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Your Ref : TP/IP/56467/2017
Our Ref : CI/TPD18000520/Z

23rd January 2018

Fatal Accident Investigation Team
Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF GARBAGE TRUCK XD 4591D

1. We refer to your request on 09th November 2017 to conduct a physical inspection of a garbage truck bearing registration number XD 4591D (herein referred to as "**Garbage Truck**"), which was involved in a road traffic accident on 19th October 2017.

2. The objective of this inspection is to determine if there was any possible mechanical failure to the Garbage Truck that may have contributed to the accident.

3. Following the request, we had carried out a physical inspection of the Garbage Truck on 08th December 2017 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. We now set out below our observations and comments with respect to this inspection.

General Condition

4. The mileage of the Garbage Truck at the time of our inspection was not recorded as its engine could not be started due to a flat battery.

5. The Garbage Truck was observed to have no signs of any fresh damages on its body portion at the time of our inspection. This is likely due to the consistency of the accident's case facts that the Garbage Truck ran over a pedestrian whom was lying on the side of the road.

6. Further investigation on the other parts of the Garbage Truck reveals that some other minor damages exist. However, it is not likely to be related to this particular case. See photo 1 to 6.

Photo 1 shows a general view of the front body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Photo 2 shows a general view of the front right body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Photo 3 shows a general view of the front left body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Photo 4 shows a general view of the rear body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Photo 5 shows a general view of the rear left body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Photo 6 shows a general view of the rear right body of the Garbage Truck at the time of our inspection. The Garbage Truck was observed to have no signs of fresh damages on its body portion.

Tyres and Wheel Rims

7. The 10 tyres fitted on the Garbage Truck were all observed to be in serviceable condition and sufficiently inflated for vehicular operation. We did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The tyre brand, tyre size and remaining tread depth of the Tipper Truck's 10 tyres were recorded as follows:-

8. The 10 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 7 – 12 below.

Photo 7 shows the condition of the front left tyre of the Garbage Truck, which was observed to be in serviceable condition with remaining tread depth of approximately 8mm.

Photo 8 shows the condition of the front right tyre of the Garbage Truck, which was observed to be in serviceable condition with remaining tread depth of approximately 10mm.

Photo 9 shows the condition of the rear left tyres (centre axle) of the Garbage Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 8mm. The tyres were also observed to be sufficiently inflated for vehicular operation.

Photo 10 shows the condition of the rear left tyres of the Garbage Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 13mm. The tyres were also observed to be sufficiently inflated for vehicular operation.

Photo 11 shows the condition of the rear right tyres of the Garbage Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 13mm. The tyres were also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s) on the outer and the inner sidewalls.

Photo 12 shows the condition of the rear right tyres (centre axle) of the Garbage Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 14mm. The tyres, which were wrapped around standard alloy wheel rims, were also observed to be sufficiently inflated for vehicular operation.

Engine Compartment & Operating Fluids

9. The engine compartment of the Garbage Truck could not be closely examined as it was located directly under the front cabin. To access the engine compartment, the front cabin of the Garbage Truck would have to be manually lifted by using the hydraulic jack fitted on the Garbage Truck that is specific for this purpose. At the time of our inspection, the motor for this hydraulic jack was not able to operate due to a flat battery. We were thus only able to inspect the engine area from the underside of the Garbage Truck.

10. From the underside, the engine assembly and transmission assembly were both observed to be intact and unaffected by the collision. There was also no sign(s) or indication(s) of fresh fluid leak and/or fluid stain found.

11. For this case, we was not able to inspect some of the operating fluids such as the engine oil as the fluids were inaccessible due to their reservoir tank and/or dip stick being within the engine compartment of the Garbage Truck. However brake fluid, steering fluid & engine coolant was found to be of sufficient level without any visible contamination for operational purposes.

12. During our checks on the underside of the Garbage Truck, we had also noted that its various undercarriage components were intact and without any visible damage. See photo 13 - 18 below.

Photo 13 shows a general view of the engine compartment area from the front bonnet of the Tipper Truck.

Photo 14 shows a general view of the engine area from the underside of the Tipper Truck. The engine assembly and transmission assembly were both observed to be intact and unaffected by the collision. There was also no sign(s) or indication(s) of fresh fluid leak and/or fluid stain found.

Photo 15 shows a general view of the engine compartment of the Tipper Truck, which was located directly under the front cabin. Although the engine compartment of the Garbage Truck could not be closely examined, we were still able to observe that the engine assembly and transmission assembly were intact and unaffected by the collision. There was also no sign(s) or indication(s) of fresh fluid leak and/or fluid stain found.

