Designation: D 256 – 06a

Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics[1]

D 256; (ϵ)

1. Scope*

1.1 (1) (2). (3). A, C, D, E, 180 (4.)

NOTE 1 (5.)

NOTE 2

NOTE 3

NOTE 4

- Method of fabrication, including but not limited to processing technology, molding conditions, mold design, and thermal treatments;
- Method of notching;
- Speed of notching tool;
- Design of notching apparatus;
- Quality of the notch;
- Time between notching and test;
- Test specimen thickness,
- Test specimen width under notch, and
- Environmental conditioning.

1.2

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 5 180:1993

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 618

D 883

D 3641

D 4066

D 5947

E 691

2.2 *ISO Standard:*

180:1993

[1] D20 D20.10 D . 1, 2006. 2006. 1926. 2006 D 256 - 06.

[2] www. *Annual Book of ASTM Standards*

*A Summary of Changes section appears at the end of this standard.

f 3

3. Terminology

3.1 *Definitions* F D 883.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *cantilever*

3.2.2 *notch sensitivity*

4. Types of Tests

4.1 F . (6.) A

NOTE 6 B C

4.1.1 I A,

4.1.2 C A,

I

C A

I 27 J/ 0.5

. (A 4 .)

A C

I

4.1.3 D

4.1.3.1 F

. I I

f 0.03 2.5 0.001

0.100 . ,

. (5.8 22.1.)

4.1.3.2 F , *b* (22.1),

f 0.25 1.0 0.010 0.040

1.0-

. I , 0.25 0.50- 0.010

0.020- .

b,

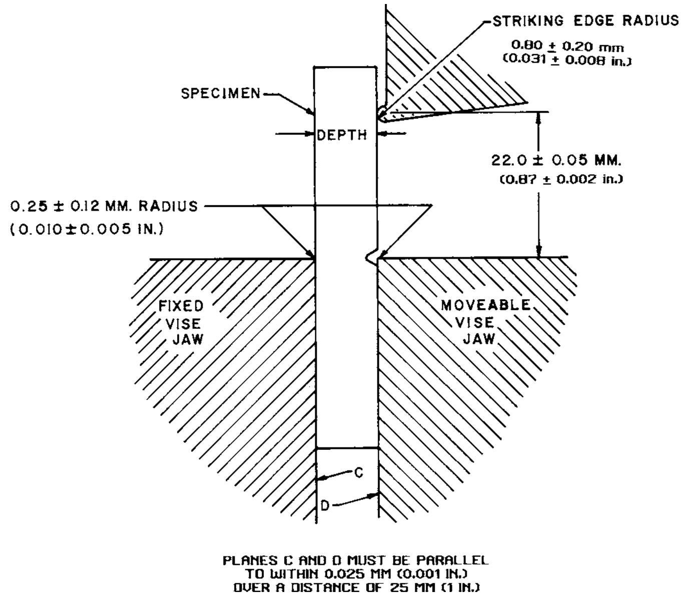


FIG. 1 Relationship of Vise, Specimen, and Striking Edge to Each Other for Izod Test Methods A and C

f *b*

b

4.2 E A,

180

. (F . 1, F . 2.) E

(28.1.)[4,5]

5. Significance and Use

5.1 B

A

. If

5.2

5.3

5.3.1 E ;

5.3.2 E ;

---

[3] A A I (A I), 25 43 ., 4 F , , 10036.

[4] A H : D20-1021.

[5] A H : D20-1026.

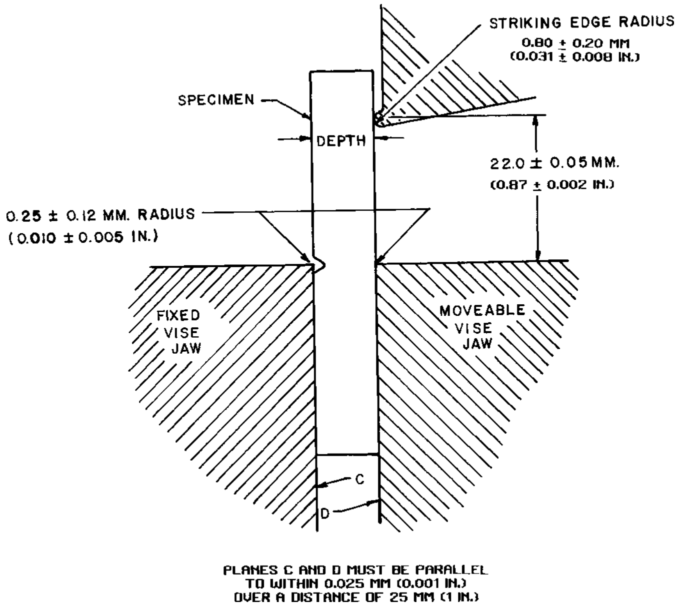


FIG. 2 Relationship of Vise, Specimen, and Striking Edge to Each Other for Test Method E

5.3.3 E w f ( ) f ( );

5.3.4 E ;

5.3.5 E ;

5.3.6 E f f ;

5.3.7 E f , w ( );

5.3.8 E f f ;

5.3.9 E f f (f) f f .

5.4 F , f w f . - w f , , f , f f 5.3.1 5.3.3. (5.3.3) f f w . C f I f 27 J/ 0.5 f f/ . . (A 4 f .) C f , - f f , f .

5.5 F , , , - - , f (5.3.2) f (5.3.1). , f (5.3.2, 5.3.5, 5.3.9) , w

w . (7.) B (5.3.4) (5.3.8) w f .

NOTE 7 A f f ff f w , f f . L f f w w . H w , , w f , w w , w .

