

Electrically propelled road vehicles — Measurement of energy performances

Part 1. Pure electric vehicles

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British Standard

ICS 43.120

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Summary of pages

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English version

Electrically propelled road vehicles —
Measurement of energy performances —
Part 1: Pure electric vehicles

Véhicules routiers à propulsion électrique —
Mesurage des performances énergétiques —
Partie 1: Véhicules électriques purs

Elektrisch angetriebene Straßenfahrzeuge —
Meßverfahren für Energieausnutzung —
Teil 1: Reine Elektrofahrzeuge

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European Committee for Standardization
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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 301, Electrically propelled road vehicles, the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

The European Standard EN 1986 consists of the following Parts under the general title *Electrically road vehicles — Measurement of energy performances*:

- Part 1: *Pure electric vehicles*;
- Part 2: *Thermal electric hybrid vehicles*;
- Part 3: *Other electric hybrid vehicles than those fitted with a thermal machine*.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies the procedure to apply in order to measure the range and the consumption of the electrically propelled road vehicles (pure electric vehicles).

This standard applies to the categories of vehicles M₁, M₂, N₁ and N₂¹⁾ motor tricycles and quadricycles²⁾ from the motorcycles type.

This standard does not apply to electric hybrid or partially electrically propelled road vehicles.

NOTE. An electrically propelled road vehicle is also named an electric vehicle.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1821-1 : 1996	<i>Electrically propelled road vehicles — Measurement of road operating ability — Part 1: Pure electric vehicles</i>
IEC 687 : 1992	<i>Alternating current static watt-hour meters for active energy (classes 0.2 S and 0.5 S)</i>

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 energy consumption

The quantity of active energy from the mains, divided by the test distance travelled, that the vehicle uses after driving one of the two proposed test sequences (see 4.1), from a fully charged battery, expressed in watthours per kilometre.

3.2 range

Distance covered in kilometres by an electric vehicle over the test sequence n° 2 from a fully charged battery (see 7.1.3 in EN 1821-1 : 1996) to the end of test criteria.

4 Test sequences

4.1 Composition

Test sequence n° 1 (see figure 1) is composed of one urban cycle made of four basic urban cycles. Its theoretical average speed is 18,77 km/h.

Test sequence n° 2 is composed of two parts (see figure 1):

- an urban cycle made of four basic urban cycles;
- an extra-urban cycle.

Its theoretical average is 33.6 km/h.

NOTE. These cycles are the same as those described in Directive 91/441/EEC, except the changing gear steps.

In the case where the vehicle is fitted with a manual gear box with several gears, the test driver shall change the gear in order to best match the reference curve.

If the vehicle has several driving modes (sport, comfort, economical, etc.) which can be selected by the test driver, the one to best match the reference curve shall be selected.

4.1.1 Urban cycle

The urban cycle is composed of four basic cycles of 195 s each and lasts 780 s in total.

The description of the basic urban cycle is given in figure 2 and table 1.

¹⁾ Categories of vehicles M₁, M₂, N₁ and N₂, are defined in Directive 92/53/EEC.

²⁾ Motor tricycles and quadricycles are defined in Directive 92/61/EEC.

