BS EN 60079-0:2009

# BSI British Standards

## Explosive atmospheres —

Part 0: Equipment — General requirements



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BSI British Standards

## National foreword

This British Standard is the UK implementation of EN 60079-0:2009. It is identical to IEC 60079-0:2007. It supersedes BS EN 60079-0:2006 and BS EN 61241-0:2006, which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/31, Equipment for explosive atmospheres.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.



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**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2009

## Amendments issued since publication

| Amd. No. | Date | Text affected |
|---|---|---|

EUROPEAN STANDARD

NORME EUROPÉENNE

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# EN 60079-0

August 2009

ICS 29.260.20

Supersedes EN 60079-0:2006 and EN 61241-0:2006

English version

# Explosive atmospheres - Part 0: Equipment - General requirements

(IEC 60079-0:2007)

Atmosphères explosives - Partie 0: Matériel - Exigences générales (CEI 60079-0:2007)

Explosionsfähige Atmosphäre - Teil 0: Geräte - Allgemeine Anforderungen (IEC 60079-0:2007)

This European Standard was approved by CENELEC on 2009-06-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**



Ref. No. EN 60079-0:2009 E

## Foreword

The text of document 31/708/FDIS, future edition 5 of IEC 60079-0, prepared by IEC TC 31, Equipment for explosive atmospheres, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60079-0 on 2009-06-01.

This European Standard supersedes EN 60079-0:2006 and EN 61241-0:2006.

The following dates were fixed:

| | | |
|---|---|---|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2010-03-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2012-06-01 |

This European Standard has been prepared under a mandate given to CENELEC by the European Commission to provide a means of conforming to Essential Requirements of the New Approach Directive 94/9/EC, for electrical equipment of Equipment Groups I and II, Equipment Categories M1, M2, 1G, 2G, 3G, 1D, 2D and 3D. See Annex ZZ.

CENELEC/TC 31 as the responsible committee has concluded that this new edition of EN 60079-0 does not contain substantial changes regarding the ESRs.

Annexes ZA, ZY and ZZ have been added by CENELEC.

EN 60079-0 will be supplemented by standards EN 60079-X for specific types of protection and by standards for specific products. In all cases requirements given in these standards result from an ignition hazard assessment made on the electrical equipment. The ignition sources taken into account are those found associated with this type of equipment, such as hot surfaces, mechanically generated sparks, thermite reactions, electrical arcing and static electric discharge.

## Endorsement notice

The text of the International Standard IEC 60079-0:2007 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| | | |
|---|---|---|
| IEC/TS 60034-17 | NOTE | Harmonized as CLC/TS 60034-17:2004 (not modified). |
| IEC/TS 60034-25 | NOTE | Harmonized as CLC/TS 60034-25:2005 (not modified). |
| IEC 60079-10 | NOTE | Harmonized as EN 60079-10:2003 (not modified). |
| IEC 60079-14 | NOTE | Harmonized as EN 60079-14:2003 (not modified). |
| IEC 60079-17 | NOTE | Harmonized as EN 60079-17:2007 (not modified). |
| IEC 60079-19 | NOTE | Harmonized as EN 60079-19:2007 (not modified). |
| IEC 60079-27 | NOTE | Harmonized as EN 60079-27:2006 (not modified). |
| IEC/TR 61241-2-2 | NOTE | Harmonized as EN 61241-2-2:1995 (not modified). |
| IEC 61241-14 | NOTE | Harmonized as EN 61241-14:2004 (not modified). |
| ISO/IEC 17000 | NOTE | Harmonized as EN ISO/IEC 17000:2004 (not modified). |

