



KYOCERA STANDARD SPECIFICATIONS OF CERDIP

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INDEX

	Page
1. Raw Ceramic	1
1.1 Material of raw ceramic	1
1.2 Dimension	1
1.3 Visual	3
1.4 Characteristics	3
2. Glass	4
2.1 Glass material	4
2.2 Glass thickness	4
2.3 Visual	4
2.4 Glass characteristics	6
3. Gold in Cavity	8
3.1 Material of gold	8
3.2 Gold thickness	8
3.3 Visual test for gold	8
3.4 Gold characteristics	9
4. Uv Windows	10
4.1 Visual	10
4.2 Transmissivity	11
5. Sampling Plan	11

STANDARD SPECIFICATIONS OF CERDIP

This specification shall apply to the out-going inspection for all cerdip glazed parts manufactured by Kyocera Corporation.

1. Raw Ceramic

1.1 Material of raw ceramic

1.1.1 Material used is alumina ceramic (90 pct. min. Al_2O_3) in black/brown.

1.1.2 Surface of substrate shall be dense and water absorption shall be zero.

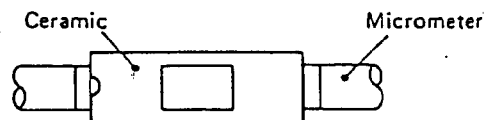
1.2 Dimension

Dimensions measured by method and equipment as shown below shall meet the dimensions specified on the drawing.

1.2.1 Length

Length shall be measured using a micrometer with flat tips of .250 (6.35) in diameter per Fig. 1.

Fig. 1



1.2.2 Width

Width shall be measured at 3 points using a micrometer with flat tips of .250 (6.35) in diameter per Fig. 2.

Readings at every point shall meet the specified dimension. Envelop width has to meet maximum width specified per Fig. 2-(4).

Fig. 2-(1)

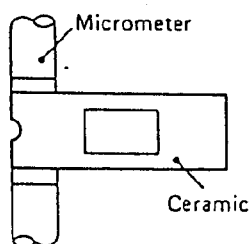


Fig. 2-(2)

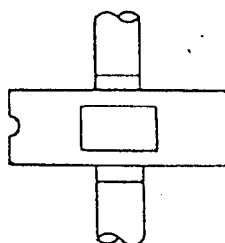


Fig. 2-(3)

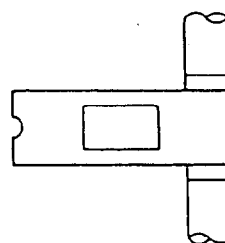
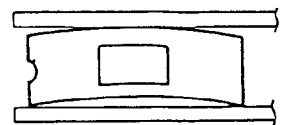


Fig. 2-(4)



1.2.3 Thickness

Thickness shall be measured at two points marked with X shown in Fig. 3-(2), using a dial gauge with a tip as shown in Fig. 3-(1).

Fig. 3-(1)

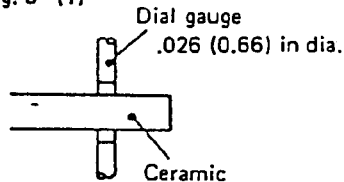


Fig. 3-(2)



1.2.4 Length and width of cavity

This shall be measured using a profile projector at 20X magnification. Base shall be measured at the bottom of cavity per Fig. 4. Cap shall be measured at the surface of cavity per Fig. 5.

Fig. 4

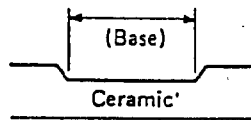
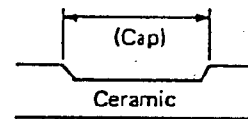


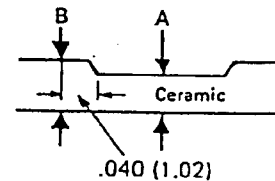
Fig. 5



1.2.5 Cavity depth

Cavity depth shall be measured using a dial gauge as shown in Fig. 3-(1). Putting a ceramic piece on a flat table, dimension A (in Fig. 6) shall be first determined (the height from a table to cavity). Dimension B (in Fig. 6) shall be then measured at a point .040 (1.02) away from cavity wall (the height from a table to top surface). The difference between two thickness is cavity depth.

