

### 6.3. Engine power

The basis of specific emissions measurement is uncorrected net power. The engine shall be submitted for testing with the auxiliaries needed for operating the engine (e.g. fan, water pump, etc.). Auxiliaries, which are only necessary for the operation of the vehicle and which may be mounted on the engine, shall be removed for the emissions test. The auxiliaries are listed in Annex 7.

Where auxiliaries have not been removed, the power absorbed by them shall be determined in order to adjust the set values and to calculate the work produced by the engine over the test cycle in accordance with paragraphs 6.3.1. to 6.3.4.

#### 6.3.1. Auxiliaries to be fitted for the emissions test

If it is impossible or inappropriate to install the auxiliaries needed for engine operation on the test bench, the power absorbed by them shall be determined and subtracted from the measured engine power over the whole engine speed range of the WHTC and the test speeds of the WHSC.

#### 6.3.2. Auxiliaries to be removed for the test

Auxiliaries needed only for the operation of the vehicle shall be removed for the test. Where the auxiliaries cannot be removed, the power absorbed by them may be determined and added to the measured engine power over the whole engine speed range of the WHTC and the test speeds of the WHSC.

#### 6.3.3 Determination of auxiliary power

The power absorbed by the auxiliaries needs only be determined, if

(a) auxiliaries needed for operating the engine, are not fitted to the engine

and/or

(b) auxiliaries not needed for operating the engine, are fitted to the engine.

If applicable, conversion of the measured power or measured cycle work to net power or net cycle work shall be submitted by the engine manufacturer for the whole operating area of the test cycles, and approved by the certification or type approval authority. The following definitions apply:

Auxiliary equipment	Power absorbed (kW) at respective engine speed
P(a) Auxiliaries needed for operating the engine (to be subtracted from measured engine power)	
P(b) Auxiliaries not needed for operating the engine (to be added to measured engine power)	

## 6.3.4. Dynamometer setting (kW)

The dynamometer settings for the WHSC and WHTC reference cycles shall be based upon the net engine power  $P(n)$  according to equation 4. In this case,  $P(m)$  and  $P(n)$  are identical.

$$s = P(n) * \frac{L}{100} \quad (4)$$

If it is impossible or inappropriate to operate the engine under net conditions, the dynamometer settings shall be corrected to net conditions using equation 5.

$$s = P(n) * \frac{L}{100} + (P(a) - P(b)) \quad (5)$$

where,

$s$  is the dynamometer setting, kW

$P(n)$  is the net engine power, kW

$L$  is per cent load, %

$P(a)$  is the power absorbed by auxiliaries to be fitted, kW

$P(b)$  is the power absorbed by auxiliaries to be removed, kW

The procedure is shown below:

	Engine speed
$P(m)$ Power measured on test bed	
$P(a)$ Power absorbed by auxiliaries to be fitted for test - if fitted - if not fitted	0
$P(b)$ Power absorbed by auxiliaries to be removed for test - if fitted - if not fitted	0
$P(n)$ Net engine power = $P(m) - P(a) + P(b)$	

## ANNEX 7

## INSTALLATION OF AUXILIARIES FOR THE EMISSIONS TEST

Auxiliary	Fitted for emissions test
Inlet manifold	Yes
Crankcase emission control system	Yes
Control devices for dual induction inlet manifold system	Yes
Air flow meter	Yes
Air inlet duct work	Yes
Air filter	Yes
Inlet silencer	Yes
Speed-limiting device	Yes
Exhaust purifier	Yes
Exhaust manifold	Yes
Connecting pipes	Yes
Silencer	Yes
Tail pipe	Yes
Exhaust brake	No
Pressure charging device	Yes
Fuel supply pump	Yes
Carburettor	Yes
Electronic control system, air flow meter, etc.	Yes
Equipment for gas engines	
Pressure reducer	Yes
Evaporator	Yes
Mixer	Yes
Fuel injection equipment (petrol and diesel)	
Pre-filter	Yes
Filter	Yes
Pump	Yes
High-pressure pipe	Yes
Injector	Yes
Air inlet valve	Yes
Electronic control system, air flow meter, etc.	Yes
Governor/control system	Yes
Automatic full-load stop for the control rack depending on atmospheric conditions	Yes
Liquid-cooling equipment	
Radiator	No
Fan	No

Fan cowl	No
Water pump	Yes
Thermostat	Yes
Air cooling	
Cowl	No
Fan or Blower	No
Temperature-regulating device	No
Electrical equipment	
Generator	Yes
Spark distribution system	Yes
Coil or coils	Yes
Wiring	Yes
Spark plugs	Yes
Electronic control system including knock sensor/spark retard system	Yes
Pressure charging equipment	
Compressor driven either directly by the engine and/or by the exhaust gases	Yes
Charge air cooler	Yes
Coolant pump or fan (engine-driven)	No
Coolant flow control device	Yes
Auxiliary test-bed fan	Yes
Anti-pollution device	Yes
Starting equipment	Yes or test bed equipment
Lubricating oil pump	Yes