

납착강도 충격시험 평가법에 관한 연구

동우대학 치기공과

=Abstract=

A Research on Evaluation Methods of Testing Impact of the Strength of Soldering

Kim, Sa Hak

Dept. of Dental Laboratory Technology, Dong-U College

So far, I conducted an examination with focus on the type, characteristic, and test methods of impact test, which is a type of mechanical that evaluate materials.

As mentioned previously, in testing soldering strength of soldering is the load when the object under experiment is broken down with the result of flexibility test or peel test. In this method, a heavy load is necessary until alloy of parent metal is bended, if the alloy of the parent metal has a large mechanical quality(peel strength or resisting power). Once the alloy of the parent metal is bended, however, it tends to come into pieces abruptly from the part where soldered. Therefore, a metal has a high breakdown value if the degree of strength of its parent metal is high even if the result of measurement indicates otherwise. Thus, the result of the test did not correspond to the clinical result. Therefore, this study concludes as the following from a test of strength of soldering by mean of conducting an impact test, which is a type of mechanical evaluation methods :

1. Among various impact tests, a charpy type is more appropriate than the izod type in testing strength of soldering.
2. As far as test piece is concerned, to use subsized impact test piece is appropriate in the impact test in that it does not have notch.
3. In the matter of analysis, it is appropriate to measure absorbing energy which results from rupture of test piece.

목 차

. 序 論	(,)
. 試驗方法	가
1. Charpy 衝擊試驗	
2. Izod 衝擊試驗	
3. 低溫 高溫 衝擊試驗	가
4. 衝擊試驗 注意事項	가 가
5. 試驗機 矯正 精密正確度 管理	
. 分析方法	
1. 吸收 測定	가
2. 波面 遷移溫度	
3. 橫膨脹	가
. 最近 研究動向	Charpy
1. 自動記錄形 衝擊試驗 (Instrumented impact test)	
2. 小型 衝擊試驗	가
. 結 論	charpy

I. 序 論

가	가 (Single Blow) 가
가	가
가	가 Charpy Izod
가	가
가	가
가	가 Ryge
Stackhouse	가, O brien
가	가, El-ebrashi
Walter Preston	가
가	가 Stade Rasmussen
가	가 Staffanou Sloan