5.6 I w - f ff , f 5.3.6 5.3.7 . (5.3.6) w w f f ff , f .

5.7 , w f f w w w , w w - , w w w w w- . w f , w , f , w , w- , w , w w w . I w f , w f ff f w .

5.8 f f f f f w :

C =	*Complete Break*—A break where the specimen separates into two or more pieces.
H =	*Hinge Break*—An incomplete break, such that one part of the specimen cannot support itself above the horizontal when the other part is held vertically (less than 90° included angle).
P =	*Partial Break*—An incomplete break that does not meet the definition for a hinge break but has fractured at least 90 % of the distance between the vertex of the notch and the opposite side.
NB =	*Non-Break*—An incomplete break where the fracture extends less than 90 % of the distance between the vertex of the notch and the opposite side.

F , f f - f - . I f w ff f f . A w f w f . ff f f f w . If f f f , w f f f , f w f

g = (w . f

), / ^{2} f / ^{2} ,

π = 3.1416 ($4\pi^2 = 39.48$),

p = , , f w (f)

20 . . . w . T

f w 5 f .

6.5 T f

f f f

610 ± 2 24.0 ± 0.1 . . T w

f f f -

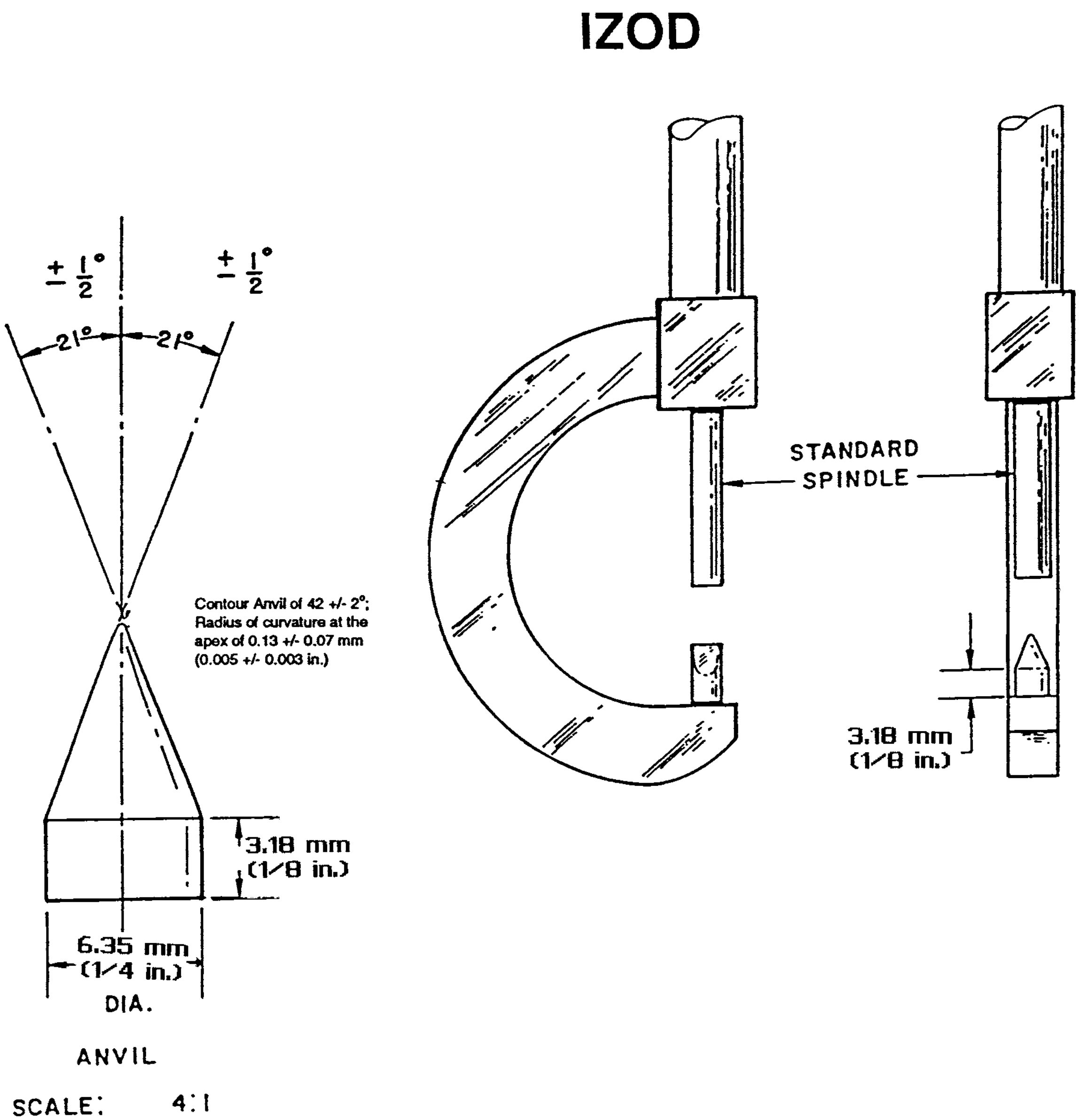
3.5 11.4 f / . (10.) T

w

w .

TE 10

V = (



TE 1 T w .
TE 2 1 - w f .
TE 3 f 0 25.4 (50.8 f) 0 1 . (2- . f) .
TE 4 A w f w .
TE 5 A . f .
TE 6 : 0 25.4 0 1 . . f .
TE 7 A . . w .