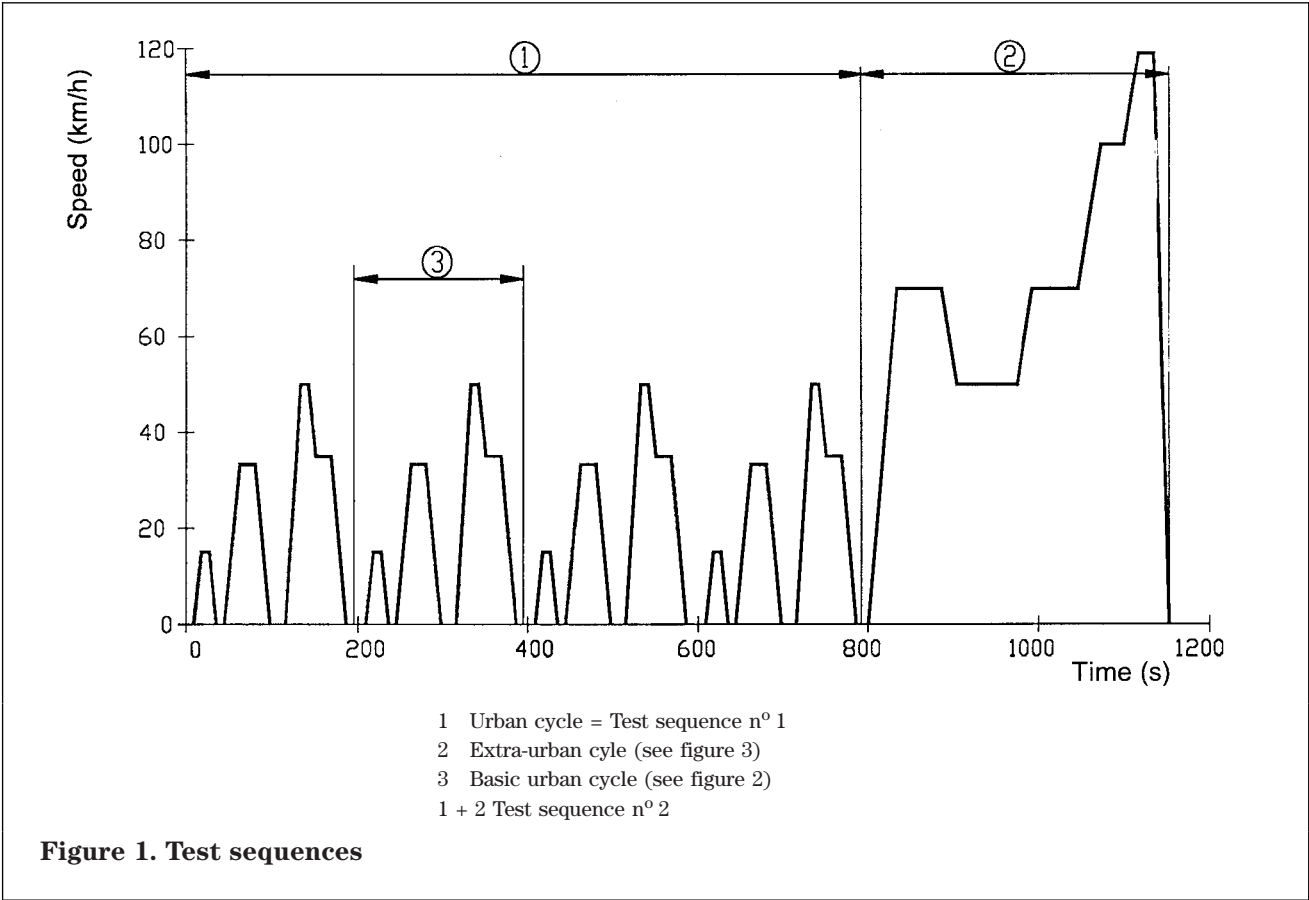


Figure 1. Test sequences