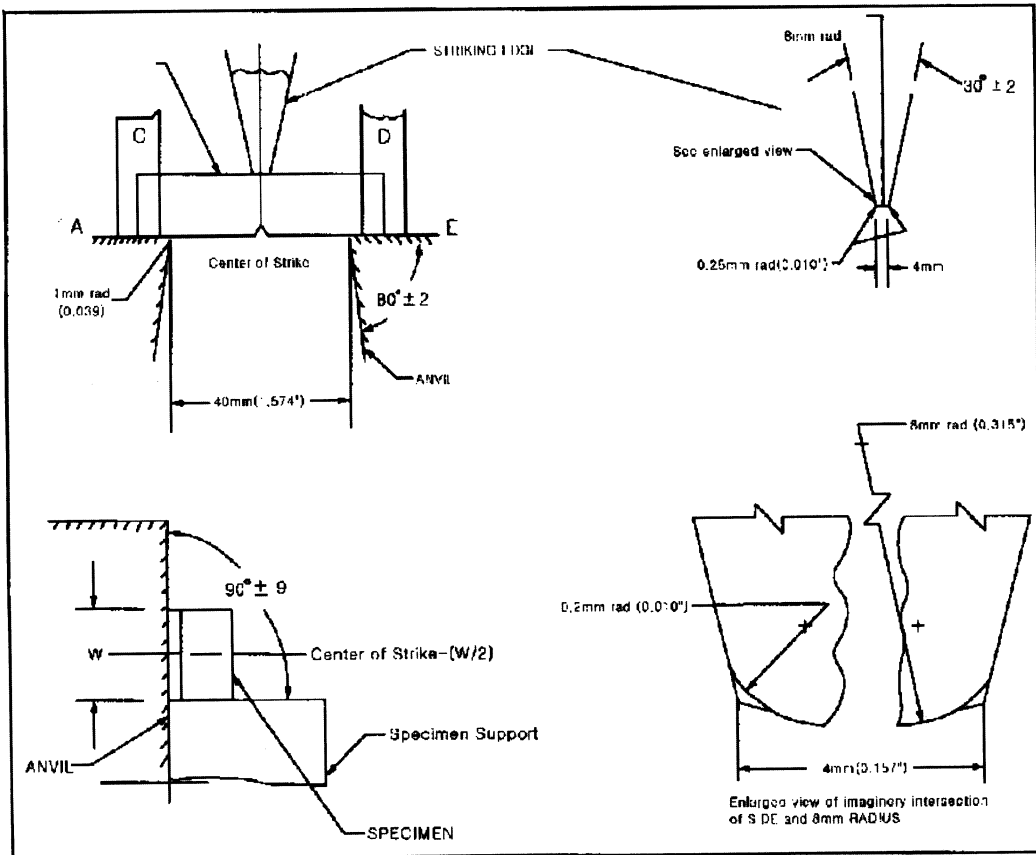
II. 試驗方法

1. Charpy 衝擊試驗	가
----------------	---

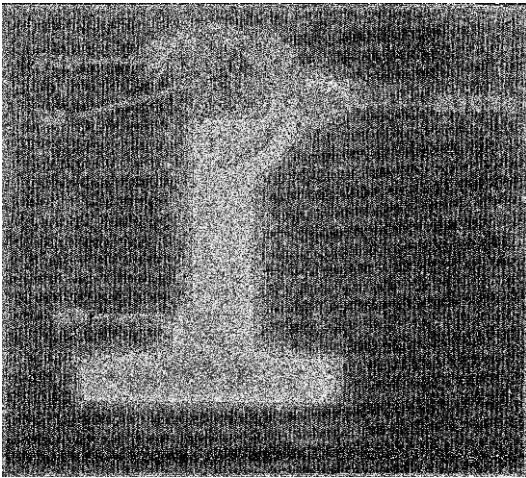
Charpy

5 ~ 5.5m/s가

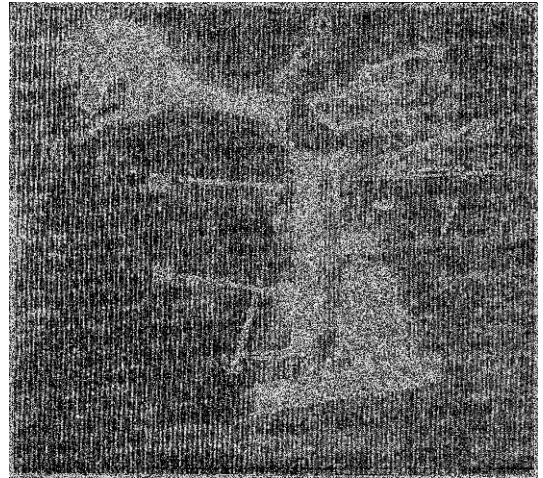
가 (1) pendulum
 , (2) 가 (3) dms
 30kg-m 75kg-m, (4) 가
 3kg-m 0.5kg-m , (5)
 (1) Charpy U 가 (1) C 가 (6)
 C 가 (2, 3) , U 가 (7)
 (tub)가 , U 가
 (8)