Photo 16 shows the engine coolant reservoir of the Garbage Truck at the time of our inspection. The engine coolant was observed to be of sufficient level and without any visible contamination for operational purposes.

Photo 17 shows the brake fluid reservoir of the Garbage Truck at the time of our inspection. It was observed to be of sufficient level and without any visible contamination for operational purposes.

Photo 18 shows the steering fluid reservoir of the Garbage Truck at the time of our inspection. It was observed to be of sufficient level and without any visible contamination for operational purposes.

Steering System & Braking System

13. The mechanical components of the Garbage Truck's steering system were all found to be visually intact and undamaged. The steering shaft and steering rack of the Garbage Truck were observed to be intact and securely attached to the front left wheel and front right wheel. The steering ball joints were also observed to be in a serviceable condition.

14. Although the steering system could not be tested at the time of our inspection (engine unable to be started), it is likely that the steering system of the Garbage Truck was in serviceable condition at the material time of accident since its mechanical components were all found to be generally intact and securely fitted. See photo 19 & 20 below.

Photo 19 shows the undercarriage components at the front right wheel of the Garbage Truck. The various undercarriage components of the Garbage Truck were all observed to be intact and without any visible damage. This had included the steering rack and steering linkages (arrowed) of the Garbage Truck.

Photo 20 shows the undercarriage components at the front left wheel of the Garbage Truck. The various undercarriage components of the Garbage Truck were all observed to be intact and without any visible damage. This had included the steering rack (arrowed) of the Garbage Truck, which was observed to be securely attached to the front left wheel.

15. The braking system of the Garbage Truck was noted to be of an air-assisted hydraulic braking system. Briefly, in this system, compressed air is used to force the hydraulic fluid to the brake wheel cylinders (for drum brakes) or to the brake callipers (for disc brakes). The pressurized hydraulic fluid then presses onto the brake shoes (for drum brakes) or onto the brake pads (for disc brakes), through the respective braking mechanism, thus slowing the rotation of the wheels.

16. Since the engine of the Garbage Truck could not be started, we were therefore not able to carry out test(s) on whether there was any leakage of compressed air that could have affected the braking efficiency of the Garbage Truck. However the air pipes, air tanks and connecting valves had all appear to be in good general condition and securely fitted upon our visual examination of these parts.

17. Checks on the brake shoes (brake pads) at the front wheels and rear wheels of the Garbage Truck revealed that the brake shoes (brake pads) were in serviceable condition with sufficient frictional material for operational purposes. In general, our visual inspection of the mechanical components of the Garbage Truck's braking system appear to suggest that its braking system was in serviceable condition at the material time of accident. See photo 21 - 26 below.

Photo 21 shows the air tanks, valves, pipes and hoses, which are some of the components for the air-assisted braking system of the Garbage Truck.

Photo 22 shows the valves, brake hoses and pipes, which are some of the components for the air-assisted braking system of the Garbage Truck. These components were mainly located around the right centre body of the Garbage Truck, and were unaffected by the accident. Our visual examination of these parts revealed all to be in good general condition and securely fitted.

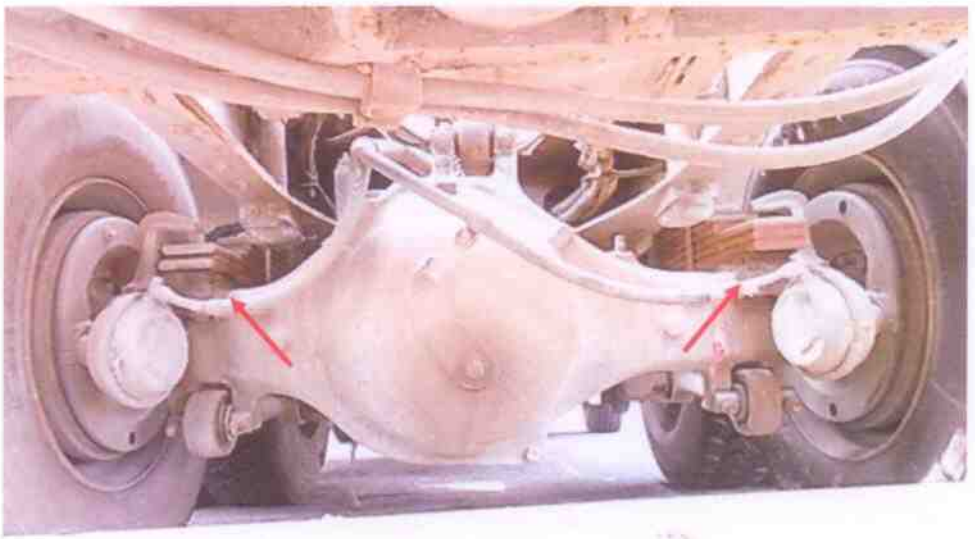


Photo 23 shows the brake hoses (arrowed) leading to the rear left wheel and rear right wheel of the Garbage Truck. At the time of our inspection, the various mechanical components of the air-assisted hydraulic braking system of the Garbage Truck were all found to be in good general condition and securely fitted.