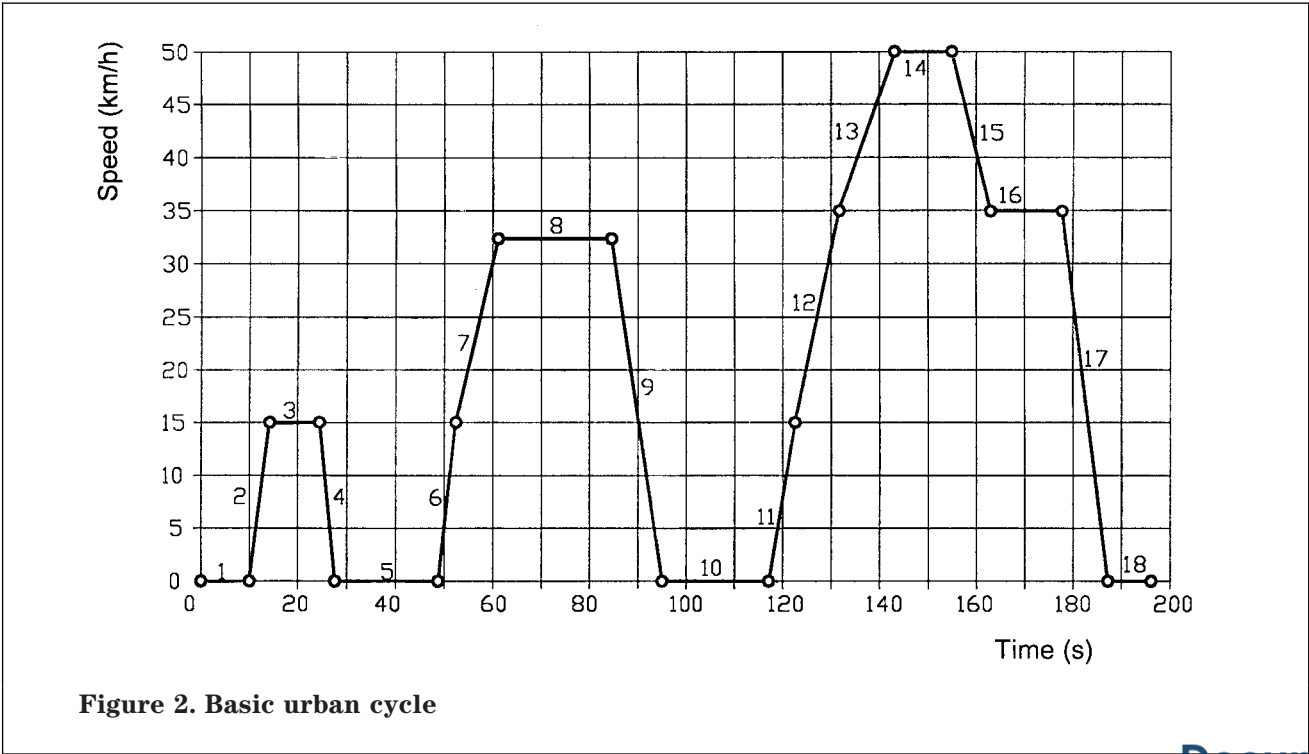
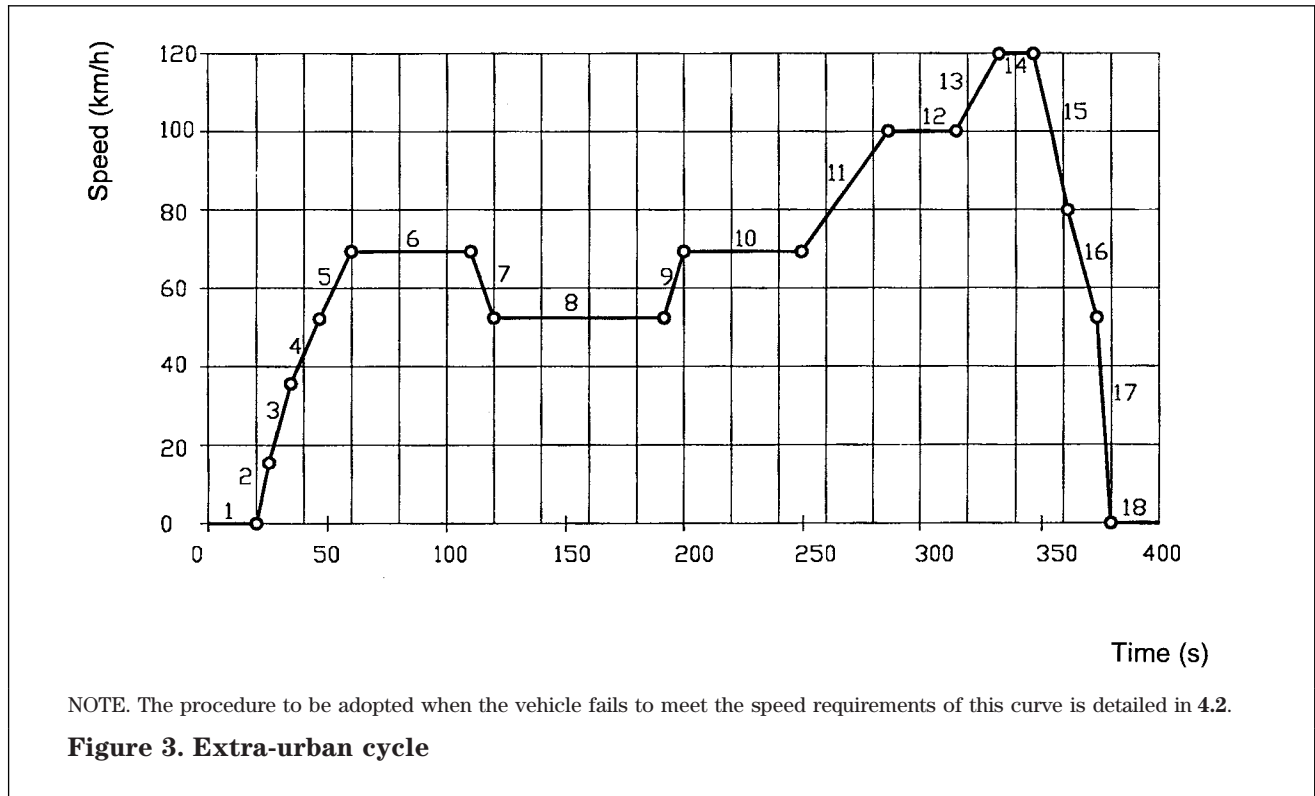