1. Charpy striking tup



2. U Charpy



3. C Charpy

(2)
Charpy

가

V

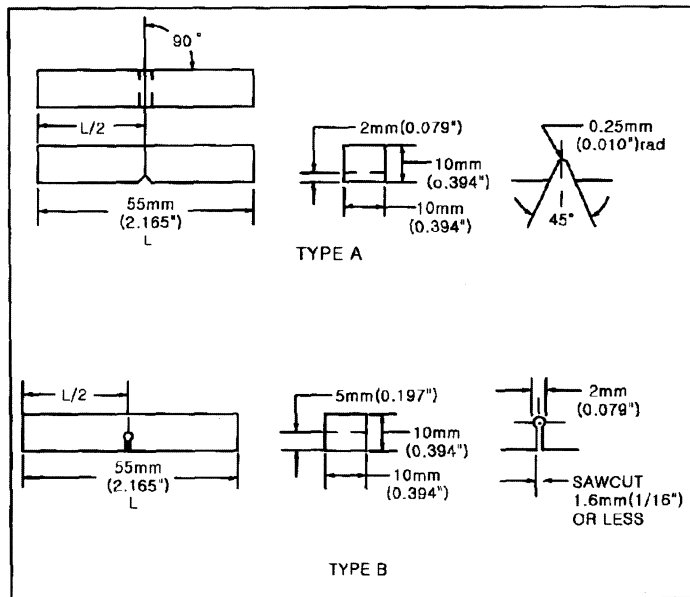
,

가

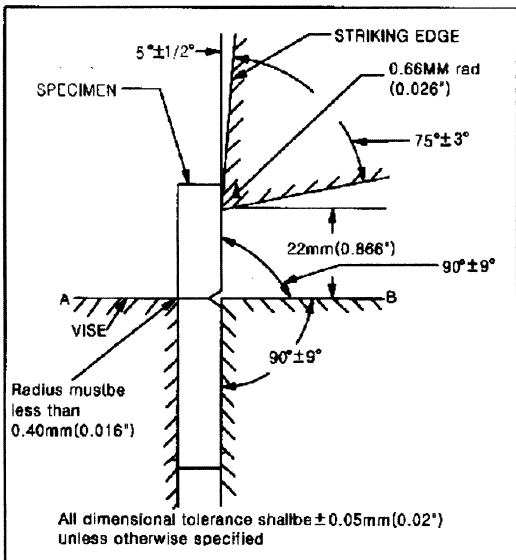
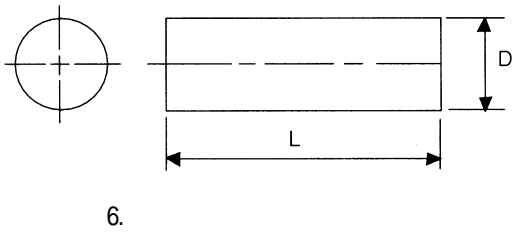
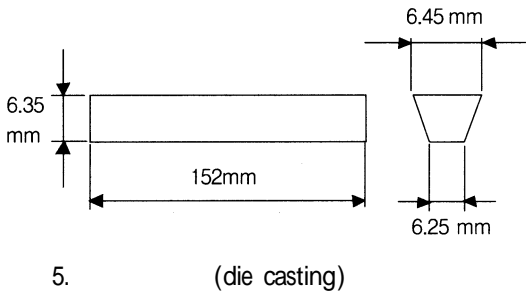
(5, 6)

(4)

(die casting)



4. Charpy impact test specimens, type A, B, C

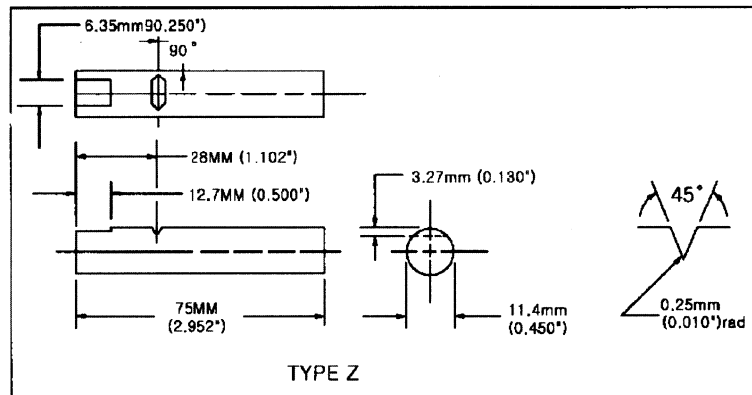
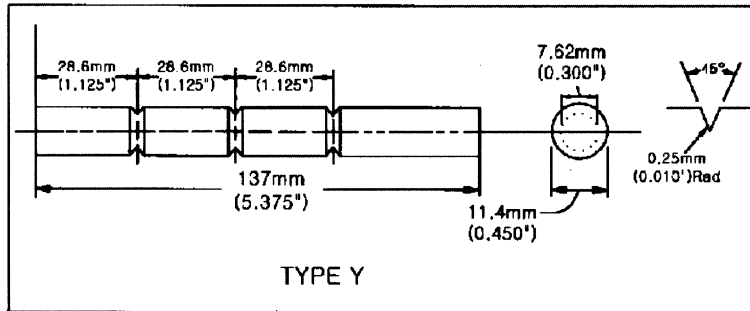
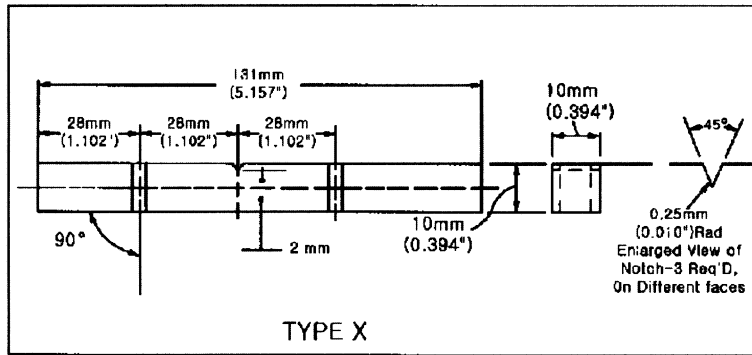


2. Izod 衝擊試驗

Izod Charpy
 가 .
 가 22mm
 Charpy 1
 Charpy (kg-m) .(
 7) Izod ,
 가 . Izod
 가 Charpy 가
 Charpy 10mm
 가 . (8)

