

DIN EN 61158-5-17

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Ersatzvermerk
siehe unten

**Industrielle Kommunikationsnetze –
Feldbusse –
Teil 5-17: Dienstfestlegungen des Application Layer
(Anwendungsschicht) – Typ 17-Elemente (IEC 61158-5-17:2007);
Englische Fassung EN 61158-5-17:2008, nur auf CD-ROM**

Industrial communication networks –

Fieldbus specifications –

Part 5-17: Application layer service definition – Type 17 elements (IEC 61158-5-17:2007);

English version EN 61158-5-17:2008, only on CD-ROM

Réseaux de communication industriels –

Spécifications des bus de terrain –

Partie 5-17: Définition des services des couches d'application – Éléments de type 17
(CEI 61158-5-17:2007);

Version anglaise EN 61158-5-17:2008, seulement en CD-ROM

Ersatzvermerk

Mit DIN EN 61158-5-2:2008-09, DIN EN 61158-5-3:2008-09, DIN EN 61158-5-4:2008-09,
DIN EN 61158-5-5:2008-09, DIN EN 61158-5-7:2008-09, DIN EN 61158-5-8:2008-09,
DIN EN 61158-5-9:2008-09, DIN EN 61158-5-10:2008-09, DIN EN 61158-5-11:2008-09,
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DIN EN 61158-5-15:2008-09, DIN EN 61158-5-16:2008-09, DIN EN 61158-5-18:2008-09,
DIN EN 61158-5-19:2008-09 und DIN EN 61158-5-20:2008-09 Ersatz für DIN EN 61158-5:2005-05
Siehe jedoch Beginn der Gültigkeit

Gesamtumfang 59 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

Beginn der Gültigkeit

Die von CENELEC am 2008-02-01 angenommene EN 61158-5-17 gilt als DIN-Norm ab 2008-09-01.

Daneben darf DIN EN 61158-5:2005-05 noch bis 2011-02-01 angewendet werden.

Nationales Vorwort

Mit DIN EN 61158-5-2:2008-09, DIN EN 61158-5-3:2008-09, DIN EN 61158-5-4:2008-09, DIN EN 61158-5-5:2008-09, DIN EN 61158-5-7:2008-09, DIN EN 61158-5-8:2008-09, DIN EN 61158-5-9:2008-09, DIN EN 61158-5-10:2008-09, DIN EN 61158-5-11:2008-09, DIN EN 61158-5-12:2008-09, DIN EN 61158-5-13:2008-09, DIN EN 61158-5-14:2008-09, DIN EN 61158-5-15:2008-09, DIN EN 61158-5-16:2008-09, DIN EN 61158-5-18:2008-09, DIN EN 61158-5-19:2008-09 und DIN EN 61158-5-20:2008-09 Ersatz für DIN EN 61158-5:2005-05.

Vorausgegangener Norm-Entwurf: E DIN EN 61158-500:2006-11.

Für diese Norm ist das nationale Arbeitsgremium K 956 „Feldbus“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

Die enthaltene IEC-Publikation wurde vom SC 65C „Industrial networks“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (maintenance result date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

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- geändert.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als Europäische Norm EN 60068 durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Einführung

Ein Feldbus ist ein digitaler serieller Datenbus für die Kommunikation zwischen Geräten der industriellen Automatisierungstechnik wie beispielsweise Messeinrichtungen, Stellgliedern, Reglern und speicherprogrammierbaren Steuerungen. Die Normen der Reihe DIN EN 61158 legen eine Anzahl von Feldbus-Protokolltypen fest.

Die vorliegende Norm legt die Dienste fest, die von einem Feldbus-Application Layer des Typs 17 (Vnet/IP) zur Verfügung gestellt werden. Dieser war in den unten aufgeführten früheren Ausgaben nicht enthalten.

Änderungen

Gegenüber DIN EN 61158-5:2005-05 wurden folgende Änderungen vorgenommen:

- a) Streichung des Typ 6-Feldbusses wegen zu geringer Marktbedeutung;
- b) Hinzufügung von weiteren Feldbustypen;
- c) Aufteilung in mehrere Teile, jeweils als 5-2, 5-3, ..., 5-20 benummert.

