

**SLOVENSKI STANDARD**  
**oSIST prEN ISO 80079-37:2014**  
**01-oktober-2014**

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**Esplozivna atmosfera - 37. del: Neelektrična oprema za uporabo v potencialno eksplozivnih atmosferah - Neelektrična vrsta zaščite s konstrukcijsko varnostjo 'c', kontrolo virov vžiga 'b', s potopitvijo v tekočino 'k' (ISO/DIS 80079-37:2014)**

Explosive atmospheres - Part 37: Non-electrical equipment for use in explosive atmospheres - Non-electrical type of protection constructional safety 'c', control of ignition sources 'b', liquid immersion 'k' (ISO/DIS 80079-37:2014)

Explosionsfähige Atmosphären - Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären - Teil 37: Sicherheit 'c', Zündquellenüberwachung 'b', Flüssigkeitskapselung 'k' (ISO/DIS 80079-37:2014)

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Atmosphères explosives - Partie 37: Matériels non électriques pour atmosphères explosives - Mode de protection non électrique par sécurité de construction "ch", par contrôle de source d'inflammation "bh", par immersion dans un liquide "kh" (ISO/DIS 80079-37:2014)

**Ta slovenski standard je istoveten z: prEN ISO 80079-37 rev**

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29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

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## Explosive atmospheres —

Part 37:

**Non-electrical equipment for use in explosive atmospheres —  
Non-electrical type of protection constructional safety 'c',  
control of ignition sources 'b', liquid immersion 'k'**

*Atmosphères explosives —**Partie 37: Matériels non électriques pour atmosphères explosives — Mode de protection non électrique par sécurité de construction "ch", par contrôle de source d'inflammation "bh", par immersion dans un liquide "kh"*

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## ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

This draft is submitted to a parallel enquiry in ISO and a CDV vote in the IEC.

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43  
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45  
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47

## CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Determination of suitability	9
5 Requirements for equipment with type of protection constructional safety "c"	9
5.1 General requirements	9
5.2 Ingress protection	9
5.2.1 General	9
5.2.2 Ingress protection in special cases	10
5.3 Seals for moving parts	10
5.3.1 Unlubricated gaskets, seals, sleeves, bellows and diaphragms	10
5.3.2 Stuffing box seals (packed glands)	10
5.3.3 Lubricated seals	10
5.4 Equipment lubricants, coolants and fluids	11
5.5 Vibration	11
5.6 Requirements for moving parts	11
5.6.1 General	11
5.6.2 Clearance	11
5.6.3 Lubrication	11
5.7 Requirements for bearings	12
5.7.1 General	12
5.7.2 Lubrication	13
5.7.3 Chemical compatibility	13
5.8 Requirements for power transmission systems	13
5.8.1 Gear drives	13
5.8.2 Belt drives	13
5.8.3 Chain drives	15
5.8.4 Other drives	15
5.8.5 Hydrostatic, hydrokinetic and pneumatic equipment	15
5.9 Requirements for clutches and variable speed couplings	16
5.9.1 General	16
5.9.2 Slipping	16
5.9.3 Friction	16
5.10 Flexible couplings	16
5.11 Requirements for brakes and braking systems	17
5.11.1 Brakes used only for stopping in emergency	17
5.11.2 Service brakes (including friction brakes and fluid based retarders)	17
5.11.3 Parking brakes	17
5.12 Requirements for springs and absorbing elements	17
5.13 Requirements for conveyor belts	17
5.13.1 Electrostatic requirements	17
5.13.2 Materials	18