## Annex ZA
(normative)

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

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60034-1 | – [1)] | Rotating electrical machines - Part 1: Rating and performance | EN 60034-1 | 2004 [2)] |
| IEC 60034-5 | – [1)] | Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification | EN 60034-5 | 2001 [2)] |
| IEC 60050-426 | – [1)] | International Electrotechnical Vocabulary (IEV) - Chapter 426: Electrical apparatus for explosive atmospheres | – | – |
| IEC 60079-1 | – [1)] | Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" | EN 60079-1 | 2007 [2)] |
| IEC 60079-2 | – [1)] | Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p" | EN 60079-2 | 2007 [2)] |
| IEC 60079-4 | – [1)] | Electrical apparatus for explosive gas atmospheres - Part 4: Method of test for ignition temperature | – | – |
| IEC 60079-5 | – [1)] | Explosive atmospheres - Part 5: Equipment protection by powder filling "q" | EN 60079-5 | 2007 [2)] |
| IEC 60079-6 | – [1)] | Explosive atmospheres - Part 6: Equipment protection by oil immersion "o" | EN 60079-6 | 2007 [2)] |
| IEC 60079-7 | – [1)] | Explosive atmospheres - Part 7: Equipment protection by increased safety "e" | EN 60079-7 | 2007 [2)] |
| IEC 60079-11 | – [1)] | Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" | EN 60079-11 | 2007 [2)] |
| IEC 60079-15 | – [1)] | Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus | EN 60079-15 | 2005 [2)] |

[1)] Undated reference.

[2)] Valid edition at date of issue.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60079-18 | – [1)] | Electrical apparatus for explosive gas atmospheres - Part 18: Construction, test and marking of type of protection encapsulation "m" electrical apparatus | EN 60079-18 + corr. April | 2004 [2)] 2006 |
| IEC 60079-25 | – [1)] | Electrical apparatus for explosive gas atmospheres - Part 25: Intrinsically safe systems | EN 60079-25 + corr. April | 2004 [2)] 2006 |
| IEC 60079-26 | – [1)] | Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga | EN 60079-26 | 2007 [2)] |
| IEC 60079-28 | – [1)] | Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation | EN 60079-28 | 2007 [2)] |
| IEC 60079-30-1 | – [1)] | Explosive atmospheres - Part 30-1: Electrical resistance trace heating - General and testing requirements | EN 60079-30-1 | 2007 [2)] |
| IEC 60079-31 | – [1)] | Explosive Atmospheres - Part 31: Equipment dust ignition protection by enclosure "tD" | EN 60079-31 | 200X [3)] |
| IEC 60086-1 | – [1)] | Primary batteries - Part 1: General | EN 60086-1 | 2007 [2)] |
| IEC 60095-1 | – [1)] | Lead-acid starter batteries - Part 1: General requirements and methods of test | – | – |
| IEC 60192 | – [1)] | Low pressure sodium vapour lamps - Performance specifications | EN 60192 | 2001 [2)] |
| IEC 60216-1 | – [1)] | Electrical insulating materials - Properties of thermal endurance - Part 1: Ageing procedures and evaluation of test results | EN 60216-1 | 2001 [2)] |
| IEC 60216-2 | – [1)] | Electrical insulating materials - Thermal endurance properties - Part 2: Determination of thermal endurance properties of electrical insulating materials - Choice of test criteria | EN 60216-2 | 2005 [2)] |
| IEC 60243-1 | – [1)] | Electrical strength of insulating materials - Test methods - Part 1: Tests at power frequencies | EN 60243-1 | 1998 [2)] |
| IEC 60423 | – [1)] | Conduit systems for cable management - Outside diameters of conduits for electrical installations and threads for conduits and fittings | EN 60423 | 2007 [2)] |
| IEC 60529 | – [1)] | Degrees of protection provided by enclosures (IP Code) | EN 60529 + corr. May | 1991 [2)] 1993 |
| IEC 60622 | – [1)] | Secondary cells and batteries containing alkaline or other non-acid electrolytes - Sealed nickel-cadmium prismatic rechargeable single cells | EN 60622 | 2003 [2)] |

