



Request for Information (RFI)

REPLACEMENT OF CAT 3406C DIESEL ENGINES IN
Double-Deck Power Coaches

Appendix A – Technical Requirements

1. INTRODUCTION

- 1.1. Israel Railways (ISR) operates the Passenger Fleet includes 80 Double-Deck Power Coaches (DDPC) manufactured by Bombardier / Alstom during the years 2000 – 2021.
- 1.2. Each of the Power Coaches equipped with two diesel generators, installed in the engine room between the driver cab and the passenger saloon (see fig.1). Diesel generator units supply electrical energy for Passenger Coaches (air conditions, lighting, control system, etc.).



Fig. 1

1.3. Diesel Generator unit includes:

- **Engine:**

Made by	CATERPILLAR	
Type	3406 DI-TA	
Power	313kW	
Speed	1500 min ⁻¹	
Fuel	Diesel <	
Electrical equipment	24VDC	2-pole insulated

Level of environmental protection: Emission Non-Certified
- **Generator:**

Made by	Lechmotoren	
Type	SDV52.30-4	
Voltage	420/243V	3Ph+N+PE
Frequency	50Hz	
Rated power	250kVA	
Rated current	362A	
cos φ	0.8	
Speed	1500 min ⁻¹	
Construction type	B20-SAE 1	
Protective system	IP23W	
Insulation class	F/H	



- Motor and generator are directly coupled via a membrane coupling

2. Project Purpose

- 2.1. Replace of the existing engine type by the improved one with low emissions level (Tier 3 minimum), in accordance with ISR requirements.
- 2.2. Extending the periods between the engine overhaul maintenance.
- 2.3. Extending the periods between the service maintenance.
- 2.4. Improving frequency stability.
- 2.5. Reducing fuel consumption.

3. Scope of work

- 3.1. Propose improved type of appropriate diesel engine with low emissions level (Tier 3 minimum).
- 3.2. Provide a theoretical justification for compliance of the new type of diesel engine to existing generator and auxiliary systems, including relevant calculations, drawings, etc.
- 3.3. Pilot tests on one double-deck Power Coach (2 engines) in static and dynamic modes to verify the required performance.
- 3.4. Mass replacement of existing CAT 3406 diesel engines with a new improved type.

4. General requirements and conditions:

- 4.1. The proposed technical solution for new engine type must guarantee the reduced emissions level of nitrogen oxide (NOX), diesel particulate matter (PM), unburned hydrocarbon (HC), and carbon monoxide (CO) to level of environmental protection not less than Tier 3.
- 4.2. The new proposed equipment shall provide the full compatibility with the existing equipment (generator, control system, etc.), and the appropriate mode of operation according to the new requirements.
- 4.3. The proposed solution must meet the following requirements:
 - 4.3.1. Fully compatible with the existing generator and DDPC auxiliary systems.
 - 4.3.2. Does not affect the integrity of the DDPC.
 - 4.3.3. Obtain the Independent Expert Permit (ISA).
 - 4.3.4. Obtain permission from the DDPC manufacturer (Bombardier / Alstom).
- 4.4. The conversion process in the engine is to be defined in details and demonstrated in the Pilot tests to the technical team on behalf of Israeli Railways. During the Pilot tests, the original engine components from the manufacturer shall be used, as well as the diesel fuel and the original type of oil used in the existing engines (15W40).



- 4.5. The new improved engine shall be checked for emissions level by an independent authorized laboratory under the responsibility of the Respondent in order to prove the conformity to at least emission level Tier 3.
- 4.6. The new improved engine must be equipped with a control system for monitoring and transmitting of the operating parameters including the amount of fuel in the fuel tank.
- 4.7. ISR is interested in the Technical Specification of the new engine.
- 4.8. ISR would like to get the rough estimate of the cost and suggested time schedule of the engine exchange including DDPC modification.
- 4.9. ISR will not be able to provide technical information due to restrictions of IP and NDA.
- 4.10. ISR will not be able to provide a place to perform the abovementioned works, excluding placing the coach on the track.