Photo 24 shows the brake air cylinder (arrowed) at the front left rear wheel of the Garbage Truck. Such air cylinder, which is amongst the various components for the air-assisted hydraulic braking system, can be found attached to all the front wheels and all the wheels of the Garbage Truck. Upon our checks, we had found all the brake air cylinders to be undamaged and securely fitted to all the wheels of the Garbage Truck.

Photo 25 shows the brake fluid at the front bonnet of the Garbage Truck. The brake fluid was found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.

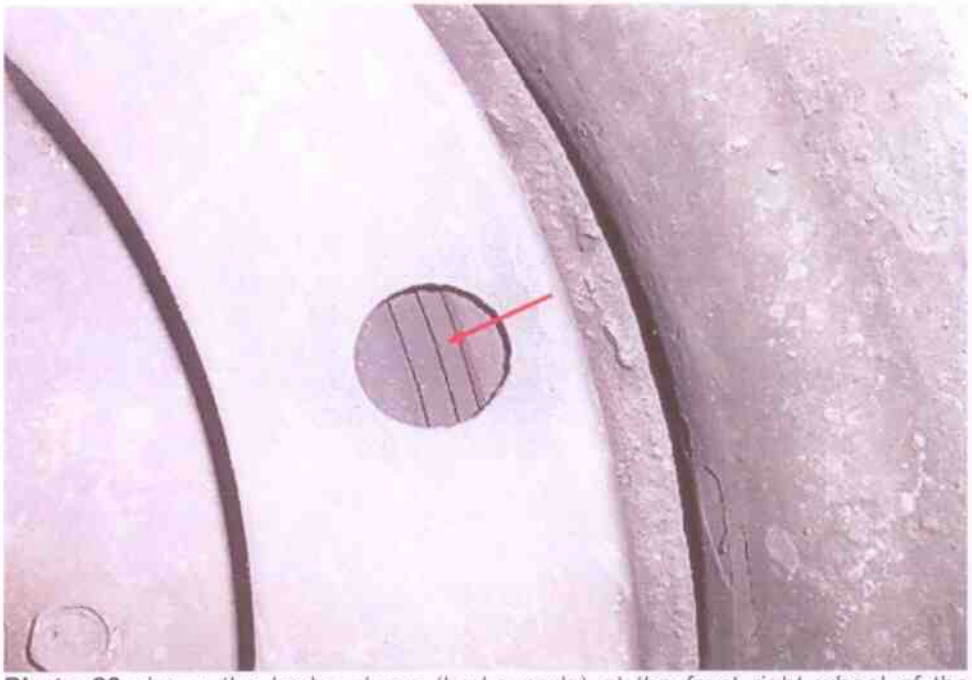


Photo 26 shows the brake shoes (brake pads) at the front right wheel of the Garbage Truck. The brake shoes (brake pads) of the Garbage Truck were all found to be in serviceable condition with sufficient frictional material for operational purposes.

Electronic Safety / Speed Limit Device

18. The Garbage Truck was not fitted with any electronic safety feature(s) like Anti-Brake Lock System (ABS), Supplemental Restraint System (SRS) etc. There was hence no test carried out on the functionality of these systems.

19. The speed limiting device was similarly unable to be tested due to the Garbage Truck's flat battery.

Operational Behaviour of the Garbage Truck

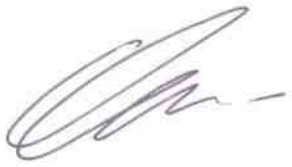
20. As the engine of the Garbage Truck could not be started, we was hence not able to carry out any operational test(s) to primarily determine whether there was any operational abnormality to its engine system, transmission system, steering system and braking system.

Conclusion

21. At the time of our inspection of the Garbage Truck, its steering system and braking system could not be tested as the Garbage Truck's engine could not be started. However basing on our observations, it would appear that the steering system and braking system of the Garbage Truck were in serviceable condition. This is taking into consideration that all the various mechanical components were found to be intact and undamaged.

22. In general, the observation gathered from our physical inspection of the Garbage Truck had indicated no evidence to suggest possible mechanical failure to the Garbage Truck that may have contributed to the accident.

23. The 10 tyres fitted on the Garbage Truck were also found to be in serviceable condition. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The 10 tyres were sufficiently inflated for vehicular operation with remaining tread depth of approximately 8mm to 13mm.



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