[3)] At draft stage.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60623 | – [1)] | Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells | EN 60623 | 2001 [2)] |
| IEC 60662 (mod) | – [1)] | High pressure sodium vapour lamps | EN 60662 | 1993 [2)] |
| IEC 60664-1 | – [1)] | Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests | EN 60664-1 | 2007 [2)] |
| IEC 60947-1 | – [1)] | Low-voltage switchgear and controlgear - Part 1: General rules | EN 60947-1 | 2007 [2)] |
| IEC 61056-1 | – [1)] | General purpose lead-acid batteries (valve regulated types) - Part 1: General requirements, functional characteristics - Methods of test | EN 61056-1 | 2003 [2)] |
| IEC 61241-1 | – [1)] | Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures "tD" | EN 61241-1 + corr. December | 2004 [2)] 2006 |
| IEC 61241-4 | – [1)] | Electrical apparatus for use in the presence of combustible dust - Part 4: Type of protection 'pD' | EN 61241-4 | 2006 [2)] |
| IEC 61241-11 | – [1)] | Electrical apparatus for use in the presence of combustible dust - Part 11: Protection by intrinsic safety 'iD' | EN 61241-11 | 2006 [2)] |
| IEC 61951-1 | – [1)] | Secondary cells and batteries containing alkaline or other non-acid electrolytes - Portable sealed rechargeable single cells - Part 1: Nickel-cadmium | EN 61951-1 | 2003 [2)] |
| IEC 61951-2 | – [1)] | Secondary cells and batteries containing alkaline or other non-acid electrolytes - Portable sealed rechargeable single cells - Part 2: Nickel-metal hydride | EN 61951-2 | 2003 [2)] |
| IEC 62013-1 | – [1)] | Caplights for use in mines susceptible to firedamp - Part 1: General requirements - Construction and testing in relation to the risk of explosion | EN 62013-1 | 2006 [2)] |
| ISO 48 | – [1)] | Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD) | – | – |
| ISO 178 | – [1)] | Plastics - Determination of flexural properties | EN ISO 178 | 2003 [2)] |
| ISO 179 | Series | Plastics - Determination of Charpy impact properties | EN ISO 179 | Series |
| ISO 262 | – [1)] | ISO general-purpose metric screw threads - Selected sizes for screws, bolts and nuts | – | – |
| ISO 273 | – [1)] | Fasteners - Clearance holes for bolts and screws | EN 20273 | 1991 [2)] |
| ISO 286-2 | – [1)] | ISO system of limits and fits - Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts | – | – |

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| ISO 527-2 | – [1)] | Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics | EN ISO 527-2 | 1996 [2)] |
| ISO 965-1 | – [1)] | ISO general-purpose metric screw threads - Tolerances - Part 1: Principles and basic data | – | – |
| ISO 965-3 | – [1)] | ISO general-purpose metric screw threads - Tolerances - Part 3: Deviations for constructional threads | – | – |
| ISO 1817 | – [1)] | Rubber, vulcanized - Determination of the effect of liquids | – | – |
| ISO 4014 | – [1)] | Hexagon head bolts - Product grades A and B | EN ISO 4014 | 2000 [2)] |
| ISO 4017 | – [1)] | Hexagon head screws - Product grades A and B | EN ISO 4017 | 2000 [2)] |
| ISO 4026 | – [1)] | Hexagon socket set screws with flat point | EN ISO 4026 | 2003 [2)] |
| ISO 4027 | – [1)] | Hexagon socket set screws with cone point | EN ISO 4027 | 2003 [2)] |
| ISO 4028 | – [1)] | Hexagon socket set screws with dog point | EN ISO 4028 | 2003 [2)] |
| ISO 4029 | – [1)] | Hexagon socket set screws with cup point | EN ISO 4029 | 2003 [2)] |
| ISO 4032 | – [1)] | Hexagon nuts, style 1 - Product grades A and B | EN ISO 4032 | 2000 [2)] |
| ISO 4762 | – [1)] | Hexagon socket head cap screws | EN ISO 4762 | 2004 [2)] |
| ISO 4892-1 | – [1)] | Plastics - Methods of exposure to laboratory light sources - Part 1: General guidance | EN ISO 4892-1 | 2000 [2)] |
| ANSI/UL 746B | – [1)] | Polymeric Materials - Long-Term Property Evaluations | – | – |

# Annex ZY
(informative)

## Equipment groups and marking examples

### Equipment groups

In all cases Equipment Protection Levels (EPL) as defined by EN 60079-0 are related to the corresponding Equipment Groups and Equipment Categories according to the following table. The same applies if a standard makes reference to the intended use of equipment in Zones according to the definitions in EN 60079-10.

| *EN 60079-0* | | *Directive 94/9/EC* | | *EN 60079-10-X* |
|---|---|---|---|---|
| *EPL* | *Group* | *Equipment Group* | *Equipment Category* | *Zones* |
| *Ma* | *I* | *I* | *M1* | *NA* |
| *Mb* | | | *M2* | |
| *Ga* | *II* | *II* | *1G* | *0* |
| *Gb* | | | *2G* | *1* |
| *Gc* | | | *3G* | *2* |
| *Da* | *III* | | *1D* | *20* |
| *Db* | | | *2D* | *21* |
| *Dc* | | | *3D* | *22* |

### Instructions

The manufacturer or his authorized representative in the Community is to draw up the instructions for use in the required Community languages.

