

---

**Industrijska komunikacijska omrežja - Specifikacije za procesno vodilo - 5-26. del:  
Definicija opravil na aplikacijski ravni - Elementi tipa 26 (IEC 61158-5-26:2019)**

Industrial communication networks - Fieldbus specifications - Part 5-26: Application layer service definition - Type 26 elements (IEC 61158-5-26:2019)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-26: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 26-Elemente (IEC 61158-5-26:2019)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-26 : Spécification du protocole de la couche application - Éléments de type 26 (IEC 61158-5-26:2019)

<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>

**Ta slovenski standard je istoveten z: EN IEC 61158-5-26:2019**

---

**ICS:**

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.70	Uporabniški sloj	Application layer
35.110	Omreževanje	Networking

**SIST EN IEC 61158-5-26:2019****en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 61158-5-26:2019](#)

<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>

EUROPEAN STANDARD

**EN IEC 61158-5-26**

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2019

ICS 25.040.40; 35.100.70; 35.110

English Version

**Industrial communication networks - Fieldbus specifications -  
Part 5-26: Application layer service definition - Type 26 elements  
(IEC 61158-5-26:2019)**

Réseaux de communication industriels - Spécifications des  
bus de terrain - Partie 5-26 : Spécification du protocole de  
la couche application - Éléments de type 26  
(IEC 61158-5-26:2019)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-26:  
Dienstfestlegungen des Application Layer  
(Anwendungsschicht) - Typ 26-Elemente  
(IEC 61158-5-26:2019)

This European Standard was approved by CENELEC on 2019-05-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

[SIST EN IEC 61158-5-26:2019](#)

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN IEC 61158-5-26:2019 (E)****European foreword**

The text of document 65C/947/FDIS, future edition 1 of IEC 61158-5-26, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61158-5-26:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-02-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-05-23

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**  
**Endorsement notice**

SIST EN IEC 61158-5-26:2019

The text of the International Standard IEC 61158-5-26:2019 was approved by CENELEC as a European Standard without any modification.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-3	-	Programmable controllers - Part 3: Programming languages	EN 61131-3	-
IEC 61158-1	2019	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	-	-
IEC 61158-6-26	2019	Industrial communication networks - Fieldbus specifications - Part 6-26: Application layer protocol specification - Type 26 elements	EN 61158-6-26	2019
IEC 61784-2	2019	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC/IEEE 8802-3	-	-
ISO/IEC 646	-	Information technology - ISO 7-bit coded character set for information interchange	-	-
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model	-	-
ISO/IEC/IEEE 8802-3	-	Standard for Ethernet	-	-
ISO/IEC 8822	-	Information technology - Open Systems Interconnection - Presentation service definition	-	-
ISO/IEC 8824-1	-	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-
ISO/IEC 10646	-	Information technology - Universal Coded Character Set (UCS)	-	-

**EN IEC 61158-5-26:2019 (E)**

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-
ISO/IEC/IEEE 60559	-	Information technology - Microprocessor Systems - Floating-Point arithmetic	-	-
IETF RFC 768	-	User Datagram Protocol	-	-
IETF RFC 791	-	Internet Protocol	-	-
IETF RFC 792	-	Internet Control Message Protocol	-	-
IETF RFC 793	-	Transmission Control Protocol,	-	-
IETF RFC 796	-	Address mappings	-	-
IETF RFC 826	-	Ethernet Address Resolution Protocol: Or Converting Network Protocol Addresses to 48.bit Ethernet Address for Transmission on Ethernet Hardware	-	-
IETF RFC 894	-	Standard for the Transmission of IP Datagrams over Ethernet Networks	-	-
IETF RFC 919	-	Broadcasting Internet Datagrams	-	-
IETF RFC 922	-	Broadcasting Internet datagrams in the presence of subnets	-	-
IETF RFC 950	-	Internet Standard Subnetting Procedure	-	-

iTeH STANDARD PREVIEW  
(standards.iteh.ai)

