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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 3319-2015

**Confirmation of the rated output of electric locomotives and
electric multiple units**

电力机车和电动车组额定功率的确定

(English Translation)

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard replaced GB/T 3319-1998 Definition of the Rated Output of Electric Locomotives and Motive Power Units; compared with GB/T 3319-1998, the major technical changes are as follows.

- Modified "Scope" (see Chapter 1 of this Edition, Chapter 1 of 1998 Edition);
- Added the description of "Terms and Definitions" (see Chapter 2 of this Edition);
- Modified the "maximum rated power" into "maximum output power" in rated power calculation [Translator note. "power" might be replaced by "output", hereafter the same] (see 3.1 of this Edition, 3.1 of 1998 Edition);
- Added "Measurement of Rated Power" (see Chapter 4 of this Edition);
- Added "Measuring Device" (see Chapter 5 of this Edition);
- Added "Measuring Data" (see Chapter 6 of this Edition).

This Standard adopts the re-drafting method to modify and use UIC 614 O. 1990 Definition of the Rated Output of Electric Locomotives and Motive Power Units.

This Standard has technical differences from UIC 614 O.1990, the clauses related to these differences have been marked with vertical single line (|) on the outside page margin; these difference and causes are as follows.

- Modified "Scope";
- According to China's requirements for drafting standard, added the description of "Terms and Definitions";
- Modified the "maximum rated power" into "maximum output power" in rated power calculation;
- Added "Measurement of Rated Power";
- Added "Measuring Device";
- Added "Measuring Data".

This Standard made the following editorial changes.

- Added the serial number of formula;
- Added "Bibliography".

Confirmation of the Rated Output of
Electric Locomotives and Electric Multiple Units

1 Scope

This Standard specifies the calculation and measurement method of rated power of electric locomotives and electric multiple units.

This Standard is applicable to the calculation and measurement of electric locomotives and electric multiple units.

2 Terms and Definitions

The following terms and definitions are applicable to this document.

2.1 Rated output

The rated power of electric locomotives and electric multiple units indicates the output power measured on the wheelsets in the following two cases.

- The maximum output power that can be provided within a defined time interval (at least 5min from the cold state);
- Nominal power, namely continuous power.

However, it shall be emphasized that the power value obtained here shall not be

regarded as a basis for comprehensively judging the tractive effort of these electric locomotives and electric multiple units; the evaluation of tractive effort still needs considering other factors.

NOTE: before the issuance of corresponding standards, the measured value indicates the value measured at the rated voltage of power network.

2.2 Electric multiple units

It includes one set of locomotive at least, also indicates the minimum independent unit where the multi-unit train is inseparable during the running period.

2.3 Continuous tractive effort

When the main controller of electric locomotives and electric multiple units is at the

D - actually-measured value of dynamic wheel diameter, in mm;

D' - wheel diameter when dynamic wheel half-worn, in mm;

F' - in the constant power working condition of locomotives, the actually-measured vehicle hook traction force, in kN;

M - calculated service weight of locomotives, in t;

w - total unit running resistance of locomotives at the corresponding speed, in N/kN.

4.1.3 Reducing calculus of continuous tractive effort of electric multiple units

wheel circumference

The continuous tractive effort (F) of wheel circumference, when wheel diameter is half-worn, shall be calculated as per Formula (4).

Where.

P - train weight, in t;

g - gravity acceleration, in m/s²;

w₀ - unit running additional resistance, in N/kN;

w_r - unit curve additional resistance, in N/kN;

w_i - unit slope additional resistance, in N/kN;

w_a - unit accelerative force, in N/kN.

Thereof, w_a shall be calculated as per Formula (5).

Where.

v - train speed, in km/h;

t - time, in s.

4.1.4.1 For step voltage-regulating electric locomotive, the speed shall be calculated

to the one when voltage of power network is 25kV, and wheel diameter is half-worn as per Formula (6).

T - measuring time, in min;

$u(t)$ - the instantaneous value of the primary voltage at the test speed point, in V;

$i(t)$ - the instantaneous value of the primary current at the test speed point, in A.

5.1 The error of equipment and system required for the measurement of electric

locomotive are as follows.

- a) Use the test vehicle equipped with dynamometer;
- b) Vehicle hook force measuring system, the system error shall be no greater than 0.5%;
- c) Running speed measuring system, the system error shall be no greater than 0.5%;
- d) Electrical parameter measuring system, the system error shall be no greater than 0.5%.

5.2 The error of equipment and system required for the measurement of electric

multiple units are as follows.

- a) Running speed measuring system, the system error shall be no greater than 0.5%;
- b) Electrical parameter measuring system, the system error shall be no greater than 0.5%.