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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Electricity metering – Payment systems – Part 41: Standard transfer specification (STS) – Application layer protocol for one-way token carrier systems

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ELECTRICITY METERING – PAYMENT SYSTEMS –

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FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 62055-41 has been prepared by IEC technical committee 13: Electrical energy measurement and control.

This second edition cancels and replaces the first edition issued in 2007. It constitutes a technical revision. The main technical changes with regard to the previous edition are as follows:

- Class 2 token is extended to include credit transfer for gas and water with associated extensions in the display/test tokens.
- MfrCode is extended from 2 to 4 digits.
- Three token identifier base dates are defined to provide for more frequent key changes with TID roll-over procedures.
- A code of practice for the management of TID roll-over key changes in association with the revised set of base dates.
- Some clarifications and additional examples have been added.

The text of this standard is based on the following documents:

CDV	Report on voting
13/1530/CDV	13/1553/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all parts in the IEC 62055 series, published under the general title *Electricity metering – Payment systems*, can be found on the IEC website.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The IEC 62055 series covers payment systems, encompassing the customer information systems, point of sale systems, token carriers, payment meters and the respective interfaces that exist between these entities. At the time of preparation of this standard, IEC 62055 comprised the following parts, under the general title, *Electricity metering – Payment systems:*

Part 21: Framework for standardization

Part 31: Particular requirements – Static payment meters for active energy (classes 1 and 2)

Part 41: Standard transfer specification – Application layer protocol for one-way token carrier systems

Part 51: Standard transfer specification – Physical layer protocol for one-way numeric and magnetic card token carriers

Part 52: Standard transfer specification – Physical layer protocol for a two-way virtual token carrier for direct local connection

Part 4x series specify application layer protocols and Part 5x series specify physical layer protocols.

The standard transfer specification (STS) is a secure message protocol that allows information to be carried between point of sale (POS) equipment and payment meters and it caters for several message types such as credit, configuration control, display and test instructions. It further specifies devices and codes of practice that allow for the secure management (generation, storage, retrieval and transportation) of cryptographic keys used within the system.

~~The national electricity utility in South Africa (Eskom) first developed and published the STS in 1993 and transferred ownership to the STS Association in 1998 for management and further development. It is currently the only open system for one-way payment meters and to date there are more than 4 million STS payment meters in the field, being used by approximately 400 utilities in 28 countries. The STS has been stable for 10 years, is the *de facto* industry standard at national and international level and hence has been developed as an IEC standard with the appropriate reformatting to comply with WG15 work. The primary application of the STS has been for use with payment meters without a tariff employing energy-based tokens, but it could be applied to currency-based token systems.~~

~~Prior to the development of the STS a variety of proprietary payment meters and POS equipment had been developed, which were, however, not compatible with each other. This gave rise to a definite need among the major users to move towards standardized solutions in addressing operational problems experienced where various types of payment meter and POS equipment had to be operated simultaneously. A standard transfer specification was developed that would allow for the application and inter-operability of payment meters and POS equipment from multiple manufacturers in a payment metering installation.~~

~~Two encryption algorithms are in this standard. The STA is used in existing systems, while the DEA may be considered for future systems.~~

The token carrier, which is not specified in this part of IEC 62055, is the physical device or medium used to transport the information from the POS equipment to the payment meter. Three types of token carriers are currently specified in IEC 62055-51 and IEC 62055-52; the magnetic card, the numeric token carrier and a virtual token carrier, which have been approved by the STS Association. New token carriers can be proposed as new work items through the National Committees or through the STS Association.

Although the main implementation of the STS is in the electricity supply industry, it inherently provides for the management of other utility services such as water and gas. It should be noted that certain functionalities may not apply across all utility services, for example, MaximumPowerLimit in the case of a water meter. Similarly, certain terminology may not be appropriate in non-electrical applications, for example, Load Switch in the case of a gas meter. Future revisions of the STS may allow for other token carrier technologies like smart cards and memory keys with two-way functionality and to cater for a real-time clock and complex tariffs in the payment meter.

Not all the requirements specified in this standard are compulsory for implementation in a particular system configuration and as a guideline, a selection of optional configuration parameters are listed in Clause C.11.

~~The STS Association has established D-type liaison with working group 15 of IEC TC 13 for the development of standards within the scope of the STS and is thus responsible for the maintenance of any such IEC standards that might be developed as a result of this liaison.~~

The STS Association is registered with the IEC as a Registration Authority for providing maintenance services in support of the STS (see Clause C.1 for more information).

Publication of IEC 62055-41 Ed 1 in May 2007 resulted in its rapid adoption as the preferred global standard for prepayment meters in many IEC member countries and a majority of IEC affiliate member countries. Prepayment electricity meters and their associated Payment Systems are now produced, operated and maintained by an ecosystem of utilities, meter manufacturers, meter operators, vending system providers, vending agents, banking institutions and adjacent industries. Multi-stakeholder interests are served by the STS Association comprising of more than 130 organisations located in over 24 countries. Interoperability and conformance to the Standard Transfer System (STS) are guaranteed by Conformance test specifications developed and administered by the STS Association. A full list of the STS Association services can be found at http://www.sts.org.za.

Developed originally for prepayment electricity meters in Africa – via an IEC TC13 WG15 D-type liaison with the STS Association – this IEC standard now serves more users in Asia than Africa, with a total of approximately 35 million meters operated by 400 utilities in 30 countries. Management of the technology has been administered by the STS Association in fulfilment of its role as the IEC appointed Registration Authority.

Global success has brought about an urgent need to extend the range of the numerical elements contained in IEC 62055-41 tables. In particular, the range of manufacturer numbers need to be extended beyond the 99 numbers originally provided. Also, application of the standard has been extended to cater for multi-energy systems including gas and water meters. Accordingly, there is a need to ensure that the content of IEC 62055-41 is maintained to cater for this market growth and multi-energy extensions.

Several corrections and clarifications are also required to bring Ed 1 up to date with current practice. This was considered by TC13 WG15 at its meeting on the 20 September 2012 in London, where it was agreed that IEC 62055-41 should be revised.

Only the most urgently required revisions have been incorporated in Edition 2 due to timing constraints, but it is anticipated that Edition 3 will consider further revisions to incorporate the following functionalities:

- Currency transfer
- Enhanced security on par with contemporary industry practice
- Complex functions fully harmonized with DLMS/COSEM suite
- Decentralized key management system with distributed architecture
- Conformance certification test suite in conjunction with IECEE CB scheme

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning special reserved token identifier given in 6.3.5.2.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

Address: Itron Measurement and Systems, P.O. Box 4059,TygerValley 7536, Republic of South Africa
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Website: http://www.itron.com

Address: Conlog (Pty) Ltd, P.O. Box 2332, Durban 4000, Republic of South Africa
Tel: +27 31 2681141
Fax: +27 31 2087790
Website: http://www.conlog.co.za

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ISO (www.iso.org/patents) and IEC (http://patents.iec.ch) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this International Standard may involve the use of a maintenance service concerning encryption key management and the stack of protocols on which the present International Standard IEC 62055-41 is based [see Clause C.1]. The IEC takes no position concerning the evidence, validity and scope of this maintenance service.

The provider of the maintenance service has assured the IEC that he is willing to provide services under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the provider of the maintenance service is registered with the IEC. Information may be obtained from:

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