[SIST EN IEC 61158-5-26:2019](https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019)

<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>



IEC 61158-5-26

Edition 1.0 2019-04

# INTERNATIONAL STANDARD

---

**Industrial communication networks – Fieldbus specifications –  
Part 5-26: Application layer service definition – Type 26 elements**

**STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN IEC 61158-5-26:2019  
<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 25.040.40; 35.100.70; 35.110

ISBN 978-2-8322-6768-4

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
1.1 Overview .....	8
1.2 Specifications .....	9
1.3 Conformance .....	9
2 Normative references .....	9
3 Terms, definitions, symbols, abbreviations and conventions .....	10
3.1 Terms and definitions from other ISO/IEC standards.....	11
3.1.1 Terms and definitions from ISO/IEC 7498-1 .....	11
3.1.2 Terms and definitions from ISO/IEC 8822 .....	11
3.1.3 Terms and definitions from ISO/IEC 9545 .....	11
3.1.4 Terms and definitions from ISO/IEC 8824-1 .....	11
3.2 Fieldbus application layer Type 26-specific definitions .....	12
3.3 Abbreviations and symbols .....	18
3.4 Conventions.....	20
3.4.1 Overview .....	20
3.4.2 General conventions.....	20
3.4.3 Conventions for class definitions .....	20
3.4.4 Conventions for service definitions .....	21
4 Concepts .....	22
5 Data type ASE.....	23
5.1 Overview.....	23
5.2 Formal definition of data type objects.....	23
5.2.1 Data type class definitions .....	23
5.2.2 Attributes .....	24
5.3 FAL defined data types .....	25
5.3.1 Fixed length types .....	25
5.3.2 String types .....	29
5.4 Data type ASE service specification.....	30
6 Communication model specification .....	30
6.1 General.....	30
6.2 Protocol stack for Type 26 fieldbus .....	30
6.3 Overview of Type 26 communication model .....	31
6.4 Cyclic data communication service with Common-memory.....	32
6.4.1 Overview .....	32
6.4.2 Common-memory: allocation to each node.....	32
6.4.3 Data sharing among nodes with the CM.....	33
6.4.4 CM data type .....	35
6.5 ASEs .....	35
6.5.1 Overview of Type 26 ASEs .....	35
6.5.2 Type 26 specific conventions for FAL service common parameters.....	36
6.5.3 Cyclic-data ASE.....	37
6.5.4 Message data ASE .....	42
6.5.5 Communication load measurement ASE .....	69
6.5.6 Network management ASE .....	74



6.5.7	General purpose command server ASE .....	87
6.5.8	AR ASE .....	90
6.5.9	FAL ASE summary .....	101
Bibliography.....		104
Figure 1	– Protocol stack for Type 26 fieldbus .....	31
Figure 2	– Unconfirmed Push-Publisher/Subscriber type interaction .....	32
Figure 3	– Unconfirmed/Confirmed Client/Server type interaction .....	32
Figure 4	– Common memory allocation .....	33
Figure 5	– Data sharing with the CM .....	34
Figure 6	– Node #01 for reception only .....	34
Figure 7	– Node #01 without the CM .....	35
Figure 8	– The structure of ASEs for Type 26 FAL .....	36
Figure 9	– Virtual-address-space for Byte block .....	45
Figure 10	– Virtual-address-space for Word block .....	48
Figure 11	– AR ASE internal architecture .....	91
Figure 12	– Structure of IP address .....	99
Table 1	– Write service parameters.....	39
Table 2	– Send-CM service parameters .....	40
Table 3	– Read service parameters.....	40
Table 4	– Update memory service parameters.....	41
Table 5	– Get- buffer service parameters .....	42
Table 6	– Byte block read service parameters.....	46
Table 7	– Byte block write service parameters .....	47
Table 8	– Word block read service parameters .....	48
Table 9	– Word block write service parameters .....	49
Table 10	– Network parameter read service parameters .....	50
Table 11	– Network parameter write service parameters .....	51
Table 12	– Stop command service parameters.....	52
Table 13	– Operation command service parameters.....	53
Table 14	– profile read service parameters .....	53
Table 15	– Transparent message service parameters .....	56
Table 16	– Log data read service parameters .....	57
Table 17	– Log data items.....	57
Table 18	– Log data clear service parameters.....	61
Table 19	– Message return service parameters.....	62
Table 20	– Vendor specific message service parameters .....	63
Table 21	– Set remote node configuration parameter service parameters .....	64
Table 22	– Data elements and Node configuration parameters.....	64
Table 23	– Service parameters of Read remote participating node management information parameter service.....	65
Table 24	– Participating node management information parameters.....	66
Table 25	– Read remote node management information parameter service parameters .....	67

