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Explosive atmospheres - Part 20-2: Material characteristics - Combustible dusts test methods (ISO/DIS 80079-20-2:2014)

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Part 20-2:

Material characteristics -- Combustible dusts test methods*Atmosphères explosives —**Partie 20-2***iTeh STANDARD PREVIEW**
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This draft is submitted to a parallel enquiry in ISO and a CDV vote in the IEC.

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CONTENTS

1			
2	1	Scope	7
3	2	Normative references	7
4	3	Terms and definitions	7
5	4	Dust sample requirements	8
6	4.1	Receipt of sample for testing	8
7	4.2	Characterisation of sample	8
8	4.3	Preparation of sample	9
9	4.4	Test conditions	9
10	5	Combustible dusts and combustible flyings determination	9
11	5.1	Test sequence	9
12	5.2	Tests to determine whether material is a combustible dust or combustible	
13		flying	9
14	5.2.1	Visual inspection	9
15	5.2.2	Determine particle distribution	9
16	5.2.3	Ignition test in the Hartmann tube	10
17	5.2.4	Ignition test in the 20 litre sphere	10
18	6	Protocol for characterisation of combustible dust or combustible flying	10
19	6.1	General	10
20	7	Test methods for determination of whether a material is a combustible dust or	
21		combustible flyings	14
22	7.1	General	14
23	7.2	Modified Hartmann tube	14
24	7.2.1	Test equipment	14
25	7.2.2	Test procedure	14
26	7.3	20 litre sphere	14
27	7.3.1	Test equipment	15
28	7.3.2	Test procedure	15
29	7.4	Alternative method to 20 litre sphere for small test material quantities	16
30	7.4.1	Test equipment	16
31	7.4.2	Test procedure	16
32	8	Test methods for characterising combustible dusts – test for MIT of a dust cloud	17
33	8.1	General	17
34	8.2	GG furnace	17
35	8.2.1	Test equipment	17
36	8.2.2	Test procedure	17
37	8.2.3	Reporting of test results	17
38	8.3	BAM furnace	18
39	8.3.1	Test equipment	18
40	8.3.2	Test procedure	18
41	8.3.3	Reporting of test results	18
42	8.4	Test for MIT of dust layer	19
43	8.4.1	Heated surface	19
44	8.4.2	Dust layers	19
45	8.4.3	Dust layer temperature	19
46	8.4.4	Ambient temperature measurements	20
47	8.4.5	Method	20

48	8.4.6	Results	20
49	8.4.7	Reporting of results	21
50	8.5	Method for determining minimum ignition energy of dust/air mixtures	21
51	8.5.1	Spark generation circuit.....	21
52	8.5.2	Test vessel for determination of minimum ignition energies by an	
53		electrically generated high-voltage d.c. sparks.	22
54	8.5.3	Procedure.....	23
55	8.6	Procedure for determination of minimum ignition energies by an electrically	
56		generated high-voltage d.c. sparks.....	23
57	8.6.1	Calibration for determination of minimum ignition energies (MIE) by	
58		an electrically generated high-voltage d.c. sparks.....	24
59	8.6.2	Test report.....	24
60	8.7	Test on resistivity	24
61	8.7.1	Principle	24
62	8.7.2	Apparatus.....	24
63	8.7.3	Procedure.....	25
64	8.7.4	Acceptance criteria.....	26
65	9	Reporting of test results	26
66	Annex A (normative)	Measurement of temperature distribution on the surface of the	
67		hot plate	27
68	Annex B (informative)	Godbert-Greenwald oven (GG).....	28
69	Annex C (informative)	Examples of spark-generating systems	29
70	C.1	General.....	29
71	C.2	Triggering by auxiliary spark using three-electrode system.....	30
72	C.3	Triggering by electrode movement.....	31
73	C.4	Triggering by voltage increase (trickle-charging circuit)	31
74	C.5	Triggering by auxiliary spark, using normal two-electrode system - (trigger	
75		transformer in discharge circuit)	32
76	Annex D (Normative)	Vertical tube (modified Hartmann tube) apparatus	34
77	Annex E (Informative)	20 litre sphere	35
78	E.1	Test apparatus	35
79	Annex F (informative)	BAM oven.....	37
80	Annex G (Informative)	Data for dust explosion characteristics.....	38
81	Annex H (informative)	1 m ³ Vessel.....	39
82	H.1	Test principal	39
83	H.2	Test apparatus	39
84	H.3	Test conditions	43
85	H.4	Test procedure	43
86			
87	Figure 1 – Protocol for Characterisation of combustible dust or combustible flying		11
88	Figure 2 – Tests to define ability to form explosive dust atmosphere (combustible		
89	dust/combustible flyings)		12
90	Figure 3 – Tests to characterise combustible dust or combustible flying.....		13
91	Figure 4 – Modified Hartmann tube		22
92	Figure 5 – Measuring cell for powder resistivity.....		25
93	Figure A.1 – Typical surface temperature distribution (method A)		27
94	Figure B.1 – Vertical Cross-section through the Godbert-Greenwald Oven.....		28
95	Figure C.1 – Circuit.....		29

