
**Road vehicles — Vocabulary and
characteristics for engineering of
starting devices**

*Véhicules routiers — Vocabulaire et caractéristiques pour l'ingénierie
des équipements d'allumage*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document harmonizes key terms and their definitions in the form of basic technical words and simple explanations, because third parties involved in starter motor testing and start/stop systems are spreading to various regions. The purpose is to guarantee an efficient and effective communication throughout development projects within and among engineering organizations and related institutions.

In practice, many inefficiencies have been observed due to unclear or ambiguous usage of engineering terms and missing knowledge about application to various starter motor development and testing. This document is meant to preserve the essential knowledge of best practices, which rely on undocumented usage of terms. With these terms and definitions, starter motor engineers as well as newcomers are able to refer to this vocabulary framework when working together on starter motor development and testing projects in an international environment.

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Road vehicles — Vocabulary and characteristics for engineering of starting devices

1 Scope

This document includes common definitions for terms and their interdependencies related to starting devices as well as describes their general and specific characteristics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

armature

rotating assembly of the electric machine part of the starter motor

3.2

battery

electrical energy source connected to the starter motor

3.3

battery open circuit voltage

voltage at the *battery* (3.2) *terminals* (3.40) without electrical load

3.4

battery voltage

voltage between the *battery* (3.2) *terminals* (3.40)

3.5

cranking

condition in which the starter motor rotates the *internal combustion engine (ICE)* (3.17)

[SOURCE: ISO 20574:2019, 3.16, modified — "engine" has been replaced by internal combustion engine.]

3.6

cranking time

time period where the starter motor drives the *internal combustion engine (ICE)* (3.17) until a significant rotational frequency change, caused by the *first ignition* (3.13), can be observed

3.7

crankshaft

shaft of the *internal combustion engine (ICE)* (3.17), which is connected to the *ring gear* (3.31)

**3.8
direct starter motor**

starter motor type in which the *pinion* (3.27) is driven at the same rotational frequency as the *armature* (3.1)

**3.9
driveshaft**

shaft of the starter motor, which supports and drives the *overrunning* (3.23) clutch and the *pinion* (3.27)

**3.10
engagement lever**

fork lever
lever to move the *pinion* (3.27)

**3.11
engine speed**

rotational frequency of the *crankshaft* (3.7)

**3.12
excitation winding**

field winding
winding that carries an exciting current to create an electromagnet

**3.13
first ignition**

initial ignition of the *internal combustion engine (ICE)* (3.17) while the starter motor is *cranking* (3.4) the ICE

**3.14
helical spline**

spline that transfers torque and axial load from the drive shaft to the *pinion* (3.27)

**3.15
idle speed**

rotational frequency of the *internal combustion engine (ICE)* (3.17) when the accelerator is not pushed

**3.16
inrush current**

maximum current when the starter motor is activated

**3.17
internal combustion engine
ICE**

engine, which generates motive power by the burning of a fuel-air mixture by means of a crank mechanism

**3.18
lock current**

stall current
current which is drawn by the starter motor when the *pinion* (3.27) is locked (no rotation)

**3.19
lock torque**

stall torque
torque of the starter motor at the *pinion* (3.27) with the *armature* (3.1) shaft locked (no rotation)

[SOURCE: ISO 8856:2014, 2.1, modified — The term "stall torque" has been added and Note 1 to entry has been removed.]

3.20**meshing spring**

spring that allows axial movement of the *pinion* (3.27)

3.21**minimum battery voltage**

lowest *battery voltage* (3.4) which occurs when the starter motor is activated

Note 1 to entry: In practice the term voltage drop is used as a synonym.

3.22**nominal battery voltage**

approximate value of the voltage used to identify a *battery* (3.2)

[SOURCE: Electropedia 482-03-31, modified — The word "battery" has been added to the term, the phrase "suitable approximate value" has been replaced by "approximate value", and the phrase "to designate or identify a cell, a battery or an electromechanical system" has been replaced by "to identify a battery".]

3.23**overrunning**

condition in which the *internal combustion engine (ICE)* (3.17) rotates the starter motor *pinion* (3.27) before starter motor OFF

[SOURCE: ISO 20574:2019, 3.17, modified — The term "engine" has been replaced by "internal combustion engine".]

3.24**overrunning clutch**

mechanism to transfer starter motor torque to the *pinion* (3.27) in only one direction of rotation

3.25**overrunning time**

time period where engine drives the starter motor *pinion* (3.27) before starter motor OFF

3.26**permanent magnet type starter motor**

starter motor type, which uses permanent magnets to create the magnetic field inside the motor

3.27**pinion**

gear driving the *ring gear* (3.31)

3.28**plunger**

relay armature

movable part of the *solenoid* (3.32), which moves the *engagement lever* (3.10)

3.29**reduction gear type starter motor**

starter motor type for which the *pinion* (3.27) is driven with a lower rotational frequency than the *armature* (3.1) rotational frequency to increase the torque

3.30**return spring**

spring exerting a force against the working direction of the *plunger* (3.28)

3.31**ring gear**

gear to transfer torque from the starter motor to the *internal combustion engine (ICE)* (3.17)

3.32

solenoid engagement relay

magnetic switch

mechanism to move the *pinion* (3.27) and to close the contact bridge

3.33

solenoid cover

switch cover

cap of the *solenoid* (3.32) including the electrical *terminals* (3.40)

3.34

starter motor disengagement speed

rotational frequency of the *internal combustion engine (ICE)* (3.17) at starter motor OFF

3.35

starter motor current

I_{STR}

current drawn by the starter motor

[SOURCE: ISO 20574:2019, 3.27]

3.36

starter motor energy

E_{STR}

electrical energy consumed by the starter motor during one start event

3.37

starter motor ON time

time period where starter motor is activated

Note 1 to entry: It is typically the time period when *starter motor current* (3.35) is above a certain level.

3.38

starter motor voltage

U_{STR}

voltage at the *battery* (3.2) *terminal* (3.40) of the starter motor

[SOURCE: ISO 20574:2019, 3.26]

3.39

switch

device that supplies electricity to the *solenoid* (3.32) *terminal* (3.40)

3.40

terminal

electrical interface of the starter motor and the *battery* (3.2)

3.41

wound field type starter motor

starter motor type, which uses the *excitation windings* (3.12) to create the magnetic field inside the motor

3.42

yoke

pole housing

housing enclosing the *armature* (3.1) and containing the *excitation windings* (3.12) or magnets