48	5.13.3	Belt tension .....	18
49	5.13.4	Alignment .....	18
50	5.13.5	Earthing and bonding .....	18
51	6	Requirements for equipment with type of protection control of ignition source "b" .....	18
52	6.1	General .....	18
53	6.2	Determination of the control parameters .....	19
54	6.2.1	General .....	19
55	6.2.2	Determination of the safety critical values .....	19
56	6.3	Ignition protection system design and settings .....	20
57	6.3.1	Determining the performance requirements or operating characteristics .....	20
58			
59	6.3.2	Instructions .....	20
60	6.3.3	System lockout .....	20
61	6.3.4	Operator intervention .....	20
62	6.4	Ignition protection of sensors and actuators .....	20
63	6.5	Ignition protection types .....	20
64	6.5.1	Ignition protection type b1 .....	20
65	6.5.2	Ignition protection type b2 .....	21
66	6.5.3	Application of ignition protection types .....	21
67	6.5.4	Requirements for ignition protection types .....	23
68	6.5.5	Programmable electronic devices .....	23
69	7	Requirements for equipment with type of protection liquid immersion "k" .....	23
70	7.1	Determination of the maximum/minimum criteria .....	23
71	7.2	Protective liquid .....	24
72	7.3	Equipment construction .....	24
73	7.3.1	General .....	24
74	7.3.2	Working angle .....	24
75	7.3.3	Measures to ensure effectiveness of liquid .....	24
76	7.3.4	Accidental loosening .....	25
77	7.3.5	Level monitoring .....	25
78	7.3.6	Loss of liquid .....	25
79	7.3.7	Open equipment .....	26
80	8	Equipment tests .....	26
81	8.1	Type tests for equipment with type of protection constructional safety "c" .....	26
82	8.2	Type tests for equipment with type of protection control of ignition source	
83	"b" .....		26
84	8.2.1	Determination of control parameters .....	26
85	8.2.2	Function and accuracy check of the ignition protection system .....	26
86	8.3	Type tests for equipment with type of protection liquid immersion "k" .....	26
87	8.3.1	General .....	26
88	8.3.2	Increased pressure test on enclosed equipment having a sealed enclosure that contains static, or flowing protective liquid .....	26
89			
90			
91	8.3.3	Overpressure test on enclosed equipment having a vented enclosure .....	26
92			
93	9	Documentation .....	26
94	9.1	Documentation for equipment with type of protection constructional safety "c" .....	26
95			
96	9.2	Documentation for equipment with type of protection control of ignition source "b" .....	27
97			

98	9.3	Documentation for equipment with type of protection liquid immersion "k" .....	27
99	10	Marking .....	27
100	10.1	General.....	27
101	10.2	Safety devices .....	28
102	Annex A (informative) Examples of some of the thought processes and principles used		
103	in the construction of items of equipment with type of protection constructional		
104	safety "c" .....		29
105	A.1	General remarks regarding ignition hazard assessment .....	29
106	A.2	Stuffing box seal .....	29
107	A.3	Slide ring seal .....	32
108	A.4	Radial seal.....	37
109	A.5	Belt drives.....	43
110	Annex B (normative) Test requirements .....		45
111	B.1	"Dry run" type test for lubricated sealing arrangements .....	45
112	B.2	Type test for determining the maximum engaging time of clutch assembly .....	45
113	B.2.1	Apparatus .....	45
114	B.2.2	Procedure.....	46
115	Annex C (informative) Flow diagram of the procedures related to equipment with type		
116	of protection control of ignition source "b" .....		47
117	Annex D (informative) Thought process used to assign the required ignition protection		
118	type used for equipment to achieve different EPL .....		48
119	D.1	For EPL Gc and Dc .....	48
120	D.2	For EPL Gb and Db.....	48
121	D.3	For EPL Mb.....	48
122	D.4	For EPL Ga and Da.....	49
123	Annex E (informative) Information on functional safety concept .....		50
124	E.1	ISO 13849-1 .....	50
125	E.2	IEC 61508-1 .....	50
126	E.3	IEC 62061.....	50
127	E.4	Reliability according to functional safety standards .....	50
128	Bibliography.....		52
129			
130	Figure C.1 – Flow diagram of the procedures described in this document .....		47
131			
132	Table 1 – Minimum ignition protection types required when Ex "b" is selected to		
133	achieve the intended EPL for Group II and III equipment .....		22
134	Table 2 – Minimum ignition protection types required when Ex "b" is selected to		
135	achieve the intended EPL for Group I equipment .....		23
136	Table A.1 – List of examples for some of the thought processes and principles used .....		29
137	Table A.2 – Stuffing box seal (1 of 2).....		30
138	Table A.3 – Slide ring seal (1 of 4).....		33
139	Table A.4 – Radial seal (1 of 5) .....		38
140	Table A.5 – Belt drives.....		44
141			
142			
143			
144			
145			

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## EXPLOSIVE ATMOSPHERES

**Part 37: Non-electrical equipment for explosive atmospheres –  
Non electrical type of protection constructional safety "c",  
control of ignition source "b", liquid immersion "k"**

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International Standard ISO 80079-37 has been prepared by ISO/IEC technical committee 31M: Non-electrical equipment and protective systems for explosive atmospheres

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

FDIS	Report on voting
31/XX/FDIS	31/XX/RVD

Full information on the voting for the approval of this 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.



