunger with a hammer whilst proving the system as operable by showing grease being omitted at the GDU, can damage the set up of the plunger and do internal damage to the plunger assembly.

- **Note:** If excessive grease build up is observed around where the plunger enters the plunger housing, this should be reported as a defect.



Figure 2 – Lubricator showing leakage of lubricant from the GDU and hose connection. The lubricant is not being transferred to the running edge of the rail. This condition shall be reported as a defect.

Grease distribution units are set to a specified dimension below the rail head to ensure they are in an optimal position for grease to transfer to the wheel flange. If the GDU is set too low grease will not transfer to the wheel. If the GDU is set too high the risk is that the wheel will strike and damage the GDU preventing it from working effectively over its entire length. Coupled with this is the risk of grease migration across the rail head and the consequential risk of contamination of the train braking system.

- **Note:** If an accumulation of grease is observed around the base of the GDU and rail foot and/or splattering over the rail head and collecting on the field side of the rail the condition shall be recorded as a defect. If the GDU is showing signs of being struck by train wheels, this suggests the GDU is set too high and shall be recorded as a defect.

Figure 3 and Figure 4 below give further guidance on the failure conditions that are likely to be observed. Whilst these photos have all been taken in the tube environment the circumstances are equally applicable to open and sub-surface locations. Figure 5 shows how the GDU should be ideally dispensing grease.