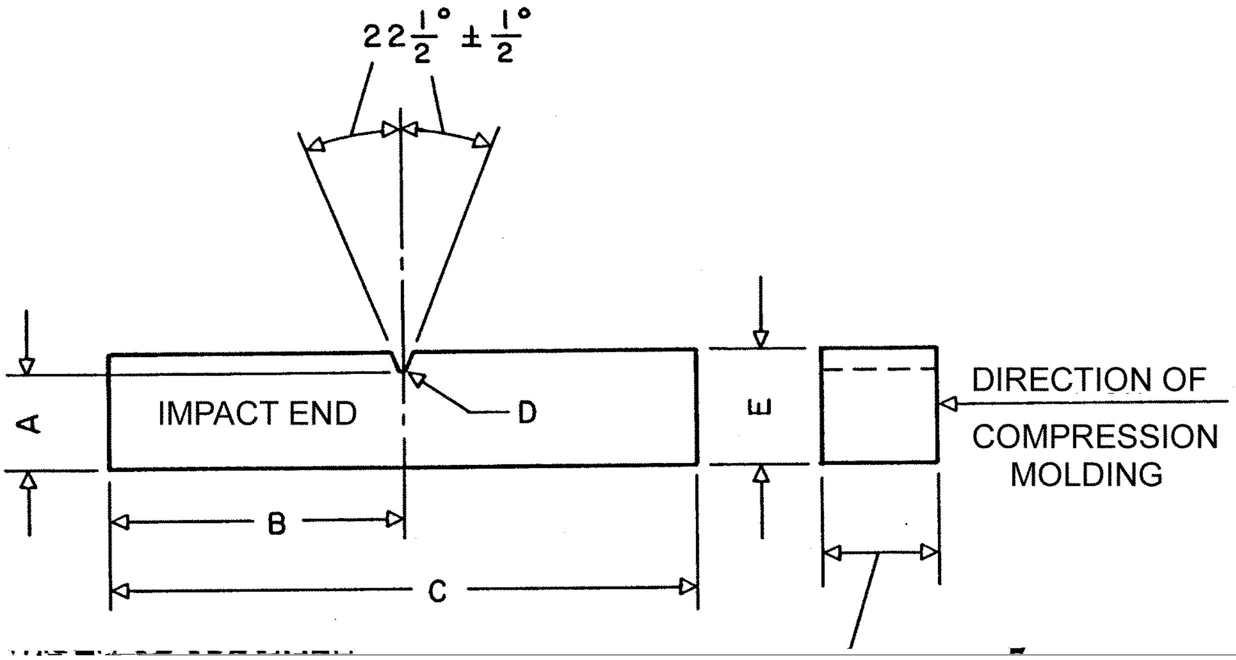
FIG. 5 Early (ca. 1970) Version of a Notch-Depth Micrometer

T f f T 1 D 5947.

7. Test Specimens

7.1 T f f F . 6, w 7.2, w F . 6 w F . 1 7.3, 7.4, 7.5. T . . F . 2. f , 8.

7.1.1 . w , f , f f ff . . T f , . w , . . f 7.2 1 w w 3.0 12.7 0.118 0.500 . . w



[redacted]

	mm	in.
A	10.16 ± 0.05	0.400 ± 0.002
B	31.8 ± 1.0	1.25 ± 0.04
C	63.5 ± 2.0	2.50 ± 0.08
D	0.25R ± 0.05	0.010R ± 0.002
E	12.70 ± 0.20	0.500 ± 0.008

FIG. 6 Dimensions of Izod-Type Test Specimen

w . A
12.7 0.500 .
. w , -
f f . (F . 6.)

NOTE 13 7.5 f
f ; -
f f f w f
I . w
f .
, f
w , f
w f f . I -
.

7.2.1 E
6.35 0.250 . w .
w
. , f ,
(11).

7.2.2 A f f
w . 6.35
0.250 . w ,
, w w . T f ,
6.35 0.250 . w -
. T f

w ', w f
f .

7.2.3 T f -
f . T f
w w
. A
f f ff
f . C
f f -
f . D 3641
f , f
f .

7.2.4 T f
ff f , ,
f . T f
w f .

7.3 F , f
w w
w . T w f
f f w 3.0
12.7 0.118 0.500 . . 12.7
w 12.7 . w
12.7- w
w f .
w , f f

7.4

7.4.1 6.35 12.7 0.250 0.500.

7.4.2 C

7.5 E (14)

NOTE 14 A 0.05 0.002. (20 30 %)

8. Notching Test Specimens

8.1 B (15). A 15 20

NOTE 15 F .7( )-

w f
500 f f
w . T ,
f , .
f f
A 1. E f
. If
f w f f
f ,
w w . (19.)

TE 19 A - -
f f .

9. Conditioning

9.1 *Conditioning* C 23 ± 2 C 73 ± 3.6 F 50 ± 5 % f
40 f w
A f D 618,
(w)
ff f f
.

9.1.1 f ,
, (f ,
D 4066) f - .
-
50 %
w -
f .

9.2 *Test Conditions* C -
f 23 ± 2 C 73 ± 3.6 F 50 ± 5 %
, w
. I f -
, ±1 C ±1.8 F ± 2 %
.

10. Procedure

10.1 A f
f
9. E f w
w (±0.13 ±0.005 .). I f
f f -
, f -
(w w f).

10.2 E f
f .
w f 85 % f (20).
C w f
f w f 6 f
. (A 1.)

TE 20 I , w
. I - , f
. F
f ff
. B 15 % ,
f w w 1.3 / 4.4 f / .
, f w f
.

10.3 If w
, f f w f
. If w
, f w f , f
w f . If f ,
f .

10.3.1 w ,
f
f w f
F A.

10.3.2 ,
. T
. (10.3.2) w
f
f F B (21).

10.3.3 w
A B .

TE 21 F B f
f w . T ff A – B
f f
. H w , w
f ,
f f w . T f ,
f f
f f -
(10.8). T A B f
f .

10.3.4 If f ,
f .

10.4 C f f w -
f 7, 8, 10.1.

10.5 w f f
0.025 0.001 .
w
f .