198 A list of all parts of the IEC 60079 series, under the general title *Explosive atmospheres*, as  
199 well as the ISO/IEC 80079 series, can be found on the IEC website.

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

- 203 • reconfirmed,
- 204 • withdrawn,
- 205 • replaced by a revised edition, or
- 206 • amended.

207

208 The National Committees are requested to note that for this publication the stability date  
209 is 2018.

210 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELET-  
211 ED AT THE PUBLICATION STAGE.

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## EXPLOSIVE ATMOSPHERES

### Part 37: Non-electrical equipment for explosive atmospheres – Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"

#### 221 1 Scope

222 This International standard specifies the requirements for the design and construction of non-  
223 electrical equipment, intended for use in explosive atmospheres, protected by the types of  
224 protection constructional safety "c", control of ignition source "b" and liquid immersion "k".

225 This standard supplements and modifies the requirements in ISO 80079-36. Where a require-  
226 ment of this standard conflicts with the requirement of ISO 80079-36 the requirement of this  
227 standard takes precedence.

228 Types of protection "c", "k" and "b" are not applicable for Group I, EPL Ma without additional  
229 protective precautions.

230 The types of ignition protection described in the standard can be used either on their own or  
231 in combination with each other to meet the requirements for equipment of Group I, Group II,  
232 and Group III depending on the ignition hazard assessment in ISO 80079-36.

#### 233 2 Normative references

234 The following documents, in whole or in part, are normatively referenced in this document and  
235 are indispensable for its application. For dated references, only the edition cited applies. For  
236 undated references, the latest edition of the referenced document (including any amend-  
237 ments) applies.

238 IEC 60079-0, *Explosive Atmospheres – Part 0: Equipment – General requirements*

239 IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

240 ISO 281, *Rolling bearings – Dynamic load ratings and rating life*

241 ISO 1813, *Belt drives – V-ribbed belts, joined V-belts and V-belts including wide section belts  
242 and hexagonal belts – Electrical conductivity of antistatic belts: Characteristics and methods  
243 of test*

244 ISO 9563 *Belt drives — Electrical conductivity of antistatic endless synchronous belts —  
245 Characteristics and test method*

246 ISO 4413, *Hydraulic fluid power – General rules and safety requirements for systems and  
247 their components*

248 ISO 4414, *Pneumatic fluid power – General rules and safety requirements for systems and  
249 their components*

250 ISO 80079-36, *Explosive atmospheres – Non-electrical equipment for explosive atmospheres  
251 – Part 1: Basic method and requirements*<sup>1</sup>

<sup>1</sup> To be published.

252

253 (EN 13237EN 13501-1, *Fire classification of construction products and building elements –*  
254 *Part 1: Classification using test data from reaction to fire tests*

### 255 3 Terms and definitions

256 For the purposes of this document, the terms and definitions given in ISO 80079-36,  
257 IEC 60079-0 and the following apply.

#### 258 3.1

##### 259 **constructional safety "c"**

260 ignition protection in which constructional measures are applied so as to protect against the  
261 possibility of ignition from hot surfaces, sparks and adiabatic compression generated by mov-  
262 ing parts

#### 263 3.2

##### 264 **mechanically generated sparks**

265 sparks produced by mechanical impact or friction burning particles, as well as showers of parti-  
266 cles, produced by impact or friction between two solid materials (EN 13237)

#### 267 3.3

##### 268 **control of ignition source "b"**

269 ignition protection where mechanical or electrical devices are used in conjunction with non-  
270 electrical equipment to manually or automatically reduce the likelihood of a potential ignition  
271 source from becoming an effective ignition source

272 Note 1 to entry: This might for example be a level sensor used to indicate loss of oil, a temperature sensor to  
273 indicate a hot bearing or a speed sensor to indicate over-speed.