Frühere Ausgaben

DIN V 19245-1: 1988-01
DIN 19245-1: 1991-04
DIN 19245-2: 1991-04
DIN EN 50170-1: 1997-07
DIN EN 50170-2: 1997-07
DIN EN 50170-3: 1997-07
DIN EN 50254: 1999-07
DIN EN 50170/A1: 2002-11
DIN EN 50170/A2: 2000-08
DIN EN 50170/A3: 2002-11
DIN EN 61158-5: 2005-05

— Leerseite —

Deutsche Fassung

Industrielle Kommunikationsnetze –
Feldbusse –
Teil 5-17: Dienstfestlegungen des Application Layer (Anwendungsschicht) –
Typ 17-Elemente
(IEC 61158-5-17:2007)

Industrial communication networks –
Fieldbus specifications –
Part 5-17: Application layer service definition –
Type 17 elements
(IEC 61158-5-17:2007)

Réseaux de communication industriels –
Spécifications des bus de terrain –
Partie 5-17: Définition des services des couches
d'application – Eléments de type 17
(CEI 61158-5-17:2007)

Diese Europäische Norm wurde von CENELEC am 2008-02-01 angenommen. Die CENELEC-Mitglieder sind gehalten, die CEN/CENELEC-Geschäftsordnung zu erfüllen, in der die Bedingungen festgelegt sind, unter denen dieser Europäischen Norm ohne jede Änderung der Status einer nationalen Norm zu geben ist.

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CENELEC

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

Zentralsekretariat: rue de Stassart 35, B-1050 Brüssel

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Ref. Nr. EN 61158-5-17:2008 D

Vorwort

Der Text des Schriftstücks 65C/475/FDIS, zukünftige 1. Ausgabe von IEC 61158-5-17, ausgearbeitet von dem SC 65C „Industrial networks“ des IEC/TC 65 „Industrial-process measurement, control and automation“, wurde der IEC-CENELEC Parallelen Abstimmung unterworfen und von CENELEC am 2008-02-01 als EN 61158-5-17 angenommen.

Dieser und die weiteren Teile der Normenreihe EN 61158-5 ersetzen EN 61158-5:2004.

Gegenüber EN 61158-5:2004 wurden die folgenden Änderungen durchgeführt:

- Streichung des Typ 6-Feldbusses wegen zu geringer Marktbedeutung;
- Hinzufügung von weiteren Feldbustypen;
- Aufteilung in mehrere Teile, jeweils als 5-2, 5-3, ..., 5-20 benummert.

Nachstehende Daten wurden festgelegt:

- spätestes Datum, zu dem die EN auf nationaler Ebene durch Veröffentlichung einer identischen nationalen Norm oder durch Anerkennung übernommen werden muss (dop): 2008-11-01
- spätestes Datum, zu dem nationale Normen, die der EN entgegenstehen, zurückgezogen werden müssen (dow): 2011-02-01

ANMERKUNG Die Anwendung einiger der aufgeführten Protokolltypen wird durch die Inhaber der Rechte an geistigem Eigentum hieran eingeschränkt. Die Zusage zur begrenzten Freigabe ihrer Rechte an geistigem Eigentum durch die Inhaber erlaubt in jedem Fall die Anwendung eines bestimmten Data Link Layer-Protokolls zusammen mit einem Physical Layer- und einem Application Layer-Protokoll in Typzusammenstellungen, die in der Normenreihe EN 61784 angegeben sind. Die Anwendung der verschiedenen Protokolltypen in anderen Zusammenstellungen erfordert möglicherweise die Erlaubnis des jeweiligen Inhabers der Rechte an dem entsprechenden geistigen Eigentum.

Der Anhang ZA wurde von CENELEC hinzugefügt.

Anerkennungsnotiz

Der Text der Internationalen Norm IEC 61158-5-17:2007 wurde von CENELEC ohne irgendeine Abänderung als Europäische Norm angenommen.

In der offiziellen Fassung sind unter „Literaturhinweise“ zu den aufgelisteten Normen die nachstehenden Anmerkungen einzutragen:

- IEC 61158-6-17 ANMERKUNG Harmonisiert als EN 61158-6-17:2008 (nicht modifiziert).
- IEC 61784-1 ANMERKUNG Harmonisiert als EN 61784-1:2008 (nicht modifiziert).
- IEC 61784-2 ANMERKUNG Harmonisiert als EN 61784-2:2008 (nicht modifiziert).