10.6 f
f
0.025 0.001 . . T w
. T w w
. F w f , f
, - (w) . f -
, .

10.7 (6.7)
, (11), .
f
w F . 6
.
f w
f f (
f 5.8).

10.8 w f f
f , .
(,
). If ,
A B f
A A1 A A2
. F .

10.8.1 I ... 10.2. If ... (A A1 A A2.)

10.9 D ... 10.8 ... J/ ... If ... J/ ^{2} ... 10.8 ... D A F 6. C ... (w ...) w ... (A 4.)

10.10 C ... I ... H w ... 5.8 ... A ...

11. Report

11.1 ... :

11.1.1 ... (A, C, D, E),

11.1.2 C ...

11.1.3 A ...

11.1.4 ...

11.1.5 ...

11.1.6 ...

11.1.7 ... (5.8),

11.1.8 ... J/ ...; ... J/ ^{2} ... (10.9),

11.1.9 ... 5.8,

11.1.10 ... (J/ ...) ... 5.8. (J/ ^{2} ...) (A 4),

11.1.11 ... 5.8.

TEST METHOD C—CANTILEVER BEAM TEST FOR MATERIALS OF LESS THAN 27 J/m [0.5 ft·lbf/in.]

12. Apparatus

12.1 ... 6.

13. Test Specimens

13.1 ... 7.

14. Notching Test Specimens

14.1 ... 8.

15. Conditioning

15.1 ... 9.

16. Procedure

16.1 ... 10 w ...

16.1.1 ... (w). ... A ...

17. Report

17.1 ... :

17.1.1 ... 11.1.1,

17.1.2 ... 11.1.2,

17.1.3 ... 11.1.3,

17.1.4 ... 11.1.4,

17.1.5 ... 11.1.5,

17.1.6 ... 11.1.6,

17.1.7 ... , J/ ... (5.8 ...),

17.1.8 ... 11.1.8,

17.1.9 ... 11.1.9,

17.1.10 ... 11.1.10,

17.1.11 ... 11.1.11.

17.1.12 ... (J) ...

17.1.13 ... I ... I ...

TEST METHOD D—NOTCH RADIUS SENSITIVITY TEST

18. Apparatus

18.1 T .
6.

19. Test Specimens

19.1 T
7. A . f w ,
f 6.35- 0.25- . .

20. Notching Test Specimens

20.1 8
F . 6, w
. f 0.25 0.010 . w .
f 1.0 0.040 . .

21. Conditioning

21.1
w 9.

22. Procedure

22.1 w 10,
f . .

22.2 T f .
. , w . f
. . C, H, C H, .

22.3 If w 0.25- 0.010- . .
, .

22.4 If f w 1.0-
0.040- . . f B, - ,
. . w .
. A w f .
f , . 0.50- 0.020- .
. . f 22.1 22.2 .

23. Calculation

23.1 C . f . f
f 0.25 1.0- 0.010
0.040- . . f w .
(If 0.500- 0.020- . . . . , .
. .)

$$b = (E_2 - E_1)/(R_2 - R_1)$$

w :

E_2 = f , J/ f
,

E_1 = f , J/
f ,

R_2 = . f , ,

R_1 = . f , .

E :

$$E_{1.0} = 330.95 \text{ J/} \; ; E_{0.25} = 138.78 \text{ J/}$$

$$b = (330.95 - 138.78 \text{ J/})/(1.00 - 0.25)$$

$$b = 192.17 \text{ J/} \; 0.75$$

$$= 256.23 \text{ J/}$$

f f .

24. Report

24.1 f w f :

24.1.1 11.1.1,

24.1.2 11.1.2,

24.1.3 11.1.3,

24.1.4 11.1.4,

24.1.5 11.1.5,

24.1.6 11.1.6,

24.1.7 T , J/
f f/ . (5.8 f f .),

24.1.8 11.1.8,

24.1.9 11.1.9,

24.1.10 11.1.10,

24.1.11 11.1.11.

24.1.12 . f b w . ,
I f 0.25- 0.010- .
.

TEST METHOD E—CANTILEVER BEAM REVERSED NOTCH TEST

25. Apparatus

25.1 T .
6.

26. Test Specimens

26.1 T
7.

27. Notching Test Specimens

27.1 w 8.

28. Conditioning

28.1
w 9.

29. Procedure

29.1 w 10,
f
, .
. (F . 2 22,
23, 24).

TE 22 T 0.25- 0.010-
. f .
. f f
. . 10.2 ± 0.05- 0.400 ± 0.002- .
f f
. (T A C).

TE 23 . w
w .
10.2- 0.400- . . . F ,
ff f ff f w
. , . ff
f ,
. .

TE 24 . f , .
f . , f
. f I ; ,
f w.

TABLE 1 Precision Data, Test Method A—Notched Izod

NOTE 1 . f f/ . f w J/ f w .
NOTE 2 F 10.

Material	Average	S_r[A]	S_R[B]	I_r[C]	I_R[D]	Number of Laboratories
Phenolic	0.57 [30.4]	0.024 [1.3]	0.076 [4.1]	0.06 [3.2]	0.21 [11.2]	19
Acetal	1.45 [77.4]	0.075 [4.0]	0.604 [32.3]	0.21 [11.2]	1.70 [90.8]	9
Reinforced nylon	1.98 [105.7]	0.083 [4.4]	0.245 [13.1]	0.23 [12.3]	0.69 [36.8]	15
Polypropylene	2.66 [142.0]	0.154 [8.2]	0.573 [30.6]	0.43 [23.0]	1.62 [86.5]	24
ABS	10.80 [576.7]	0.136 [7.3]	0.585 [31.2]	0.38 [20.3]	1.65 [88.1]	25
Polycarbonate	16.40 [875.8]	0.295 [15.8]	1.056 [56.4]	0.83 [44.3]	2.98 [159.1]	25

[A] S_r = within-laboratory standard deviation of the average.
[B] S_R = between-laboratories standard deviation of the average.
[C] $I_r = 2.83\ S_r$.
[D] $I_R = 2.83\ S_R$.

