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## 0 - Scope

The purpose of this leaflet is to specify the calculation method for use in determining the value of the rated output of electric locomotives, electric motive power units and electric multiple units.

The rated output thus obtained shall constitute the sole reference to be used by UIC railways for defining or describing the above-mentioned electric motive power units, particularly in all written documents.

## 1 - Definition of rated output

Rated output of the motive power units defined in 0 above shall be the output measured at wheel rim in accordance with point 2 below. It shall be :

- the maximum output that can be supplied exclusively within a limited period (from cold and from a minimum of 5' ) ;
- the nominal rated output, corresponding to the continuous rating.

It should nevertheless be stressed that the output values thus obtained do not carry any implications regarding the tractive capacity of these motive power units, calculation of which takes other factors into account.

## 3 - Calculation of rated output

2.1 - The rated output of motive power units shall, in all events, be the effective output resulting from the "Speed/Force" characteristic, whilst the speed range in which it can be obtained should also be indicated.

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One major parameter is the ratio of the maximum rated output to the continuous rating. This should be related to the following formula :

$$P = n \cdot q \cdot \frac{U \cdot I \cdot \lambda}{1000} \cdot \eta_r \text{ (kW)}$$

where

$n$  = number of motors ;

$q$  = number of motor phases ;

$U$  = effective phase voltage (V) at intended rating ;

$I$  = effective phase intensity (amps) at intended rating ;

$\lambda$  = power factor ( $\lambda = \frac{I_1}{I} \cos \Phi$  with  $I_1$  amplitude of basic current) ;

$\eta_r$  = total output motor/rim.

For d.c. motive power units, the values of  $q$  and  $\lambda$  shall be 1.

2.2 - Use of motive power units may be affected by the various features of the motive power system, namely :

- transformer(s)
- converter(s)
- inverter(s)
- traction motors
- mechanical transmission

and by operating characteristics.

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## Application

With effect from 1 July 1990.

All UIC railways.

## Record references

Most recent heading under which the question has been examined :

- Question 5 A FIC - Revision of leaflets.

1.1 - Leaflet 614 "Definition of the reference output of electric locomotives and motor coaches".

(Sub-Committee for Motive power units : Paris, January 1990).