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INTRODUCTION

This part of IEC 61158 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/TR 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 standard 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 standard is a conceptual architectural service, independent of administrative and implementation divisions.

INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –

Part 5-17: Application layer service definition – Type 17 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 standard 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 17 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 standard defines in an abstract way the externally visible service provided by the different Types of the 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 standard is to define the services provided to

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

This standard specifies the structure and services of the IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498) and the OSI Application Layer Structure (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 standard to provide access to the FAL to control certain aspects of its operation.

1.2 Specifications

The principal objective of this standard 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.

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 standard does not specify individual implementations or products, nor do they 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 the Type 17 application layer services as defined in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For all other undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/TR 61158-1 (Ed.2.0), *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

ISO/IEC 7498 (all parts), *Information technology – Open Systems Interconnection – Basic Reference Model*

ISO/IEC 9545, *Information technology – Open Systems Interconnection – Application Layer structure*

ISO/IEC 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

3 Definitions

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

3.1 Terms and definitions

3.1.1 ISO/IEC 7498-1 terms

For the purposes of this document, the following terms as defined in ISO/IEC 7498-1 apply:

- a) application entity
- b) application protocol data unit

c) application service element

3.1.2 ISO/IEC 10731 terms

- a) (N)-connection
- b) (N)-entity
- c) (N)-layer
- d) (N)-service
- e) (N)-service-access-point

3.1.3 Other terms and definitions

3.1.3.1

application

function or data structure for which data is consumed or produced

3.1.3.2

application process

part of a distributed application on a network, which is located on one device and unambiguously addressed

3.1.3.3

application relationship

cooperative association between two or more application-entity-invocations for the purpose of exchange of information and coordination of their joint operation

NOTE This relationship is activated either by the exchange of application-protocol-data-units or as a result of preconfiguration activities

3.1.3.4

application relationship endpoint

context and behavior of an application relationship as seen and maintained by one of the application processes involved in the application relationship

NOTE Each application process involved in the application relationship maintains its own application relationship endpoint.

3.1.3.5

attribute

description of an externally visible characteristic or feature of an object

NOTE The attributes of an object contain information about variable portions of an object. Typically, they provide status information or govern the operation of an object. Attributes may also affect the behaviour of an object. Attributes are divided into class attributes and instance attributes.

3.1.3.6

behaviour

indication of how an object responds to particular events

3.1.3.7

bridge

intermediate equipment that connects two or more segments using a data-link layer relay function

3.1.3.8

channel

single physical or logical link of an input or output application object of a server to the process

3.1.3.9

class

a set of objects, all of which represent the same kind of system component

NOTE A class is a generalisation of an object; a template for defining variables and methods. All objects in a class are identical in form and behaviour, but usually contain different data in their attributes.

3.1.3.10

client

- a) object which uses the services of another (server) object to perform a task
- b) initiator of a message to which a server reacts

3.1.3.11

connection

logical binding between application objects that may be within the same or different devices

NOTE 1 Connections may be either point-to-point or multipoint.

NOTE 2 The logical link between sink and source of attributes and services at different custom interfaces of RT-Auto AEs is referred to as interconnection. There is a distinction between data and event interconnections. The logical link and the data flow between sink and source of automation data items is referred to as data interconnection. The logical link and the data flow between sink (method) and source (event) of operational services is referred to as event interconnection.

3.1.3.12

connection point

buffer which is represented as a subinstance of an Assembly object

3.1.3.13

conveyance path

unidirectional flow of APDUs across an application relationship

3.1.3.14

dedicated AR

AR used directly by the FAL User

NOTE On Dedicated ARs, only the FAL Header and the user data are transferred.

3.1.3.15

device

physical hardware connected to the link

NOTE A device may contain more than one node.

3.1.3.16

domain

part of the RTE network consisting of one or two subnetwork(s)

NOTE Two subnetworks are required to compose a dual-redundant RTE network, and each end node in the domain is connected to both of the subnetworks.