30. Report

30.1 f w f :
30.1.1 11.1.1,
30.1.2 11.1.2,
30.1.3 11.1.3,
30.1.4 11.1.4,
30.1.5 11.1.5,
30.1.6 11.1.6,
30.1.7 , J/ f f/ . (5.8 f f .),
30.1.8 11.1.8,
30.1.9 11.1.9,
30.1.10 11.1.10,
30.1.11 11.1.11.

31. Precision and Bias

31.1 1 2 [7] w E 691. F , w . , f . E . 1 2 f . f . I . , , f .

31.2 3 [5] . F , w . , w . 3 f . f . I . , f .

31.3 *Concept of I and I* If S_r S_R . f . f , f w f . (**Warning—** f w- f I_r I_R (31.3-31.3.3) f w f f . 1-3 . . f , . f , , , . f . E 691 - , w . f 31.3-31.3.3 w . f .)

31.3.1 *Repeatability, I (Comparing Two Test Results for the Same Material, Obtained by the Same Operator Using the Same Equipment on the Same Day)* w . . . f ff I_r . f .

31.3.2 *Reproducibility, I (Comparing Two Test Results for the Same Material, Obtained by Different Operators Using Different Equipment on Different Days)* w . . . f ff I_R . f .

31.3.3 A . w 31.3.1 31.3.2 w . 95 % (0.95) f .

31.4 *Bias* w f .

NOTE 25 . . . f . - 1973.[7] C . , w . f . f f .

32. Keywords

32.1 ; I ; ; ;

[7] . f A H . . . : D20-1034.

TABLE 2 Precision Data, Test Method C—Notched Izod

NOTE 1 f f/ . f w J/ f w .
NOTE 2 F 10.

Material	Average	S_r[A]	S_R[B]	I_r[C]	I_R[D]	Number of Laboratories
Phenolic	0.45 [24.0]	0.038 [2.0]	0.129 [6.9]	0.10 [5.3]	0.36 [19.2]	15

[A] S_r = within-laboratory standard deviation of the average.
[B] S_R = between-laboratories standard deviation of the average.
[C] I_r = 2.83 S_r.
[D] I_R = 2.83 S_R.

TABLE 3 Precision Data, Test Method E—Reversed Notch Izod

NOTE 1 f f/ . f w J/ f w .
NOTE 2 F 8.

Material	Average	S_r[A]	S_R[B]	I_r[C]	I_R[D]
Acrylic sheet, unmodified	3.02 [161.3]	0.243 [13.0]	0.525 [28.0]	0.68 [36.3]	0.71 [37.9]
Premix molding compounds laminate	6.11 [326.3]	0.767 [41.0]	0.786 [42.0]	2.17 [115.9]	2.22 [118.5]
acrylic, injection molded	10.33 [551.6]	0.878 [46.9]	1.276 [68.1]	2.49 [133.0]	3.61 [192.8]
compound (SMC) laminate	11.00 [587.4]	0.719 [38.4]	0.785 [41.9]	2.03 [108.4]	2.22 [118.5]
Preformed mat laminate	19.43 [1037.6]	0.960 [51.3]	1.618 [86.4]	2.72 [145.2]	4.58 [244.6]

[A] S_r = within-laboratory standard deviation of the average.
[B] S_R = between-laboratories standard deviation of the average.
[C] I_r = 2.83 S_r.
[D] I_R = 2.83 S_R.

ANNEXES

(Mandatory Information)

A1. INSTRUCTIONS FOR THE CONSTRUCTION OF A WINDAGE AND FRICTION CORRECTION CHART

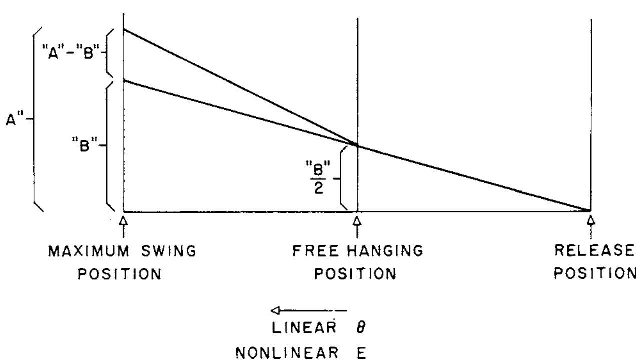


FIG. A1.1 Method of Construction of a Windage and Friction Correction Chart

A1.1 T f f w w . F . A1.1 w f w . T - f f f F . A1.1. T w f f - f . T *A* *B* 10.3.

A1.2 f (F . A1.2) ff f f f

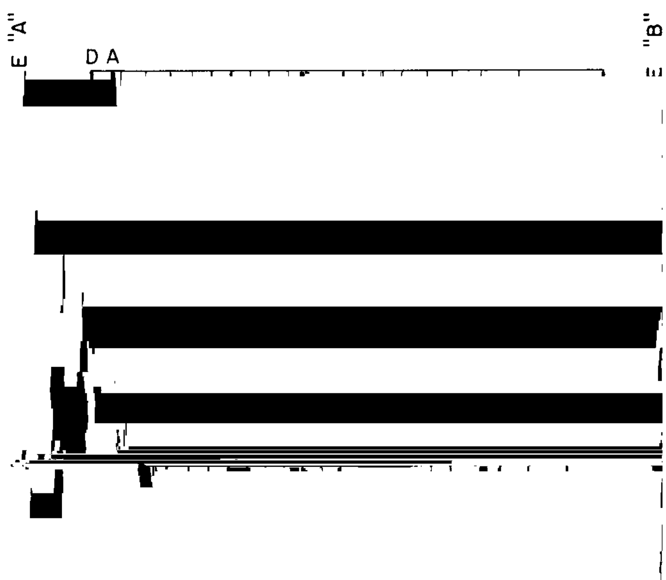


FIG. A1.2 Sample Windage and Friction Correction Chart

f w f . F , f f f w f . T f C. A , f f

. C w

.