### Marking

The marking according to this standard is to be supplemented by the marking according to Directive 94/9/EC. Examples are given below.

### European marking examples

| **Directive part** | **Standard part** | **Equipment example** |
|---|---|---|
| **I M2** | **Ex d I Mb** | Mining equipment,<br>type of protection “Flameproof Enclosure” d |
| **II 2G** | **Ex e IIB T4 Gb** | Gas explosion protected equipment<br>type of protection, “Increased Safety” e |
| **II 1D** | **Ex ma IIIC 120°C Da** | Dust explosion protected equipment,<br>type of protection “Encapsulation” ma |

NOTE Attention is drawn to the requirement in 29.8:
The Ex marking for explosive gas atmospheres and explosive dust atmospheres shall be separate and not combined:

**II 1 G - Ex ia IIB T4**

**II 1 D - Ex ia IIIC T120°C**

or alternatively:

**II 1 GD**

**Ex ia IIB T4 Ga**

**Ex ia IIIC T120°C Da**

## Annex ZZ
(informative)

## Coverage of Essential Requirements of EC Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers only the following essential requirements out of those given in Annex II of the EC Directive 94/9/EC:

– ER 1.0.1 to ER 1.0.6;

– ER 1.1;

– ER 1.2.1 to ER 1.2.9;

– ER 1.3.1 to ER 1.3.4;

– ER 1.4.1, ER 1.4.2;

– ER 1.6.2, ER 1.6.4;

– ER 2.0 to ER 2.3.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

TC 31/Publication 60079-0 (2007), Fifth edition/I-SH 01

# EXPLOSIVE ATMOSPHERES –

## Part 0: Equipment – General requirements

## INTERPRETATION SHEET

This interpretation sheet has been prepared by committee 31: Equipment for explosive atmospheres, of IEC.

The text of this interpretation sheet is based on the following documents:

| ISH | Report on voting |
|---|---|
| 31/768/ISH | 31/779/RVD |

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

_____

**Subclauses 26.8 and 26.9 of IEC 60079-0 (2007)**

Following the discussions by the TC 31/WG 22 Task Group addressing the repeatability of the thermal endurance to heat and thermal endurance to cold tests it was proposed that a tolerance be clarified for the test periods in Edition 6, 31/744/DC was issued and comments received and resolved as 31/752A/INF.

These interpretations are made available for edition 5 of this standard due to the current use of that standard by manufacturers, conformity assessment schemes and national bodies by means of this “Interpretation Sheet” as follows:

**Details of interpretation:**

**Interpretation of subclause 26.8 Thermal endurance to heat and 26.9 Thermal endurance to cold of IEC 60079-0 (2007):**

**Question:** As it is unreasonable to consider them to be the exact test time, are the time frames for the 24 h, 336 h (2 weeks) or 672 h (4 weeks) tests considered to be the minimum times? If so, what is the maximum time?

**Interpretation:** The 24 h, 336 h and 672 h values are considered the minimum number of hours for each of the tests. It is practical that the time periods should not extend beyond $24\,^{+2}_{0}$ h, $336\,^{+30}_{0}$ h, $672\,^{+30}_{0}$ h.

It is intended that this interpretation will be introduced in IEC 60079-0 Edition 6 and therefore an Interpretation Sheet will not be required for this or future editions.

# CONTENTS

# EXPLOSIVE ATMOSPHERES –

# Part 0: Equipment – General requirements

## 1 Scope

This part of IEC 60079 specifies the general requirements for construction, testing and marking of electrical equipment and Ex components intended for use in explosive atmospheres.

Unless modified by one of the standards supplementing this standard, electrical equipment complying with this standard is intended for use in hazardous areas in which explosive atmospheres exist under normal atmospheric conditions of

- temperature –20 °C to +60 °C;
- pressure 80 kPa (0,8 bar) to 110 kPa (1,1 bar); and
- air with normal oxygen content, typically 21 % v/v.