3.1.3.17

domain master

station which performs diagnosis of routes to all other domains, distribution of network time to nodes inside the domain, acquisition of absolute time from the network time master and notification of status of the domain

3.1.3.18

domain number

numeric identifier which indicates a domain

3.1.3.19

end node

producing or consuming node

3.1.3.20

endpoint

one of the communicating entities involved in a connection

3.1.3.21

error

discrepancy between a computed, observed or measured value or condition and the specified or theoretically correct value or condition

3.1.3.22

external bridge

bridge to which neither internal bridges nor RTE stations are connected directly

3.1.3.23

event

an instance of a change of conditions

3.1.3.24

group

- a) <general> a general term for a collection of objects. Specific uses:
- b) <addressing> when describing an address, an address that identifies more than one entity

3.1.3.25

interface

- a) shared boundary between two functional units, defined by functional characteristics, signal characteristics, or other characteristics as appropriate
- b) collection of FAL class attributes and services that represents a specific view on the FAL class

3.1.3.26

interface port

physical connection point of an end node, which has an independent DL-address

3.1.3.27

internal bridge

bridge to which no routers, external bridges or nodes non-compliant with this specification are connected directly

3.1.3.28

invocation

act of using a service or other resource of an application process

NOTE Each invocation represents a separate thread of control that may be described by its context. Once the service completes, or use of the resource is released, the invocation ceases to exist. For service invocations, a service that has been initiated but not yet completed is referred to as an outstanding service invocation.

3.1.3.29

junction bridge

bridge to which at least one router, external bridge or node non-compliant with this specification, and to which at least one internal bridge or RTE station is connected

3.1.3.30

link

physical communication channel between two nodes

3.1.3.31

method

<object> a synonym for an operational service which is provided by the server ASE and invoked by a client

3.1.3.32

network

a set of nodes connected by some type of communication medium, including any intervening repeaters, bridges, routers and lower-layer gateways

3.1.3.33

network time master

station which distributes network time to domain masters

3.1.3.34

node

single DL-entity as it appears on one local link

3.1.3.35

non-redundant interface node

node which has a single interface port

3.1.3.36

non-redundant station

station that consists of a single end node

NOTE "non-redundant station" is synonymous with "end node".

3.1.3.37

object

abstract representation of a particular component within a device, usually a collection of related data (in the form of variables) and methods (procedures) for operating on that data that have clearly defined interface and behaviour

3.1.3.38

originator

client responsible for establishing a connection path to the target

3.1.3.39

path

logical communication channel between two nodes, which consists of one or two link(s)

3.1.3.40

peer

role of an AR endpoint in which it is capable of acting as both client and server

3.1.3.41

producer

node that is responsible for sending data

3.1.3.42

provider

source of a data connection

3.1.3.43

publisher

role of an AR endpoint that transmits APDUs onto the fieldbus for consumption by one or more subscribers

NOTE A publisher may not be aware of the identity or the number of subscribers and it may publish its APDUs using a dedicated AR.

3.1.3.44

redundant interface node

node with two interface ports one of which is connected to a primary network, while the other is connected to a secondary network

3.1.3.45

redundant station

station that consists of a pair of end nodes

NOTE Each end node of a redundant station has the same station number, but has a different DL-address.

3.1.3.46

resource

a processing or information capability of a subsystem

3.1.3.47

RTE station

station compliant with this specification

3.1.3.48

route

logical communication channel between two communication end nodes

3.1.3.49

router

intermediate equipment that connects two or more subnetworks using a network layer relay function

3.1.3.50

segment

communication channel that connects two nodes directly without intervening bridges

3.1.3.51

server

- a) role of an AREP in which it returns a confirmed service response APDU to the client that initiated the request
- b) object which provides services to another (client) object

3.1.3.52

service

operation or function than an object and/or object class performs upon request from another object and/or object class

3.1.3.53

station

end node or a pair of end nodes that perform a specific application function

3.1.3.54

station number

numeric identifier which indicates a RTE station

3.1.3.55

subnetwork

part of a network that does not contain any routers. A subnetwork consists of end nodes, bridges and segments

NOTE Every end node included in a subnetwork has the same IP network address.