A1.3 - B
w
f w .

A1.4 f D
f 1.2
B, w
f B.

A1.5 A D w A f
f w f
D C.
f A
D.

A1.6 *Instructions for Using Chart:*

A1.6.1 L A A
f f w f w -
f
.

A1.6.2 L B B
f f w w
f
w 10.3.

A1.6.3 C w
.

A1.6.4 F C
f
f w f f D.

A1.6.5 f
.

A2. PROCEDURE FOR THE CALCULATION OF WINDAGE AND FRICTION CORRECTION

A2.1 f f w
f
A 3.
f
A A1
.

A2.2 C L, f f
f 6.3. (I
f
f .)

A2.3 , h_M, f f
(f) f f
2.16.

A2.4 , E_A, f
w f f , -
w w f w
.
, E_M, f .

A2.5 f -
A2.4, , E_B, f -
w f w f
w .

A2.6 C β f w:

$$\beta = {}^{-1}\{1 - (h_M/L)(1 - E_A/E_M)]\}$$

w :

E_A = f w f
f , J f f ,

E_M = f - f , J f f ,

L = f f f f
, f ,

h_M = f f f
f , f ,

β = w w
w f .

A2.7 , E_s, J f f .

A2.8 C β f E_s :

$$\beta = {}^{-1}\{1 - (h_M/L)(1 - E_s/E_M)]\}$$

w :

β = f ,

E_s = f , J f f .

A2.9 C , E_{TC}, :

$$E_{TC} = (E_A - (E_B/2))(\beta/\beta_{max}) + (E_B/^2)$$

w :

E_{TC} = f , E_s,
f , J f f ,

E_B = f w f , J
f f .

A2.10 C f w
f :

$$I_s = (E_s - E_{TC})/t$$

w :

I_s = f , J/ f f/ . f w ,

t = w f w f , . .

APPENDIXES

(Nonmandatory Information)

X1. PROCEDURE FOR THE INSPECTION AND VERIFICATION OF NOTCH

1.1 f f f . f .

1.1 f 0.25 ± 0.05 0.010 ± 0.002 . f 45 ± 1 .

1.2 *Apparatus:*

1.2.1 *Optical Device* w f 60×, F .

1.2.2 *Transparent Template*, (w).

1.2.3 *Ruler*.

1.2.4 *Compass*.

1.2.5 *Plastic 45°–45°–90° Drafting Set Squares (Triangles)*.

1.3 A f f . I f . I f w ff w .

1.3.1 f w f 60×.

1.3.2 F - f . F f F .

1.3.3 f F (F . 1.1).

1.3.4 C w F . 1.2.

1.3.4.1 F f f .

1.3.4.2 D w f .

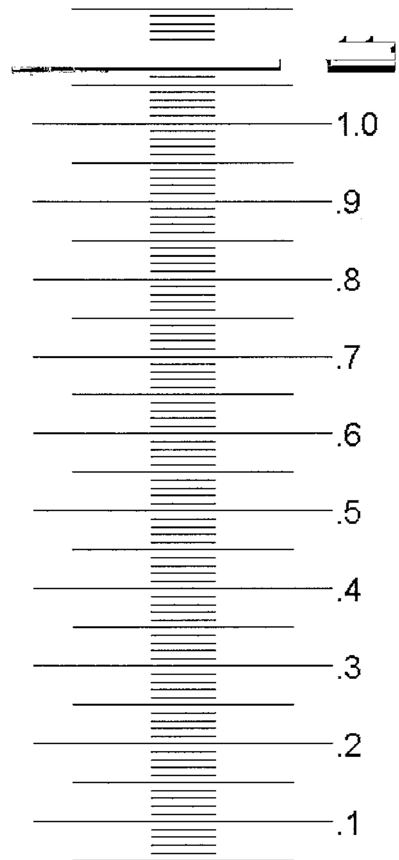
1.3.4.3 D w f f f F .

1.3.4.4 f 0.1 0.004 . f f F . 0.02 0.001 . , w 0.4 0.016 . f .

1.3.5 w f .

1.3.6 C , F . 1.3 f . D w . L (0). D w . L 90 . F w 44 0 . L 44 . D w 46 . L 46 .

1.4 f . f . F f



1 100× f .
2 0.1 ; 0.01 .

FIG. X1.1 Filar Scale

, f w . f .

