



Service Manual

S4S Diesel Engine (Tier 2)

FOREWORD

This service manual covers S4S Mitsubishi Diesel Engine and gives detailed maintenance and repair information. The instructions are grouped by systems to serve the convenience of your ready reference.

Long productive life of your forklifts depends to a great extent on correct servicing – the servicing consistent with what you will learn from this service manual. We hope you read the respective sections of this manual carefully and know all the components you will work on before attempting any work.

All descriptions, illustration, specifications, and serial numbers in this manual are effective as of the date printing of this manual. Towmotor Forklifts reserves the right to change specifications or design without notice and without incurring obligation.

How to Use This Manual

In this service manual, the Mitsubishi Diesel Engine S4S specifications, maintenance standards and adjustment procedure as well as service procedures such as disassembly, inspection, repair and reassembly are arranged in groups for quick reference.

There are separate manuals for the fuel injection pump and governor.

A short summary of each Group is given in the General Contents, and there is also a table of contents at the beginning of each Group.

Regarding engine operation and periodical maintenance, refer to the Operation & Maintenance Manual. For component parts and ordering of service parts, refer to the Parts Catalogue. Structure and function of the engine are described in various training manuals.

1. Methods of Indication

- (1) Parts shown in illustrations and described in text are numbered to correspond with the sequence of disassembly.
- (2) Inspections to be conducted during disassembly are indicated in a box  in disassembled views.
- (3) Maintenance standards for inspection and repair are described in text where they are relevant, are also listed in Group 2 in the General Contents.
- (4) The sequence in which parts are to be assembled is summarized below each assembled view.
Such as: ⑤ → ② → ④ → ③ → ①.
- (5) The following marks are used in this manual to emphasize important safety cautions.

WARNING

...Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

CAUTION

...Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

NOTE

...Indicates important information or information which is useful for engine operation or maintenance.

- (6) Tightening torque under wet conditions is indicated by “[Wet].” When so indicated, apply engine oil to the threaded portion of the fastener. Unless indicated as such, the tightening torque is to be assumed in the dry condition.

2. Terms Used in This Manual

Nominal value: Indicates the standard dimension of a part to be measured.

Standard: Indicates the dimension of a part, the clearance between parts, or the standard performance. Since the value is indicated in a range needed for inspection, it is different from the design value.

Limit: A part must be repaired or replaced with a new part when it reaches the limit value.

3. Abbreviations, Standards, Etc.

- BTDC = Before Top Dead Center
- ATDC = After Top Dead Center
- BBDC = Before Bottom Dead Center
- ABDC = After Bottom Dead Center
- TIR = Total Indicated Reading
- API = American Petroleum Institute
- ASTM = American Society for Testing and Materials
- JIS = Japanese Industrial Standards
- LLC = Long Life Coolant
- MIL = Military Specifications and Standards (U.S.)
- MSDS = Material Safety Data Sheet
- SAE = Society of Automotive Engineers (U.S.)

4. Units of Measurement

Measurements are based on the International System of Units (SI), and their converted metric values are indicated in parentheses (). For metric conversion, the following rates are used.

- Pressure: $1 \text{ MPa} = 10.197 \text{ kgf/cm}^2$
- Torque: $1 \text{ N}\cdot\text{m} = 0.10197 \text{ kgf}\cdot\text{m}$
- Force: $1 \text{ N} = 0.10197 \text{ kgf}$
- Horsepower: $1 \text{ kW} = 1.341 \text{ HP} = 1.3596 \text{ PS}$
- Meter of mercury: $1 \text{ kPa} = 0.7 \text{ cmHg}$
- Meter of water: $1 \text{ kPa} = 10.197 \text{ cmH}_2\text{O} (\text{cmAq})$
- Rotational speed: $1 \text{ min}^{-1} = 1 \text{ rpm}$

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