Fig. 6



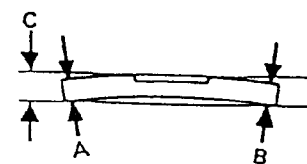
$$\text{Cavity depth} = B - A$$

1.2.6 Camber

- (1) At first, substrate thickness shall be measured at both end A and B in Fig. 7. Total thickness C shall then be measured along length. The difference between C and the average of A and B shall be determined as camber.

$$\text{Camber} = C - \frac{A + B}{2}$$

Fig. 7

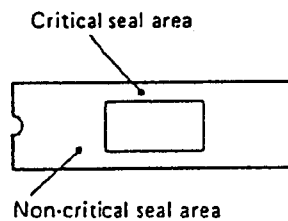


- (2) Camber of die attach area shall be measured using surface roughness measuring instrument. Die attach area shall be defined as Fig. 23.

1.3 Visual

- 1.3.1 The surface shall be free of dirt, grease and finger marks.
- 1.3.2 No cracks shall be allowed.
- 1.3.3 Pits up to .015 (0.38) dia. shall be allowed.
- 1.3.4 Burrs or projections up to .003 (0.08) shall be allowed.
- 1.3.5 Chips to $.050 \times .050 \times .010$ (1.27 \times 1.27 \times 0.25) or $.030 \times .030 \times .030$ (0.76 \times 0.76 \times 0.76) shall be allowed in the non-critical seal area. (Ref. Fig. 8)
- 1.3.6 Chips shall not exceed $.010 \times .010 \times .010$ (0.25 \times 0.25 \times 0.25) in the critical seal area. (Ref. Fig. 8)

Fig. 8



1.4 Characteristics

1.4.1 Hermeticity - Raw ceramic

A piece part shall pass hermeticity test per MIL-STD-883C method 1014 condition A and C after thermal shock with 15 cycles per MIL-STD-883C method 1011 condition C.

1.4.2 Acid durability

A piece part shall not be discolored after immersed in 50 percent sulfuric acid solution at 95°C for 1 minute.

1.4.3 Heat resistance

No cracks shall be allowed after a piece part is placed on a heater block at a surface temperature of $530^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for 1 minute after pre-heating on a heater block at a surface temperature of $300^{\circ}\text{C} \pm 10^{\circ}\text{C}$ for 2 minutes.

2. Glass

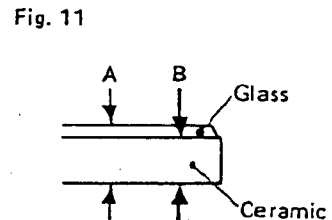
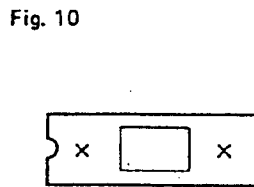
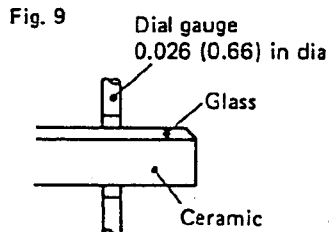
2.1 Glass material

Glass material shall be specified by customer.

2.2 Glass thickness

Glass thickness shall be determined by first measuring the overall thickness of substrate and glass at two points marked as indicated in Fig. 10, using a dial gauge with such a shaped tip as shown in Fig. 9. The glass shall then be stripped from the substrate and the substrate thickness shall be measured at the same points.

The difference between the average of A and B in Fig. 11 is glass thickness. Glass thickness measured by the above method shall meet the dimension specified in the drawing.