3. 低溫 및 高溫에서의 衝擊試驗

25cm 가 .
 200 ±2
 10 , 200
 가 20 ±5
 5
 가 가
 가 가
 가 가



8. Izod impact test specimens, type X, Y, Z

시험온도	매체
500℃ ~ 200℃	기체(가열로 사용)
200℃ ~ 상온	고온유(오일탱크)
0℃	얼음과 물
0℃ ~ -70℃	드라이 아이스로 냉각된 알코올이나 아세톤
-70℃ ~ -155℃	액체질소로 냉각된 이소펜탈
-196℃	액체질소

4. 衝擊試驗시 注意事項

III. 分析方法

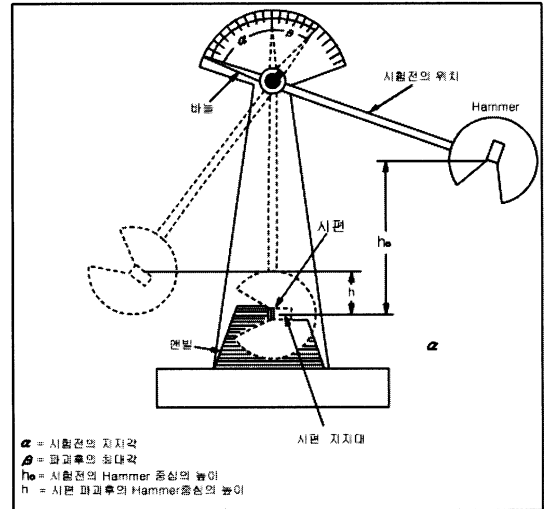
1. 吸收에너지 測定(그림 9)

가

가

가

5. 試驗機의 矯正과 精密正確度 管理



9.

Charpy

3 1

가

MTL(Army Materials & Mechanics Reserch Center: AMMRC)

W(kg)

가

R(m)

가

E(kg·m)

가

L

$$E = WR(\cos \alpha - \cos \alpha_0) - L \quad \text{----- (1)}$$

E Charpy

(kg · m/

(가)

()

()

()

()

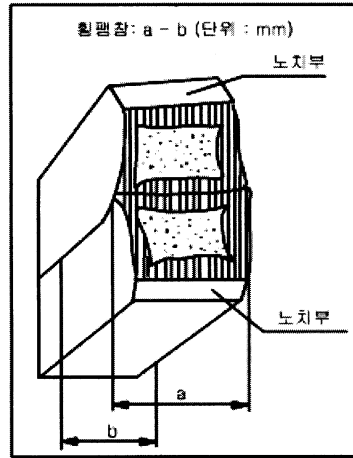
cm²) Charpy

가

$$L = WR(\cos \theta_1 - \cos \theta_2 - \cos \theta_3 - \cos \theta_4) / 2 \quad \text{----- (2)}$$

$$1/4 \quad L$$

$$L = WR[\cos(\theta_1 + \theta_2) - \cos(\theta_3 - \theta_4)] \quad \text{----- (3)}$$



10.

가 .

가

E

2. 波面 및 에너지 遷移溫度

1/2

shelf

energy 1/2

3. 橫膨脹

()

)

b

가

a

(dynamic yield strength)

.(

가

10)

IV. 最近 研究動向

1. 自動記錄形 衝擊試驗(Instrumented impact test)

가

가

(Instrument impact test) notched bar
(notched bar impact test)

가 Charpy

가

(dynamic fracture behavior)

(dynamic

가

Instrumented impact test
dynamic fracture toughness(KID), dynamic
J-integral(JID)

가

가

2mm
6kgf/cm가
15kgf/cm²가

5mm,

가

potentiometer

V. 結論

가

1000m/sec

가

가

(

2. 小型시편을 이용한 衝擊試驗

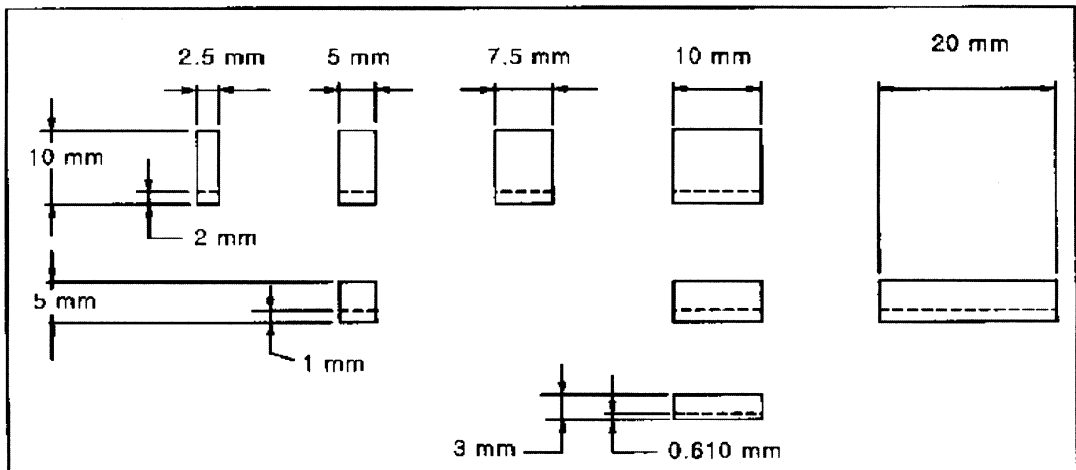
(Subsize)