96	Figure C.2 – Apparatus for determining the minimum ignition energies of dust	
97	(schematic) - Triggering by auxiliary spark using three-electrode system	30
98	Figure C.3 – Apparatus for determining the minimum ignition energies of dust	
99	(schematic) – Triggering by electrode movement	31
100	Figure C.4 – Apparatus for determining the minimum ignition energies of dust	
101	(schematic) – Triggering by voltage increase	32
102	Figure C.5 – Apparatus for determining the minimum ignition energies for dust	
103	(schematic) – Trigger transformer in discharge circuit	33
104	Figure D.1 – Vertical Tube Apparatus (modified Hartmann tube)	34
105	Figure E.1 – Test equipment 20 l sphere (schematic)	35
106	Figure E.2 – Cross-sectional view of rebound nozzle	36
107	Figure E.3 – Plan view of rebound nozzle	36
108	Figure E.4 – Cross-sectional view of dispersion cup	36
109	Figure F.1 – Cross-sectional arrangement of BAM oven	37
110	Figure H.1 – 1 m ³ vessel (schematic)	40
111	Figure H.2 – Location of the 6 mm holes in the semicircular dust disperser	41
112	Figure H.3 – Rebound Nozzle	42
113	Figure H.4 – Dispersion cup	43
114	Table 1 – Example of ignition test report	21
115		

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPLOSIVE ATMOSPHERES –

Part 20-2: Material characteristics – Combustible dusts test methods

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International Standard IEC 80079-20-2 has been prepared by subcommittee 31M: Non-electrical equipment and protective systems for explosive atmospheres, of IEC 31: Equipment for explosive atmospheres.

This first edition cancels and replaces the first editions of IEC 61241-2-1, IEC 61241-2-2 and IEC 61241-2-3 combining the requirements into a single document and is considered to constitute a technical revision.

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

FDIS	Report on voting
31M/XX/FDIS	31M/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.

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

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

- 173 • reconfirmed,
- 174 • withdrawn,
- 175 • replaced by a revised edition, or
- 176 • amended.

177

178 The National Committees are requested to note that for this publication the stability date
179 is 2018

180 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE
181 DELETED AT THE PUBLICATION STAGE.

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EXPLOSIVE ATMOSPHERES –

Part 20-2: Material characteristics – Combustible dusts test methods

190 **1 Scope**

191 This standard describes the test methods for determining whether a material exhibits
192 properties to be considered to be combustible dust and for determining the characteristics of
193 combustible dusts.

194 This test method is applicable to the identification and classification of areas where explosive
195 dust atmospheres and combustible dust layers are present, in order to permit the proper
196 assessment of potential equipment ignition sources that must be used in the construction and
197 application of equipment for use in the presence of combustible dust.

198 The test methods defined do not apply to:

- 199 – recognized explosives, gunpowder, dynamite, or substances or mixtures of substances
200 which may, under some circumstances, behave in a similar manner; or
- 201 – dusts of explosives that do not require atmospheric oxygen for combustion, or to
202 pyrophoric substances

203 **2 Normative references**

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

207 ISO/IEC 80079-34, *Explosive atmospheres – Part 34: Application of quality systems for*
208 *equipment manufacture*

209 **3 Terms and definitions**

210 For the purpose of this standard the following definitions apply:

211 **3.1**

212 **combustible dust**

213 finely divided solid particles, 500 µm or less in nominal size, which may form explosive
214 mixtures with air at standard atmospheric pressure and temperatures

215 NOTE 1 to entry: This includes dust and grit as defined in ISO 4225.

216 NOTE 2 to entry: The term 'solid particles' is intended to address particles in the solid phase and not the gaseous
217 or liquid phase, but does not preclude a hollow particle.