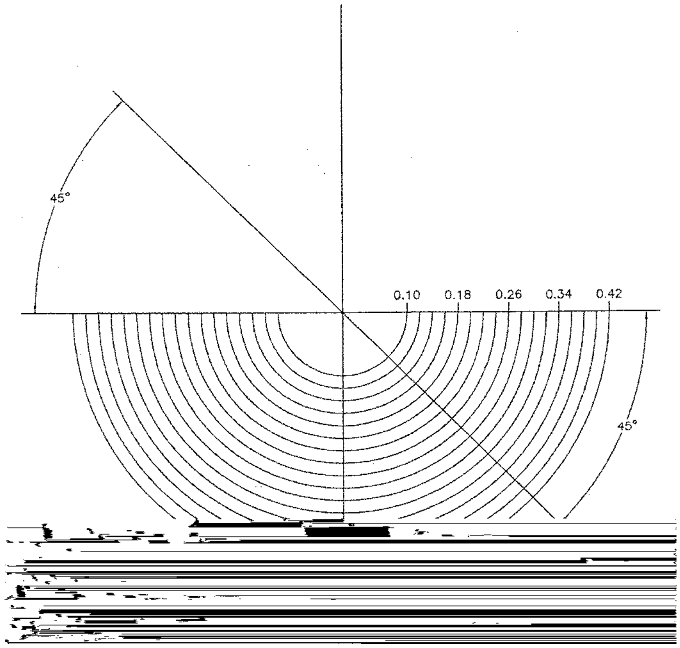
1.4.1 *Determination of Notching Radius* (F . 1.4):

1.4.1.1 f . f f w w 64 2.5 . f f . w .

1.4.1.2 D w w f w w I (F . 1.4).

1.4.1.3 51 2 . . I f , w w f (F . 1.4). 1 1 .

1.4.1.4 C 38 1.5 . . 1 f w (2) , w (2) w 2



NE 1 = 100×.

FIG. X1.2 Example of Transparent Template for Determining Radius of Notch

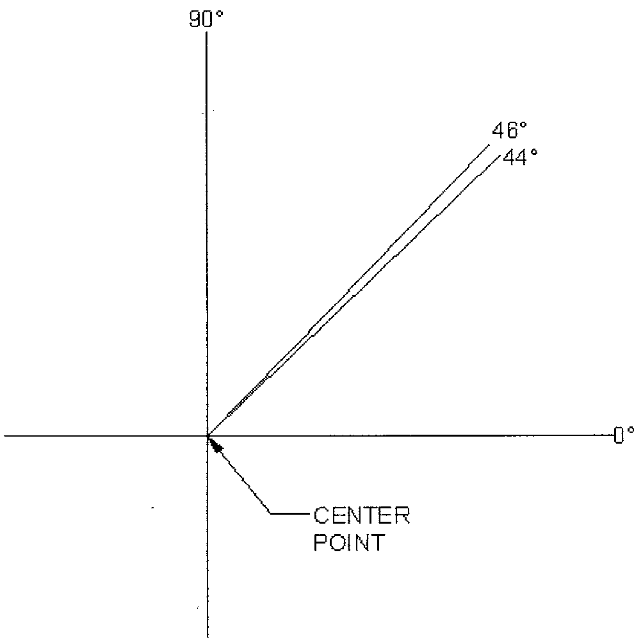


FIG. X1.3 Example of Transparent Template for Determining Angle of Notch

J. D w w *I* *J.*
f (F . 1.4).

1.4.1.5 f
f w w
f (F . 1.4).

1.4.1.6 w f
f .

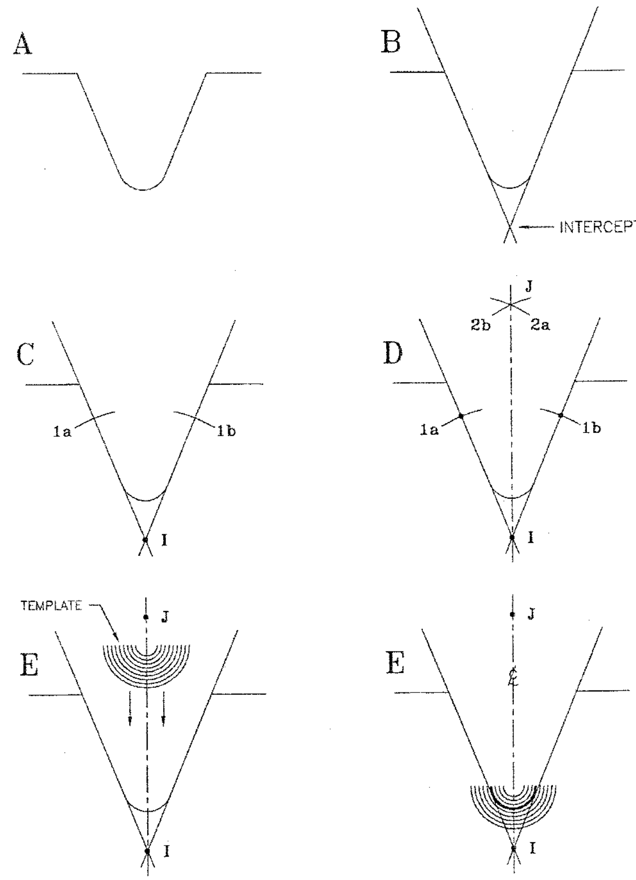


FIG. X1.4 Determination of Notching Radius

f
A f 0.2 0.3 0.008 0.012 . .

1.4.1.7 E
. .

1.4.2 *Determination of Notch Angle*:

1.4.2.1 f
(F . 1.3) f
f .
w . . f f
I 0 f w
f . C f
f f w
44 46 . If , .

1.5 A f 500
f
- f .

1.6 If w
, . f
f
. If A .
w , w w w
f
.

1.7 I

. If . w .
(. f)
f .

X2. CALIBRATION OF PENDULUM-TYPE HAMMER IMPACT MACHINES FOR USE WITH PLASTIC SPECIMENS

X2.1 T . I . H w , . f . C w .

X2.2 L . . I w - . L f f w . I f 23 f . 2.7 J 2 f f .

X2.3 C f f w . , , f f f . f , w . . T w 1 0.001 f w w 1 0.002 . w .

X2.4 . , f w w. I . f w w 0.08 0.003 . .

X2.5 C . f . f . . (0.80 ± 0.20) (6.3).

X2.6 C f f . . w 0.40 0.016 . f f . . f , . . f w w .