가

가

가

(11)



11. (subsize)

1. Chapy Izod
2. 가 (subsize)
- 3.

참 고 문 헌

1. Blustein, R., et al. : A reliable technique of post soldering of nonprecious ceramic units, J. Prosthet. Dent., 36 : 112, 1976
2. Chandler, H.T., and Brudvik, J. S.,: silde- ring porcelain-fused-to-metal fixed partial dentures, J. Prosthet. Dent., 30 : 918, 1973.
3. El-Ebrashi, M. K., Asgar, K., and Bige- low, W. C. : Electron microscopy of gold soldered joints, J. Dent. Res., 47 : 5, 1968.
4. O'Brien, W. J., Hirthe, W. M., and Ryge, G. : Wetting characteristics of dental gold solders, J. Dent. Res., 42 : 675, 1963.
5. Presswood, R. G. : Soldering ceramic-met- al restorations, J. Prosthet. Dent., 34 : 352, 1975.
6. Preston, J. D., and Reisbick, M. H. : Laser fusion of selected dental casting alloys, J. Dent. Res., 54 : 232, 1975.
7. Pruden H, W. H. : Solder connections with porcelain fused to gold, J. Prosthet. Dent., 22 : 679, 1969.
8. Rasmussen, E. J., Goodkind, R. J., and Gerberich, W. W. : An investigation of tensile strength of dental solder joints, J. Prosthet. Dent. 41 : 418, 1979.
9. Ryge, G. : Dental soldering procedures, Dent. Clin. North Am., 2 : 747, 1958.
10. Sloan, R. M., Reisbick, M. H., and Preston, J. D. : Post-ceramic soldering of various alloys, J. Prosthet. Dent., 48 : 686, 1982.
11. Stade, E. H., Reisbick, M. H., and Preston, J. D. : Preceramic and postceramic solder joints, J. Prosthet. Dent., 34 : 527, 1975.
12. Staffanou, R. S., Radke, R. A., and Jend- resen, M. D. : Strength properties of sol- dered joints from various ceramic- metal combinations, J. Prosthet. Dent., 43 : 31, 1980.
13. Stackhouse, J. A. : Assembly of dental units by soldering, J. Prosthet. Dent., 18 : 131, 1967.
14. Townsend, L. W. A., Vermilyea, S. G., and Griswold, w. H. : Soldering nonoble alloys, J. Prosthet. Dent., 50 : 51, 1983.
15. Walters, R. A. : A photomicrographic eval- uation of the solder joint between pre- cious and nonprecious metal, J. Prosthet. Dent., 35 : 689, 1976.
16. G.E.Dieter : Mechanical Metallurgy, Mc- GrawHill, 1976
17. ASTM E 23-96 : Standard test methods for notched bar testing of metallic ma- terials, 1996.
18. 永野清司의 : Co-Cr系合金を用いた接着ブ リッツの後蝕着-その2. 蝕着強さについての 實驗的檢討-齒科技工, 13(8) : 985-991, 1985
19. 이선형 : 금합금과 도재소부전장구조관용 비 금속합금간의 납착에 관한 연구, 대한치과 의사협회지, 15 : 969, 1977.
20. _____ : 구조용 귀금속합금과 비금속합금 간 납착부의 인장강도, 대한치과의사협회 지, 16 : 953, 1978.
21. 문인형, 백현영, 이동녕, 이동희 : 금속공학 실험, 반도출판사, 1980.
22. 한국과학기술연구소 재료시험실 : 재료시험, 1980.
23. 하본 실 : 재료시험, 조창서점, 1980. 일본

24. 이동녕 : 재료강도학, 문운당, 1996
25. 김창주 : 금속기계 재료시험, 학문사, 1993

26. 사단법인 대한금속학회 : 금속공학실험, 1989.
27. 한국표준연구소 : 재료시험법, 1987.