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Remanufacturing – Evaluation Indexes and Calculation Methods of Energy Saving and Emission Reduction

再制造 节能减排评价指标及计算方法

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Remanufacturing – Evaluation Indexes and Calculation Methods of Energy Saving and Emission Reduction

1 Scope

This Document specifies the evaluation indicators and calculation methods of energy saving and emission reduction for the remanufacturing of mechanical and electrical products.

This Document is applicable to remanufacturing organizations of mechanical and electrical products in China to carry out evaluation activities on energy saving and emission reduction.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 28618 Remanufacturing - General Technical Requirements for Mechanical Products

GB/T 28619 Remanufacturing - Terminology

GB/T 28620 The Calculating Methods of Remanufacturing Rate

GB/T 32811 Technical Specification for Evaluation of Remanufacturing of Mechanical Products

GB/T 33221 Remanufacturing - Technological Specifications for Enterprise

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 28619 apply.

4 General

4.1 The remanufacturing organization includes original equipment remanufacturers and independent remanufacturers.

4.2 The remanufacturing organization shall meet the requirements of GB/T 28618, GB/T 33221 and GB/T 32811, when carrying out remanufacturing business.

4.3 In the process of calculating the relevant indicators, the independent remanufacturer shall estimate the relevant quantities involved in this Document in combination with the manufacturing process of the new prototype product; and make relevant explanations.

4.4 The calculation of the energy saving and emission reduction evaluation indicators for remanufacturing can be calculated according to the relevant quantities of fixed quantities (such as 100 pieces, 1000 pieces, etc.).

4.5 In the calculation process of the energy saving and emission reduction evaluation indicators for remanufacturing, the involved relevant quantities can be the total amount or the average value of the fixed quantities, which shall be explained in the calculation process.

4.6 In the calculation process of the energy saving and emission reduction evaluation indicators for remanufacturing, the calculation of the relevant quantity of the remanufactured product shall cover the whole process of remanufacturing; and the calculation of the relevant quantity of the new prototype product shall cover the whole process of the manufacture of the new product.

4.7 The data collected during the calculation process of the energy saving and emission reduction evaluation indicators for remanufacturing shall be objective and true.

5 Evaluation Indicators

5.1 Energy saving and emission reduction evaluation indicators for remanufacturing are shown in Table 1.

5.2 Energy saving and emission reduction evaluation indicators for remanufacturing include: three Level-1 indicators of "energy and resource saving", "emission reduction", and "remanufacturing and utilization". Among them, "remanufacturing and utilization" is a unique indicator for the remanufacturing of mechanical products, which reflects the supporting role of remanufacturing on the circular economy.

can be measured and calculated according to the carbon dioxide equivalent.

6.2.2 Reduce air pollutant emission rate

The calculation of the reduced air pollutant emission rate (S_P) is shown in Formula (5).

$$S_P = \left(1 - \frac{EP_R}{EP_M}\right) \times 100\% \quad \cdots\cdots (5)$$

Where:

EP_R - air pollutant emissions from the remanufacturing of the fixed quantities of remanufactured products, in kilograms (kg);

EP_M - air pollutant emissions from the production and manufacturing of the fixed quantities of new prototype products, in kilograms (kg).

In the calculation process, the main air pollutants shall be explained according to the characteristics of the product and its production.

6.2.3 Reduce waste liquid discharge rate

The calculation of the reduced waste liquid discharge rate (S_L) is shown in Formula (6).

$$S_L = \left(1 - \frac{EL_R}{EL_M}\right) \times 100\% \quad \cdots\cdots (6)$$

Where:

EL_R - the quantity of waste liquid discharged from the remanufacturing of the fixed quantities of remanufactured products, in kilograms (kg);

EL_M - the quantity of waste liquid discharged from the production and manufacturing of the fixed quantities of new prototype products, in kilograms (kg).

The discharged waste liquid includes: acid waste water, alkaline waste water, organic waste liquid, volatile organic solution, halogen-containing organic waste liquid, heavy metal waste liquid, etc.

6.2.4 Reduce solid waste discharge rate

The calculation of the reduced solid waste discharge rate (S_R) is shown in Formula (7).

$$S_R = \left(1 - \frac{ER_R}{ER_M}\right) \times 100\% \quad \cdots\cdots (7)$$

Where:

ER_R - solid waste discharge from remanufacturing of the fixed quantities of remanufactured products, in kilograms (kg);

ER_M - solid waste discharge from the production and manufacturing of the fixed quantities of new prototype products, in kilograms (kg).

The discharged solid waste includes general industrial solid waste and hazardous solid waste, which can be calculated separately according to Formula (7), when required.

6.3 Remanufacturing and utilization

6.3.1 Utilization rate of used parts

6.3.1.1 The used parts are the objects of recycling for the purpose of remanufacturing; and can be used as remanufactured blanks after meeting the relevant conditions. The used parts utilization rate (S_U) is divided into the used parts quantity utilization rate (S_{UN}) and the used parts quality utilization rate (S_{UQ}).

6.3.1.2 The calculation of the used parts quantity utilization rate (S_{UN}) is shown in Formula (8).

$$S_{UN} = \frac{N_U}{N_P} \times 100\% \qquad \cdots\cdots (8)$$

Where:

N_U - the number of parts that can be reused in the used part;

N_P - the number of parts in the used part.

6.3.1.3 The calculation of used parts quality utilization rate (S_{UQ}) is shown in Formula (9).

$$S_{UQ} = \frac{Q_U}{Q_P} \times 100\% \qquad \cdots\cdots (9)$$

Where:

Q_U - the mass of the parts that can be reused in the used parts, in kilograms (kg);

Q_P - the mass of the used parts, in kilograms (kg).

6.3.2 Lossless dismantling rate

The calculation of the lossless dismantling rate (S_D) is shown in Formula (10).

$$S_D = \frac{Q_{ND}}{Q_{RD}} \times 100\% \qquad \cdots\cdots (10)$$

Where:

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