X2.7 C . . f w 1.2 0.05 . w w f . A w . . w - w . . . .

X2.8 I w 12.7- 0.500- . . , w 0.025 0.001 . f 60 2.4 . . C f w 1 0.005 w , . . , f , f f . . w , . . f . F . f . . w , f f - f f f . . If - . , . . f . f .

X2.9 I X2.8 f w f . f f . . w . . T . w f . If , . . f . . If . , . If . , . f w . f f .

X2.10 C f f f f w 1 0.002 w , . . .

X2.11 . f X2.8 f f , f f f . f . f f , . ' . . T f f . 22 ± 0.05 0.87 ± 0.002 . . C w , , f .

X2.12 . . f w , . w 0.2 % f f .

X2.13 I f X2.8 . w , . w 0.2 % f f .

X2.14 w . . . w . A w f f . . w f f w ff w f . . . T ff . . w . w 0.4 % f . w f . . . If w . , w w . ff f . . I w f f ff w f . . . f f . . .

X2.15 C . ff f . . , f . f f , . 9. T ff . w 6.6.

X3. DERIVATION OF PENDULUM IMPACT CORRECTION EQUATIONS

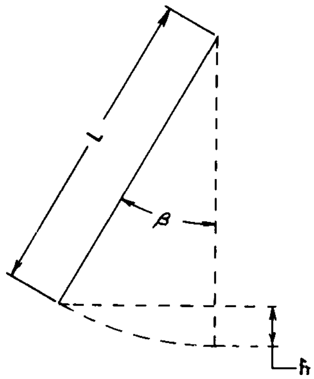


FIG. X3.1 Swing of Pendulum from Its Rest Position

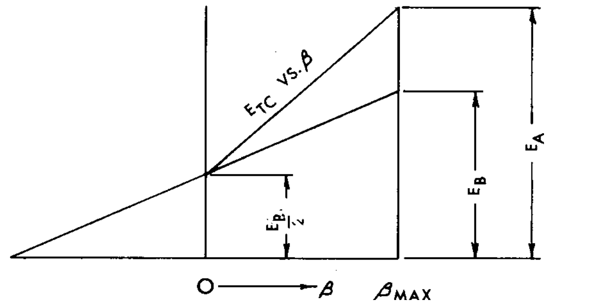


FIG. X3.2 Total Energy Correction for Pendulum Windage and Dial Friction as a Function of Pendulum Position

X3.1 F F . X3.1:

$$L - h = L \quad β \quad (X3.1)$$

X3.2 B. f . . E_p :

$$E_p = hW_pg \quad (X3.2)$$

X3.3 C E X3.1 E X3.2 f w :

$$L - E_p/W_pg = L \quad β \quad (X3.3)$$

X3.4 T . f . . f , E_M,

$$E_M = h_MW_pg \quad (X3.4)$$

X3.5 T . . , E_p, f f , E_s, f w . :

$$E_M - E_s = E_p \quad (X3.5)$$

X3.6 C E X3.3-X3.5 f w :

$$(E_M - E_s)/E_M = L/h_M (1 - \quad β) \quad (X3.6)$$

X3.7 E X3.6 f β f w :

$$β = \quad ^{1}\{1 - (h_M/L)(1 - E_s/E_M)\} \quad (X3.7)$$

X3.8 F F . X3.2, E_{TC} :

$$E_{TC} = mβ + b \quad (X3.8)$$

X3.9 B. f . . :

$$E_B/2 = m(0) + b \quad (X3.9)$$

:

$$b = E_B/2 \quad (X3.10)$$

X3.10 T , E_A, w f . . . . . , β . . . E X3.8 f w :

$$E_A = mβ_{max} + (E_B/2) \quad (X3.11)$$

X3.11 C E X3.8 E X3.11 f w- :

$$E_{TC} = (E_A - (E_B/2))(β/β \quad) + (E_B/2) \quad (X3.12)$$

X3.12 *Nomenclature:*

b = f ,
E_A = , . . . w - . f , J,
E_B = f . . w , J,
E_M = . f . . (f), J,
E_p = f . . f . - . , J,
E_s = . f , J,
E_{TC} = f , E_s, J,
g = f , / 2,
h = f f . . - f f . . , ,
h_M = . f f f . . , ,
m = f ,
L = f f . f f - . . , ,
W_p = w f . . , X2.14, ,
β = f . . f . . .

X4. UNIT CONVERSIONS

4.1 J (J/) J/ ^{2}. f J/ ^{2} f f/ .^{2} ; f , - .

4.2 T f w :

4.2.1 *Example 1*:

1 ft·lbf/39.37 in.	= 1.356 J/m
1 ft·lbf/in.	= (39.37)(1.356) J/m
1 ft·lbf/in.	= 53.4 J/m
1 ft·lbf/in.	= 0.0534 kJ/m

4.2.2 *Example 2:*

1 ft·lbf/1550 in.^{2}	= 1.356 J/m^2
1 ft·lbf/in.^{2}	= (1550)(1.356) J/m^2
1 ft·lbf/in.^{2}	= 2101 J/m^2
1 ft·lbf/in.^{2}	= 2.1 kJ/m^2

SUMMARY OF CHANGES

C D20 f , D 256 - 06, f . (D 1, 2006)

(*1*) 8.6 f f w f f .

C D20 f , D 256 - 05 , f . 15, 2006)

(*1*) 6.10, 10.3, 10.3.4.

(2) E F . 6.

C D20 f , D 256 - 05, f . (1, 2005)

(*1*) 5.2, 5.3.7, 6.1, 6.10, 6.11, 10.3.1, 10.7, 21.

(2) E 1.1 f 1 2.

C D20 f , D 256 - 04, f . (J 1, 2005.)

(*1*) 7.2.

(2) A 13.