The application of electrical equipment in atmospheric conditions outside this range requires special consideration and may require additional assessment and testing.

NOTE 1 Although the normal atmospheric conditions above give a temperature range for the atmosphere of -20°C to +60°C, the normal ambient temperature range for the equipment is -20°C to +40°C, unless otherwise specified and marked. See 5.1.1.

NOTE 2 In designing equipment for operation in explosive atmospheres under conditions other than the atmospheric conditions given above, this standard may be used for guidance. However, additional testing related specifically to the intended conditions of use is recommended. This is particularly important when the types of protection 'flameproof enclosure "d"' (IEC 60079-1) and 'intrinsic safety "i"' (IEC 60079-11 or IEC 61241-11) are applied.

NOTE 3 Requirements given in this standard result from an ignition hazard assessment made on electrical equipment. The ignition sources taken into account are those found associated with this type of equipment, such as hot surfaces, mechanically generated sparks, thermite reactions, electrical arcing and static electric discharge in normal industrial environments.

NOTE 4 It is acknowledged that, with developments in technology, it may be possible to achieve the objectives of the IEC 60079 series of standards in respect of explosion prevention by methods that are not yet fully defined. Where a manufacturer wishes to take advantage of such developments, this International Standard, as well as other standards in the IEC 60079 series, may be applied in part. It is intended that the manufacturer prepare documentation that clearly defines how the IEC 60079 series of standards has been applied, together with a full explanation of the additional techniques employed. The designation "Ex s" has been reserved to indicate a type of protection that is not defined by the IEC 60079 series of standards, but may be referenced in national requirements.

NOTE 5 Where an explosive gas atmosphere and a combustible dust atmosphere are, or may be, present at the same time, the simultaneous presence of both should be considered and may require additional protective measures.

This standard does not specify requirements for safety, other than those directly related to the explosion risk. Ignition sources like adiabatic compression, shock waves, exothermic chemical reaction, self ignition of dust, naked flames and hot gases/liquids, are not addressed by this standard.

NOTE 6 Such equipment should be subjected to a hazard analysis that identifies and lists all of the potential sources of ignition by the electrical equipment and the measures to be applied to prevent them becoming effective.

This standard is supplemented or modified by the following standards concerning specific types of protection:

– IEC 60079-1: Gas – Flameproof enclosures "d";
– IEC 60079-2: Gas – Pressurized enclosures "p";
– IEC 60079-5: Gas – Powder filling "q";
– IEC 60079-6: Gas – Oil immersion "o";
– IEC 60079-7: Gas – Increased safety "e";
– IEC 60079-11: Gas – Intrinsic safety "i";
– IEC 60079-15: Gas – Type of protection “n”;
– IEC 60079-18: Gas and Dust – Encapsulation "m";
– IEC 61241-1: Dust – Protection by enclosures “tD”;
– IEC 61241-2 (IEC 61241-4): Dust – Pressurization “pD”;
– IEC 61241-11: Dust – Intrinsic safety “iD”.

NOTE 7 The former requirements of IEC 61241-18, Encapsulation “mD”, have been incorporated in IEC 60079-18.

This standard is supplemented or modified by the following equipment standards:

IEC 60079-25: Electrical apparatus for explosive gas atmospheres – Part 25: Intrinsically safe systems

IEC 60079-26: Explosive atmospheres – Part 26: Equipment with equipment protection level (EPL) Ga

IEC 60079-28: Explosive atmospheres – Part 28: Protection of equipment and transmission systems using optical radiation

IEC 62013-1: Caplights for use in mines susceptible to firedamp – Part 1: General requirements – Construction and testing in relation to the risk of explosion

IEC 60079-30-1: Explosive atmospheres – Part 30-1: Electrical resistance trace heating – General and testing requirements.

This standard with the additional standards mentioned above, are not applicable to the construction of

- electromedical apparatus,
- shot-firing exploders,
- test devices for exploders, and
- shot-firing circuits.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5*, Rotating electrical machines – Part 5: Classification of degrees of protection provided by the enclosures of rotating electrical machines (IP Code)*