Figure 2. Basic urban cycle

Table 1. Basic urban cycle							
Basic urban cycle							
Operation n°	Operation type	Mode n°	Acceleration	Speed	Operation duration	Mode duration	Total time
			m/s ²	km/h	s	s	s
							0
1	Stop	1	0,00	0	11	11	11
2	Acceleration	2	1,04	0 to 15	4	4	15
3	Constant speed	3	0,00	15	8	8	23
4	Deceleration	4	−0,83	15 to 0	5	5	28
5	Stop	5	0,00	0	21	21	49
6	Acceleration	6	0,69	0 to 15	6	12	55
7	Acceleration		0,79	15 to 32	6		61
8	Constant speed	7	0,00	32	24	24	85
9	Deceleration	8	−0,81	32 to 0	11	11	96
10	Stop	9	0,00	0	21	21	117
11	Acceleration	10	0,69	0 to 15	6	26	123
12	Acceleration		0,51	15 to 35	11		134
13	Acceleration		0,46	35 to 50	9		143
14	Constant speed	11	0,00	50	12	12	155
15	Deceleration	12	−0,52	50 to 35	8	8	163
16	Constant speed	13	0,00	35	15	15	178
17	Deceleration	14	−0,97	35 to 0	10	10	188
18	Stop	15	0,00	0	7	7	195
Generalities							
		Time		Percentage			
		s		%			
Stop		60		30,77			
Acceleration		42		21,54			
Constant speed		59		30,26			
Deceleration		34		17,44			
Total		195		100,00			
Theoretical average speed					18,77 km/h		
Working time					195 s		
Theoretical distance by basic urban cycle					1 017 m		
Theoretical distance for four basic urban cycles					4 067 m		



4.1.2 Extra-urban cycle

The description of the extra-urban cycle is given in figure 3 and table 2.

4.2 Tolerances

Tolerances on speed to be observed in following the test sequences n° 1 and n° 2 are given in figure 4.

Tolerances on speed (± 2 km/h) and on time (± 1 s) are geometrically combined at each point as represented in figure 4.

Below 50 km/h, the deviations beyond this tolerance are permitted as follows:

- at gear changes for a duration less than 5 s;
- and up to five times per hour at other times, for a duration less than 5 s each.

The total time out of tolerance has to be mentioned in the test report.

Over or equal to 50 km/h, it is accepted to go beyond tolerances provided the accelerator pedal is fully depressed.

4.3 End of test sequence criteria

The end of test sequence criteria is when the vehicle is not able to meet the reference curve up to 50 km/h, or when an indication from the on board instrumentation is given to the driver that he has to stop the vehicle.