218 **3.2**

219 **combustible flyings**

220 solid particles, including fibres, where one dimension is greater than 500 µm in nominal size,
221 which may form an explosive mixture with air at standard atmospheric pressure and
222 temperature

223 NOTE 1 to entry: One dimension has a high ratio when compared to the other two dimensions

224 NOTE 2 to entry: Examples of flyings include carbon fibre, rayon, cotton (including cotton linters and cotton waste)
225 sisal, jute, hemp, cocoa fibre, oakum and baled waste kapok.

226 **3.3**
227 **conductive dust**
228 combustible metal dusts and other combustible dusts with electrical resistivity equal to or less
229 than $1 \times 10^3 \Omega \cdot m$

230 **3.4**
231 **non-conductive dust**
232 combustible dust with electrical resistivity greater than $1 \times 10^3 \Omega \cdot m$

233 **3.5**
234 **minimum ignition temperature of a dust layer**
235 lowest temperature of a hot surface at which ignition occurs in a dust layer under specified
236 test conditions

237 **3.6**
238 **minimum ignition temperature of a dust cloud**
239 lowest temperature of a hot surface on which the most ignitable mixture of the dust with air is
240 ignited under specified test conditions

241 **4 Dust sample requirements**

242 **4.1 Receipt of sample for testing**

243 It is normal to provide a quantity of at least 0,5 kg for testing. If sample preparation is
244 required this may be insufficient. If only smaller volume of material is available then the full
245 range of testing may not be possible.

246 The applicant shall provide a material safety data sheet or equivalent with the sample.

247 The applicant shall provide the test material in suitable packaging, labelled according to
248 relevant guidelines, and appropriate transportation.

249 **4.2 Characterisation of sample**

250 The applicant shall be responsible for ensuring that the sample is representative of the
251 material as it appears in the process operated.

252 NOTE Many unit operations such as extract systems will separate dust into finer fractions than seen in the main
253 processing equipment and is accounted for when taking the sample.

254 If the applicant cannot ensure that the sample is representative then sample preparation shall
255 be carried out to apply worst case conditions as determined by the testing laboratory.

256 The applicant shall advise the condition of the sample to be tested. This shall include

257

- 258 – minimum particle size;
- 259 – median particle size;
- 260 – maximum particle size;
- 261 – particle distribution;
- 262 – moisture content; and
- 263 – method of determination (e.g. Optical methods or sieving).

264 If the applicant cannot provide usable data then this shall be determined separately.

265 Any apparent changes noted in the properties of the dust during preparation of the sample, for
266 example, by sieving or owing to temperature or humidity conditions, shall be stated in the test
267 report.

268 **4.3 Preparation of sample**

269 If it is not possible to test the sample as received, or if the sample is no longer representative
270 of the process material then it may be necessary to condition or alter the sample for testing.
271 This may include

272 – grinding/sieving;

273 – drying; and

274 – humidifying.

275 NOTE Sample preparation such as grinding and sieving, or drying can alter the material characteristics. Where
276 finer fractions are present in a facility it is appropriate to take fractions of less than 63 µm to give the most easily
277 ignitable mixtures. When the sample is a mixture of substances, the sample preparation can result in a change to
278 the sample's composition.

279 **4.4 Test conditions**

280 The tests shall be carried out at standard atmospheric temperature and pressure unless
281 otherwise specified.

282 **5 Combustible dusts and combustible flyings determination**

283 **5.1 Test sequence**

284 The sequence followed for the determination of the material properties of combustible dust
285 and combustible flyings is given in 5.2, 6 and Figure 1, Figure 2 and Figure 3.

286 NOTE Refer also to the information referenced in Annex G.

287 **5.2 Tests to determine whether material is a combustible dust or combustible flying**

288 The following is an outline of the steps that are followed in the process of making the
289 determination of whether the sample of the material being tested consists of combustible dust
290 or a combustible flying.

291 **5.2.1 Visual inspection**

292 Make a visual inspection of the test material (by microscope if necessary) to determine
293 whether the material consists of combustible flyings:

- 294 • if the material consists of combustible flyings with dust then continue to test procedure
295 in Hartmann tube to determine whether the combination of the two is combustible dust
- 296 • if the material consists only of combustible flyings then continue to test procedure in
297 Hartmann tube to determine whether it is combustible flyings

298 **5.2.2 Determine particle distribution**

299 For material which does not contain combustible flyings check the particle size distribution:

- 300 • if there are no particles below 500 µm in size then the material is not a combustible dust
- 301 • if there are any particles below 500 µm in size then continue to test procedure in
302 Hartmann tube to determine whether it is a combustible dust

303