3.1.3.56

subscriber

role of an AREP in which it receives APDUs produced by a publisher

3.2 Abbreviations and symbols

3.2.1 ISO/IEC 10731 abbreviations

ASE	application-service-element
OSI	Open Systems Interconnection

3.2.2 Other abbreviations and symbols

AE	Application entity
AL	Application layer
AP	Application process
APDU	Application protocol data unit
APO	Application object
AR	Application relationship
AREP	Application relationship end ooint
Cnf	Confirmation
DL-	data-link layer (as a prefix)
DLL	DL-layer
DLSAP	DL-service-access-point
FAL	Fieldbus application layer
FIFO	First-in first-out (queuing method)
ID	Identifier
IEC	International Electrotechnical Commission
Ind	Indication
ISO	International Organization for Standardization
MSU-AR	Multipoint network-scheduled unconfirmed publisher/subscriber AREP
MTU-AR	Multipoint user-triggered unconfirmed publisher/subscriber AREP
PDU	Protocol Data Unit
PSU-AR	Point-to-point network-scheduled unconfirmed client/server AREP
PTC-AR	Point-to-point user-triggered confirmed client/server AREP
PTU-AR	Point-to-point user-triggered unconfirmed client/server AREP
Req	Request
Rsp	Response
SAP	Service Access Point

3.3 Conventions

3.3.1 Overview

The FAL is defined as a set of object-oriented ASEs. Each ASE is specified in a separate subclause. Each ASE specification is composed of two parts, its class specification, and its service specification.

The class specification defines the attributes of the class. The attributes are accessible from instances of the class using the Object Management ASE services specified in Clause 5 of this standard. The service specification defines the services that are provided by the ASE.

3.3.2 Conventions for class definitions

Class definitions are described using templates. Each template consists of a list of attributes for the class. The general form of the template is shown below:

FAL ASE:	ASE Name
CLASS:	Class Name
CLASS ID:	#
PARENT CLASS:	Parent Class Name
ATTRIBUTES:	
1	(o) Key Attribute: numeric identifier
2	(o) Key Attribute: name
3	(m) Attribute: attribute name(values)
4	(m) Attribute: attribute name(values)
4.1	(s) Attribute: attribute name(values)
4.2	(s) Attribute: attribute name(values)
4.3	(s) Attribute: attribute name(values)
5.	(c) Constraint: constraint expression
5.1	(m) Attribute: attribute name(values)
5.2	(o) Attribute: attribute name(values)
6	(m) Attribute: attribute name(values)
6.1	(s) Attribute: attribute name(values)
6.2	(s) Attribute: attribute name(values)
SERVICES:	
1	(o) OpsService: service name
2.	(c) Constraint: constraint expression
2.1	(o) OpsService: service name
3	(m) MgtService: service name

- (1) The "FAL ASE:" entry is the name of the FAL ASE that provides the services for the class being specified.
- (2) The "CLASS:" entry is the name of the class being specified. All objects defined using this template will be an instance of this class. The class may be specified by this standard, or by a user of this standard.
- (3) The "CLASS ID:" entry is a number that identifies the class being specified. This number is unique within the FAL ASE that will provide the services for this class. When qualified by the identity of its FAL ASE, it unambiguously identifies the class within the scope of the FAL. The value "NULL" indicates that the class cannot be instantiated. Class IDs between 1 and 255 are reserved by this standard to identify standardized classes. They have been assigned to maintain compatibility with existing national standards. CLASS IDs between 256 and 2048 are allocated for identifying user defined classes.
- (4) The "PARENT CLASS:" entry is the name of the parent class for the class being specified. All attributes defined for the parent class and inherited by it are inherited for the class being defined, and therefore do not have to be redefined in the template for this class.

NOTE The parent-class "TOP" indicates that the class being defined is an initial class definition. The parent class TOP is used as a starting point from which all other classes are defined. The use of TOP is reserved for classes defined by this standard.

- (5) The "ATTRIBUTES" label indicate that the following entries are attributes defined for the class.
 - a) Each of the attribute entries contains a line number in column 1, a mandatory (m) / optional (o) / conditional (c) / selector (s) indicator in column 2, an attribute type label in column 3, a name or a conditional expression in column 4, and optionally a list of enumerated values in column 5. In the column following the list of values, the default value for the attribute may be specified.