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Pyrometric reference cones for laboratory use — Specification

Cônes pyroscopiques de référence pour emploi en laboratoire — Spécifications

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Reference number
ISO 1146:1988 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1146 was prepared by Technical Committee ISO/TC 33, *Refractories*.

It cancels and replaces ISO Recommendation R 1146 : 1969, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Pyrometric reference cones for laboratory use — Specification

1 Scope and field of application

1.1 This International Standard specifies the characteristics of a standard series of pyrometric reference cones, which are used for determining the pyrometric cone equivalent (refractoriness) of refractory materials, over the temperature range 1 500 to 1 800 °C.

1.2 The pyrometric reference cones specified in this International Standard are suitable for use in the procedure described in ISO 528, excluding determinations at 1 500 and 1 800 °C.

2 Reference

ISO 528, *Refractory products — Determination of pyrometric cone equivalent (refractoriness)*.

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 pyrometric reference cone: A blunt-tipped skew triangular pyramid with sharp edges, of specified shape and dimensions and of such composition that, when mounted and heated under specified conditions, it bends in a known manner with reference to the temperature (see 3.2).

3.2 reference temperature; temperature of collapse: The temperature at which the tip of a pyrometric reference cone reaches the level on which the base of the cone is mounted when the cone is heated at a specified rate under specified conditions.

4 Dimensions and shape of cones

4.1 The nominal dimensions of a cone shall be as shown in figure 1.

4.2 The shape of a cone shall be as indicated in figures 2 or 3.

4.3 A cone may lean in the direction of an edge, as in figure 2, or in the direction of a face, as in figure 3. The angle to the vertical to be made by the leading edge or face when the cone is mounted, shall be $8 \pm 1^\circ$.

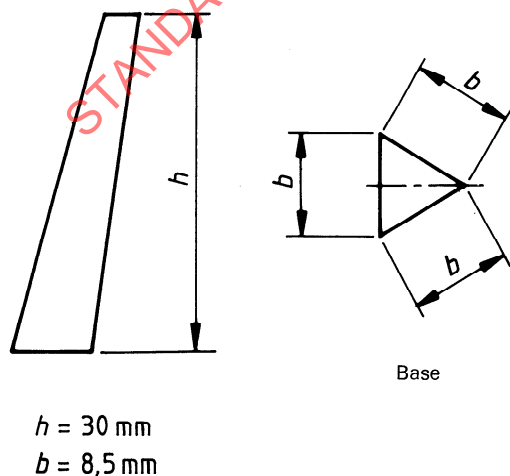


Figure 1

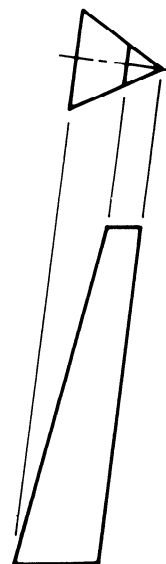


Figure 2

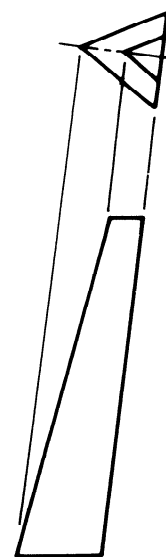


Figure 3

5 Reference temperatures

Each reference cone shall be of such composition that the temperature of collapse is one of the temperatures shown in table 1, with a tolerance of ± 5 K.

6 Rate of heating

Each pyrometric reference cone conforming to this International Standard shall be suitable for heating to its reference temperature at a rate of 2,5 K/min.

Table 1 — Reference temperatures and cone designations

Cone designation	Temperature °C	Cone designation	Temperature °C
ISO 150	1500	ISO 166	1660
ISO 152	1520	ISO 168	1680
ISO 154	1540	ISO 170	1700
ISO 156	1560	ISO 172	1720
ISO 158	1580	ISO 174	1740
ISO 160	1600	ISO 176	1760
ISO 162	1620	ISO 178	1780
ISO 164	1640	ISO 180	1800

7 Verification of temperature of collapse

The reference temperature of each batch of cones having the same nominal reference temperature shall be verified for conformity to clause 5 by carrying out the procedure specified in ISO 528 on a sample of the batch. The temperature of collapse shall be determined by a calibrated thermocouple. The sample, to be taken at random from the batch, shall consist of 2 % of the batch with a minimum of two cones.

8 Marking

Each reference cone conforming to this International Standard shall be marked with the appropriate cone designation as shown in table 1.

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Annex

Comparison of the properties of different brands of pyrometric reference cones

(This annex does not form an integral part of the Standard.)

Table 2 — Summary of reference temperatures and cone designations of ISO, Seger, Orton and H.P.C. pyrometric reference cones

Reference temperature °C	Seger	H.P.C.	Reference temperature °C	ISO	Seger	Orton	H.P.C.	Reference temperature °C	ISO	Seger	Orton	H.P.C.
605	022	022	1 315		9	—	11	1 665				
650	021	021	1 330		10	—	—	1 680	168	30	30	30
675	020	020	1 340		—	12	—	1 690		—	—	31
695	019	019	1 350		11	13	12	1 700	170	31	31½	
715	018	018						1 710		32		32
735	017	017	1 375		12	—	13					
760	016	016	1 395		13	14	—	1 720	172	32½	32½	
785	015a	015a										
815	014a	014a	1 410		14	—	14					
835	—	013a										
845	013a	—	1 430		—	15	15	1 730	—	33	—	33
855	—	012a										
880	—	011a										
890	012a	—	1 440		15	—	—	1 740	174	33½	33	—
			1 460		—	—	16					
900	011a	010a	1 470		16	—	—					
			1 480		—	—	17	1 750				34
925	010a	09a	1 490		—	16	—	1 760	176	34	34	—
940	09a	08a	1 500	150	17	—	18					
								1 770				35
965	08a	07a	1 510	—	—	17	—	1 780	178	35		
975	07a	06a	1 520	152	18	18	19	1 785			35	36
								1 800	180	36	36	
995	06a	05a	1 530	—	—	—	20					
1 010	05a	—	1 540	154	19	19	—					
1 020	—	04a										
1 040	—	03a										
1 055	04a	02a						1 820			37	37
1 070	03a	—	1 560	156	20	20	—	1 830		37		
1 080	—	01a										
1 100	02a	1a						1 835			38	
								1 850				38
1 125	01a	2a	1 580	158	26	—	26	1 860		38	39	
1 145	1a	3a	1 600	160	27	—	—					
1 165	2a	4a	1 605	—	—	23	27	1 880		39	40	39
1 185	3a	5a	1 620	162	27½	26	—					
1 200	—	6a										
1 220	4a	—						1 900		40		
			1 630	—	—	—	28	1 920				40
1 230	5a	7	1 640	164	28	27	—	1 940		41		
1 250	—	8						1 960				41
1 260	6a	—	1 646	—	—	28	29	1 970			41	
1 270	7	—						1 980		42		
1 280	—	9						2 000				42
1 295	8	10	1 660	166	29	29	—	2 015			42	

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