Manual for Definition and Calculation of Recyclable Ratio for New model

July 25, 2001

Japan Construction Equipment Manufacturers Association (CEMA)

This manual has been prepared for the purpose of the definition and calculation of the recyclable ratio.

1. Definition of recycle feasibility ratio and assessment indicator

1) Definition of recycle feasibility ratio of new model

The recyclable ratio of a new model is estimated when the vehicle is manufactured. It is the estimated recycle ratio that is presumed to be attainable at the time that the Construction Equipment completes its useful life. (The recycle ratio should be estimated in consideration of the prospect of progress in treatment and disposal method.)

2) Indicator for assessing the recycling feasibility

The below-listed four factors should be taken into consideration in estimating the recycling feasibility.

(1) Ease of disassembly (The component can be dismantled from the equipment.)

(2) Ease of separation (The component can be separated into groups of the same material.)

(3) Ease of identification (The material name can be identified)

(4) Re-usability (The material, parts and liquid can be reused)

2. Method for calculation of the recyclable ratio

1) Prerequisites

The types of recycling to be used in the calculation of the recyclable ratio are:

(1) Material recycle (Mrc)------Used for a raw material

(2) Thermal recycle (Trc)-------- Used for thermal energy

In general a priority is given to the material recycle for selecting recycling type.

2) Method for calculation of the recyclable ratio

A component of a Construction Equipment is evaluated in accordance with the “Procedure for estimation of recyclable ratio” as mentioned below.

3) Procedure for estimation of recyclable ratio

3-1) Assessment indicator of recyclable and criteria for assessment

In determining the assessment indicator, the following criteria (1) to (4) should be reviewed for recycle feasibility.

(1) Criteria for ease of disassembly -> A component can be dismantled from the equipment by means of ordinary tools and facilities
(2) Criteria for ease of separation -> The component can be separated into groups of the same material by means of ordinary tools and facilities
(3) Criteria for ease of identification -> The material name can be identified visually or by other means)
(4) Criteria for ease of reuse -> Substances that are applicable to any of the following requirements A, B, or C are considered to be 'recyclable'

A. Substances that have already been routed to recycling processes due to the establishment of the Mrc and Trc technology (Recyclable)

e.g. - Material: Metals
- Parts: Battery
- Liquids: Fuel, oil, LLC (Coolant)

B. Substances that have a future prospect for recycling due to the development the Mrc technology (Recyclable)

e.g. - Material: Thermoplastic resin, fiber, and glass
- Parts: Rubber shoe, Counterweight

C. Substances that have a future prospect for recycling due to the development the Trc technology (Recyclable)

e.g. - Material: Thermoplastic resin, woods, rubber, paper, skin, etc that does not emit hazardous substances
- Parts: Tire

D. Substances that are not available for recycling with no recycling technology developed or due to difficulty in recycling (Not recyclable)

Refer to the attached "Criteria for Assessment of Recycle Feasibility of Component of Construction Equipment and Actions for Improvement of Recycling".

3-2) Procedure for assessment of component of Construction Equipment and method for calculation of recyclable ratio

(1) Procedure for assessment of component

Recyclable parts are sorted out in a procedure as shown below.

Assessment of ease of disassembly -> Assessment of ease of separation -> Assessment of ease of identification -> Assessment of reusability -> Recyclable (Mrc and Trc) parts

(2) Calculation of recycle feasibility ratio

Recyclable ratio = Sum of mass of recyclable parts ÷ Mass of machine × 100(%)

or

Recyclable ratio = (1 - Sum of mass of non-recyclable parts ÷ Mass of machine) × 100(%)

3. Scope

This Manual can be applied to Construction Equipment that our Association deals with including (but not limited to) the Hydraulic Excavators, Mini-hydraulic Excavators, Bulldozers, Wheel loaders, Crawler cranes, Rough terrain cranes, Construction by-product treatment machines, Compacting equipment, Graders, Carriers, and Aerial working platforms.