##### 274 3.3.1

##### 275 **automatic control measure**

276 action taken without manual intervention, to reduce the likelihood of a potential ignition source  
277 from becoming an effective ignition source

##### 278 3.3.2

##### 279 **manual control measure**

280 action taken by a person as a result of a warning, indication, or alarm, to reduce the likelihood  
281 of a potential ignition source from becoming an effective ignition source

##### 282 3.3.3

##### 283 **ignition protection devices/systems**

284 arrangement that converts signals from one or more sensors into an action, or indication, to  
285 reduce the likelihood of a potential ignition source from becoming an effective ignition source

##### 286 3.3.4

##### 287 **safety devices**

288 devices intended for use inside or outside explosive atmospheres but required for or contrib-  
289 uting to the safe functioning of equipment and protective systems with respect to the risks of  
290 explosion

#### 291 3.4

##### 292 **liquid immersion "k"**

293 type of protection in which potential ignition sources are made ineffective or separated from  
294 the explosive atmosphere by either totally immersing them in a protective liquid, or by partially  
295 immersing and continuously coating their active surfaces with a protective liquid in such a way  
296 that an explosive atmosphere which may be above the liquid, or outside the equipment enclo-  
297 sure, cannot be ignited

298 **3.4.1**299 **protective liquid**

300 a liquid which prevents the explosive atmosphere from making direct contact with potential  
301 ignition sources and thereby ensures the explosive atmosphere cannot be ignited

302 **3.4.2**303 **equipment with a sealed enclosure**

304 totally enclosed equipment that limits the ingress of an external atmosphere during the ex-  
305 pansion and contraction of the internally contained protective liquid during use in service

306 Note 1 to entry: Such equipment includes any pipework associated with it and often contains an overpressure  
307 relief device.

308 **3.4.3**309 **equipment with a vented enclosure**

310 enclosed equipment that allows the ingress and egress of an external atmosphere through a  
311 breathing device or constricted opening during the expansion and contraction of the internally  
312 contained protective fluid during normal operation

313 Note 1 to entry: Such equipment includes any pipework associated with it.

314 **3.4.4**315 **open equipment**

316 equipment that is immersed, or has its components immersed, in a protective liquid that is  
317 open to the external atmosphere

318 Note 1 to entry: For example, an open top vessel with immersed moving components. Such equipment includes  
319 any pipework associated with it.

320 **4 Determination of suitability**

[https://standards.iteh.ai/catalog/standards/sist/1a6caf0c-f47f-41be-b88e-406ee868ab93/sist-](https://standards.iteh.ai/catalog/standards/sist/1a6caf0c-f47f-41be-b88e-406ee868ab93/sist-1a6caf0c-f47f-41be-b88e-406ee868ab93/sist-1a6caf0c-f47f-41be-b88e-406ee868ab93)

321 Before a decision is made to protect equipment or parts of equipment for use as an assembly,  
322 including interconnecting parts, by the measures described in this standard, it shall have been  
323 subjected to the ignition hazard assessment in accordance with ISO 80079-36.

324 **5 Requirements for equipment with type of protection constructional safety**  
325 **"c"**326 **5.1 General requirements**

327 All parts shall be capable of functioning in conformity with the operational parameters estab-  
328 lished by the manufacturer. They shall be sufficiently firm and durable to withstand the me-  
329 chanical and thermal stresses to which they are intended to be subjected.

330 This also applies to interconnecting parts of equipment including joints (e.g. cemented, sol-  
331 dered or welded joints).

332 **5.2 Ingress protection**333 **5.2.1 General**

334 The degree of ingress protection (IP) as specified in IEC 60529 provided by the outer enclo-  
335 sures of equipment depends upon its intended duty and the type of environment it is designed  
336 to be used in. An appropriate rating shall be determined as part of the ignition hazard as-  
337 sessment (see Clause 4) and if relevant for ignition protection shall be able to provide the re-  
338 quired degree of protection against the entry of foreign objects and water.

339 NOTE IP degrees of protection according to IEC 60529 are not intended to provide protection against the ingress  
340 of explosive gas atmosphere.

## 341 **5.2.2 Ingress protection in special cases**

342 The following points specify the minimum degree of protection (IP) for enclosures used in the  
343 circumstances described.

344 a) In the case of equipment intended for use in explosive gas atmospheres, where entry of  
345 foreign objects can cause ignition, but entry of dust is harmless, the required degree of  
346 protection against the entry of foreign objects shall be determined in the ignition hazard  
347 assessment and shall be at least IP20.

348 b) In the case of equipment intended for use in explosive gas atmospheres, where the entry  
349 of dusts or liquids could cause malfunction leading to an ignition source, the enclosure  
350 shall be at least IP5X for dust and IPX4 for liquids.

351 c) In the case of equipment intended for use in explosive dust atmospheres, where ingress of  
352 dust can result in an ignition source or fire, the enclosure shall be IP6X.