Table 26 – Node management information parameters .....	67
Table 27 – Read remote node setting information parameter service parameters.....	68
Table 28 – Node setting information parameters .....	69
Table 29 – Start TK-holding-time measurement service parameters.....	71
Table 30 – Terminate TK-holding-time measurement service parameters.....	71
Table 31 – Token-holding-time measurement result .....	72
Table 32 – Start GP_Comm sender log service parameters .....	73
Table 33 – Terminate GP_Comm sender log service parameters .....	73
Table 34 – GP_Comm sender log measurement result.....	74
Table 35 – Service parameters for Set configuration parameter .....	77
Table 36 – Configuration parameters .....	78
Table 37 – Read node management information parameter service parameters .....	78
Table 38 – Node management information parameters .....	79
Table 39 – Service parameters for Read participating node mgt. information parameter .....	80
Table 40 – Participating node management information parameters.....	80
Table 41 – Service parameters for Read network management information parameter.....	81
Table 42 – Network management information parameters .....	81
Table 43 – Service parameters for Read message sequence number management information.....	82
Table 44 – Read message sequence number management information parameters .....	82
Table 45 – Read node status service parameters.....	83
Table 46 – Read node status parameters.....	83
Table 47 – Upper layer operating condition matrix .....	84
Table 48 – Reset node service parameters .....	84
Table 49 – Set network address service parameters .....	85
Table 50 – Register service parameters.....	85
Table 51 – Event service parameters .....	86
Table 52 – Activate/Deactivate measurement service parameters .....	86
Table 53 – Get log data service parameters.....	87
Table 54 – Send command service parameters.....	90
Table 55 – CT send service parameters.....	93
Table 56 – MT send service parameters .....	95
Table 57 – CS send service parameters.....	96
Table 58 – Notify state change service parameters .....	97
Table 59 – Control measurement service parameters.....	97
Table 60 – DLSAP assignments.....	99
Table 61 – DLS Primitives and parameters .....	100
Table 62 – Lower layer T-profile and the required standards.....	101
Table 63 – Summary of FAL ASEs .....	101

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELD BUS SPECIFICATIONS –****Part 5-26: Application layer service definition –  
Type 26 elements**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61158-5-26 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement and control.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/947/FDIS	65C/950/RVD

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

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

A list of all parts in the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC website.

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.

A bilingual version of this publication may be issued at a later date.

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[SIST EN IEC 61158-5-26:2019](https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019)

<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>

## INTRODUCTION

This document is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1.

The application service is provided by the application protocol making use of the services available from the data-link or other immediately lower layer. This document defines the application service characteristics that fieldbus applications and/or system management may exploit.

Throughout the set of fieldbus standards, the term “service” refers to the abstract capability provided by one layer of the OSI Basic Reference Model to the layer immediately above. Thus, the application layer service defined in this document is a conceptual architectural service, independent of administrative and implementation divisions.

