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Smart community infrastructures — Smart transportation using battery-powered buses for passenger services

Infrastructures urbaines intelligentes — Transport intelligent utilisant des bus alimentés par des batteries pour le transport de voyageurs

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Foreword

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This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC 1, *Smart community infrastructures*.

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

City centres, often small areas, are frequently congested with internal-combustion-engine-driven vehicles. This creates significant city issues, including air pollution from greenhouse gases (GHGs) and irritation to citizens from noise and vibration. The number of internal-combustion-engine-driven private vehicles nowadays is small. Heavy trucks, which are commonly driven by internal combustion engines, are not allowed in city centres. Thus, the main source of such air pollution and environmental irritation is now commercial vehicles, i.e. buses equipped with internal combustion engines (see Annex A). Fuel energy is more efficiently converted to driving forces by motors consuming electric power generated from fuel than by engines directly burning fuel. Therefore, motor-driven or battery-powered buses are suitable options for transportation vehicles.

Bus transportation systems offer convenient and casual transport for citizens in all cities as they can operate in narrow streets in accordance with passenger flow changes in a city and require minimum facilities for bus stops. However, although bus journeys are popular among citizens, the ride comfort is not always of a high quality due to sudden stops to avoid collisions or traffic accidents, and irritating jerky movements caused by the traction mechanism in the internal combustion engine driving systems. Such behaviour can give passengers motion sickness or discomfort or even lead to injuries.

At the same time as promoting modal shifts from conventional to alternative systems, service performance and quality should be maintained or improved, in particular regarding low environmental impact, safe and steady operation and passenger ride comfort. Battery-powered bus transportation systems are now commonly used for short-distance transportation and contribute to solving the issues mentioned previously in a number of cities across the world (see Annex B).

Smart community infrastructures — Smart transportation using battery-powered buses for passenger services

1 Scope

This document specifies a procedure for the introduction of smart transportation to city centres by means of battery-powered buses. This service contributes to a clean atmosphere and a relatively quiet environment while offering services that provide safe and comfortable rides for citizens.

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 terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
battery-powered bus
bus run by electric power that is provided only with onboard rechargeable batteries

3.2
rechargeable battery
battery which can be recharged within an allowable waiting time for the next operation

Note 1 to entry: Batteries which do not cause any change to currently organized bus service operations are to be used in smart transportation. In this case, battery recharging should be completed in the same bus operation schedule as already adopted so that buses currently in service can simply and successfully be replaced with battery-powered buses.

3.3
recharging
putting an electrical charge back into battery-powered buses

Note 1 to entry: Recharging can be done by directly applying voltage to batteries onboard or, if the work can be completed in the current allowable waiting time, by swapping discharged and fully charged batteries. Wireless charging while battery-powered buses are running could be another way to recharge batteries onboard, if this procedure does not disturb current bus operation.

4 General

Battery-powered buses are driven with traction motors run by electricity. Motors can indirectly convert fuel energy into driving forces extremely efficiently by consuming electricity that is generated from fuel by a power plant in a normal way. Thus, motor traction saves energy compared with engine traction, which burns fuel directly. In addition, battery-powered buses emit no pollutants or GHGs into the atmosphere (see Annex C, which shows a typical application of battery-powered buses in a city). Furthermore, traction motors enable buses to run quietly with little irritating vibration. This enables battery-powered buses to maintain a good environment for those living near bus routes, while