353 d) In the case of equipment intended for use in explosive dust atmospheres, where ingress of  
354 dust, foreign objects and liquids are not likely to cause an ignition, no enclosure is neces-  
355 sary for the purpose of ignition protection.

356 NOTE An enclosure can be required for other safety reasons, e.g. IP2X to prevent parts of the body coming into  
357 contact with rotating parts.

## 358 **5.3 Seals for moving parts**

### 359 **5.3.1 Unlubricated gaskets, seals, sleeves, bellows and diaphragms**

360 Unlubricated gaskets, seals, sleeves, bellows and diaphragms shall not become an effective  
361 ignition source, e. g. if there is a risk of mechanically generated sparks and hot surfaces  
362 which can become an effective ignition source. Light metals shall not be used for these parts  
363 in this case (see ISO 80079-36).

364 Non-metallic materials shall be resistant to distortion and degradation which would reduce the  
365 effectiveness of explosion protection within the specified lifetime of operation.

### 366 **5.3.2 Stuffing box seals (packed glands)**

367 Stuffing box seals (packed glands) shall only be used when instructions are provided by the  
368 manufacturer to limit the maximum surface temperature during operation of the gland; alter-  
369 nately an automatic means shall be provided.

### 370 **5.3.3 Lubricated seals**

371 Seals which normally require the presence of a lubricant which can be replenished to reduce  
372 the likelihood of hot surfaces occurring at their interface with equipment parts shall be de-  
373 signed to ensure the sufficient presence of lubricant or shall be protected by one of the follow-  
374 ing means:

- 375 – provision of an effective means to monitor the continued presence of the lubricant; or
- 376 – provision of a temperature detection device to warn of increasing temperatures; or
- 377 – design of the equipment to be capable of completing the 'dry run' type test, as described  
378 in Annex B, without exceeding the maximum surface temperature of the equipment and  
379 not suffering damage which would reduce the effectiveness of its ignition protection.

380 Monitoring shall be either continuous or by required appropriate inspection and examination.  
381 Where the level of lubricant cannot be easily monitored (e. g. seal containing grease) the rel-  
382 evant information shall be given in the instructions.

383 The instructions shall include details relating to the correct lubrication, monitoring and  
384 maintenance of such seals.

#### 385 **5.4 Equipment lubricants, coolants and fluids**

386 Lubricants and coolants, which are required for the prevention of incendive hot surfaces or  
387 mechanical generated sparks (see Clause 7) shall have an autoignition temperature (see  
388 IEC 60079-20-1) at least 50 K above the maximum surface temperature of the equipment  
389 where the liquid is being used.

390 NOTE IEC 60079-20-1 is under revision and is expected to be published as ISO/IEC 80079-20-1.

391 Any fluid which can be released shall not result in an effective ignition source, e. g. due to  
392 high temperature or electrostatic charging.

#### 393 **5.5 Vibration**

394 Effective ignition sources, hot surfaces or mechanically generated sparks or loss of protec-  
395 tion, caused by vibration shall be avoided. Vibration can arise from the equipment itself or  
396 from the place where it is mounted.

397 The manufacturer shall prepare any necessary installation, operation and maintenance in-  
398 structions. In particular, the instructions shall specify the correct operating speed range of the  
399 equipment in order to avoid excessive vibration.

#### 400 **5.6 Requirements for moving parts**

##### 401 **5.6.1 General**

402 The ignition hazard assessment (see Clause 4) shall identify those moving parts which could  
403 lead to the occurrence of unsafe vibration or impact or friction. Such parts shall be construct-  
404 ed in such a way so that they are unlikely to become an effective ignition source during the  
405 specified lifetime of operation of the equipment, taking the EPL into consideration in combina-  
406 tion with the instructions.

407 Where the melting point of the material used in the construction of moving parts is below the  
408 maximum surface temperature of the equipment, or is not capable of causing incendive hot  
409 surfaces or mechanical sparks, additional protective measures are not normally necessary  
410 (e.g. the provision of a low melting point sacrificial wear plate; the use of a plastic fan inside a  
411 metal housing, or a metallic fan with sacrificial non-sparking low melting point fan blade-tips).

##### 412 **5.6.2 Clearance**

413 Clearances between unlubricated moving parts and fixed parts shall be designed such that  
414 likelihood of frictional contact, able to produce an effective ignition source in the form of hot  
415 surfaces or mechanically generated sparks, is appropriate to the intended EPL.