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[SIST EN IEC 61158-5-26:2019](https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019)

<https://standards.iteh.ai/catalog/standards/sist/20507047-ec30-4cf7-b425-154e636b4a34/sist-en-iec-61158-5-26-2019>

## INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

### Part 5-26: Application layer service definition – Type 26 elements

#### 1 Scope

##### 1.1 Overview

The Fieldbus Application Layer (FAL) provides user programs with a means to access the Fieldbus communication environment. In this respect, the FAL can be viewed as a “window between corresponding application programs.”

This part of IEC 61158 provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment and material specific to Type 26 fieldbus. The term “time-critical” is used to represent the presence of a time-window, within which one or more specified actions are required to be completed with some defined level of certainty. Failure to complete specified actions within the time window risks failure of the applications requesting the actions, with attendant risk to equipment, plant and possibly human life.

This International Standard defines in an abstract way the externally visible service provided by the different Types of fieldbus Application Layer in terms of

- a) an abstract model for defining application resources (objects) capable of being manipulated by users via the use of the FAL service;
- b) the primitive actions and events of the service;
- c) the parameters associated with each primitive action and event, and the form which they take; and
- d) the interrelationship between these actions and events, and their valid sequences.

The purpose of this document is to define the services provided to

- a) the FAL user at the boundary between the user and the Application Layer of the Fieldbus Reference Model, and
- b) Systems Management at the boundary between the Application Layer and Systems Management of the Fieldbus Reference Model.

This document specifies the structure and services of the IEC Fieldbus Application Layer, in conformance with the OSI Basic Reference Model (see ISO/IEC 7498-1) and the OSI Application Layer Structure (see ISO/IEC 9545).

FAL services and protocols are provided by FAL application-entities (AE) contained within the application processes. The FAL AE is composed of a set of object-oriented Application Service Elements (ASEs) and a Layer Management Entity (LME) that manages the AE. The ASEs provide communication services that operate on a set of related application process object (APO) classes. One of the FAL ASEs is a management ASE that provides a common set of services for the management of the instances of FAL classes.

Although these services specify, from the perspective of applications, how request and responses are issued and delivered, they do not include a specification of what the requesting and responding applications are to do with them. That is, the behavioral aspects of the applications are not specified; only a definition of what requests and responses they can

send/receive is specified. This permits greater flexibility to the FAL users in standardizing such object behavior. In addition to these services, some supporting services are also defined in this document to provide access to the FAL to control certain aspects of its operation.

## 1.2 Specifications

The principal objective of this document is to specify the characteristics of conceptual application layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of application layer protocols for time-critical communications.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols. It is this latter objective which gives rise to the diversity of services standardized as the various Types of IEC 61158, and the corresponding protocols standardized in subparts of IEC 61158-6.

This specification may be used as the basis for formal Application Programming-Interfaces. Nevertheless, it is not a formal programming interface, and any such interface will need to address implementation issues not covered by this specification, including

- a) the sizes and octet ordering of various multi-octet service parameters, and
- b) the correlation of paired request and confirm, or indication and response, primitives.

## 1.3 Conformance

This document does not specify individual implementations or products, nor does it constrain the implementations of application layer entities within industrial automation systems.

There is no conformance of equipment to this application layer service definition standard. Instead, conformance is achieved through implementation of conforming application layer protocols that fulfill any given Type of application layer services as defined in this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE All parts of the IEC 61158 series, as well as IEC 61784-1 and IEC 61784-2, are maintained simultaneously. Cross-references to these documents within the text therefore refer to the editions as dated in this list of normative references.

IEC 61131-3, *Programmable controllers – Part 3: Programming languages*

IEC 61158-1:2019, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-6-26:2019, *Industrial communication networks – Fieldbus specifications – Part 6-26: Application layer protocol specification – Type 26 elements*

IEC 61784-2:2019, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC/IEEE 8802-3*

ISO/IEC 646, *Information technology – ISO 7-bit coded character set for information interchange*