##### 416 **5.6.3 Lubrication**

417 For moving parts needing lubrication to avoid excessive temperatures or mechanically gener-  
418 ated sparks, effective lubrication shall be ensured, e.g. by:

- 419 • an oil splash lubricator, or
- 420 • a constant oil feed by means of a reservoir, pump and perhaps an oil cooler, or
- 421 • an automatic greasing system, or
- 422 • an adequate maintenance procedure to provide for routine greasing or oil level verification  
423 by manual or visual means.



424 If the above measures do not achieve the required EPL of the equipment additional measures  
 425 to monitor adequate lubrication shall be applied, e.g. level, flow, pressure or temperature  
 426 sensor which operates an alarm or switch function before a critical lubricant condition is  
 427 reached, see Clause 6.

428 Where equipment is designed to process liquids and the presence of the process liquid is es-  
 429 sential for the purpose of lubrication, cooling, quenching, or ignition protection, or when the  
 430 safe operation of the equipment (e.g. of a pump) requires special priming considerations, this  
 431 shall be stated in the instructions.

## 432 5.7 Requirements for bearings

### 433 5.7.1 General

434 Bearings are basically divided into three types, sliding plane motion, sliding rotary motion and  
 435 rolling element. When assessing bearings, as part of the ignition hazard assessment required  
 436 by ISO 80079-36, at least the following list shall be taken into account:

- 437 a) bearing's suitability for the equipment's intended duty e.g. speed, temperature, loading  
 438 and variations of speed and loading;
- 439 b) the bearing's basic rated life as described in ISO 281 for rolling element bearings (see al-  
 440 so Note 1);
- 441 c) the proper fit of the bearings in their housing and on the shaft (tolerances, roundness and  
 442 surface quality), taking into consideration the vertical and axial loads on the bearing with  
 443 respect to shaft and housing;
- 444 d) the correct alignment of the bearings;
- 445 e) the axial and radial loading of the bearings caused by thermal expansion of the shaft and  
 446 the housing under the most severe operating conditions;
- 447 f) protection of the bearing from ingress of water and solids, if necessary to avoid premature  
 448 failure;
- 449 g) protection of the bearing from electrical currents, including stray circulating currents  
 450 (which can cause, for example, incendive sparking, or spark erosion leading to premature  
 451 failure, at the point of contact between the ball and ball race of a ball bearing);
- 452 h) the provision of adequate lubrication, according to the lubricating regime necessary for the  
 453 type of bearing (e.g. for sliding bearings, boundary lubrication, mixed film, or full film hy-  
 454 drodynamic lubrication are the most commonly used regimes);
- 455 i) maintenance at the recommended intervals;
- 456 j) replacement after unacceptable wear or at the end of its recommended life, whichever  
 457 comes first;
- 458 k) protection of the bearing from vibration, especially at standstill;
- 459 l) the use of well documented low reliability of non-metallic bearing cages in industrial appli-  
 460 cations.

461 Where a special initial running in period is necessary that could lead to an effective ignition  
 462 source, information shall be given in the instructions.

463 NOTE 1 At the present time, no suitable experimental test exists to demonstrate that a given type of bearing has  
 464 a low risk of becoming an ignition source in service. Ball and roller bearing manufacturers do, however, quote a  
 465 basic rated life corresponding to a probability of mechanical failure occurring during operation (e.g. failure by de-  
 466 formation of an element, or fatigue flaking or spalling occurring on one of its elements). This basic rating can be  
 467 used in the ignition hazard assessment in an attempt to determine the risk of bearing malfunction that might lead to  
 468 the production of an incendive hot surface or sparks. The basic rated life of a ball/roller bearing is based on the  
 469 amount of radial and axial loading that a ball/roller bearing can theoretically endure for one million revolutions. It is  
 470 usually expressed as an "L" value in terms of foreseeable lifetime operating revolutions, or foreseeable lifetime  
 471 hours of service. In an attempt to reduce the risk of malfunction in service to a minimum, it is paramount that the  
 472 equipment manufacturer pays attention to good design, the ratio of the axial and radial loadings, construction, lu-  
 473 brication, cooling, and maintenance procedures. Regular examination is also recommended during operation, in an  
 474 attempt to detect impending malfunction. If bearings act as an insulator, constructive measures should be taken, so  
 475 that the isolation of parts of the equipment is avoided (see ISO 80079-36).