2.3 Visual

2.3.1 Bare ceramic (Glass void exposing substrate)

There shall be no bare ceramic visible in the critical seal area. Pits up to .010 (0.25) in dia. shall be allowed in the non-critical seal area.

2.3.2 Pin hole (Glass void, not exposing substrate)

Pin holes up to .010 (0.25) in dia. shall be allowed in the critical seal area. Pinholes up to 0.30 (0.76) in dia. shall be allowed in the non-critical seal area.

Fig. 12 (Bare ceramic)

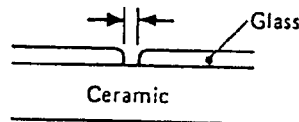
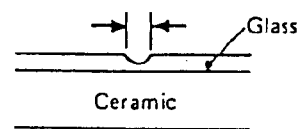


Fig. 13 (Pinhole)

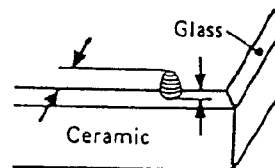


2.3.3 Glass chipping

No glass chipping shall be allowed in the critical seal area.

Glass chipping in the non-critical seal area shall meet the following criteria.

Fig. 14 (Glass chipping)



8LD - 20LD	.010 × .010 × Glass thickness (0.25 × 0.25 × Glass thickness)
22LD - 40LD	.015 × .015 × Glass thickness (0.38 × 0.38 × Glass thickness)

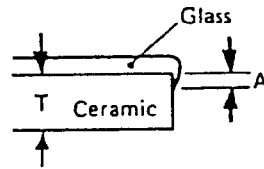
2.3.4 Glass rundown on the edge of the substrate

Glass rundown A in Fig. 15 shall not exceed one-third of the base substrate thickness and one-half of the cap substrate thickness.

BASE : $\frac{T}{3} \geq A$

CAP : $\frac{T}{2} \geq A$

Fig. 15



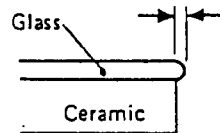
2.3.5 Foreign material in the glass

There shall be no foreign material visible greater than .005" in the critical seal area. Inspect with unaided eye, measure with magnification. Foreign material up to .020 (0.51) in dia. shall be allowed in the non-critical seal area.

2.3.6 Glass overhang

Glass overhang shall not exceed .010 (0.25).

Fig. 16 Glass overhang

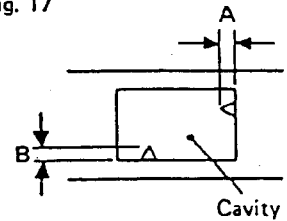


2.3.7 There shall be no glass on the opposite side of glazed surface visible greater than .015 (0.38).

2.3.8 Maximum glass rundown into cavity shall be determined at point A and B as indicated in Fig. 17. Readings at point A and B shall meet the following specification:

Description	inch (mm)	
	A max.	B max.
Cap	.015 (0.38)	.015 (0.38)
BASE	.015 (0.38)	.010 (0.25)

Fig. 17

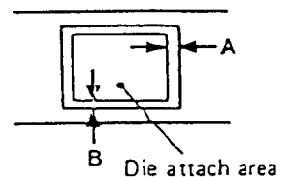


2.3.9 Glass splatter in cavity

Glass splatter in cavity of cap shall not exceed .015 (0.38) in dia. Visible glass splatter in die attach cavity of base shall not exceed .005 (0.13) in dia. and not exceed .001 (0.03) in height. The dimensions of A and B in Fig. 18 are defined as below:

Description	inch (mm)	
	A max.	B max.
8LD - 20LD BASE	.015 (0.38)	.010 (0.25)
22LD - 40LD BASE	.015 (0.38)	.015 (0.38)

Fig. 18



2.3.10 Glass pull back

Glass pull back is defined as the distance from the ceramic edge to the toe of the glass bulk as shown in Fig. 19.

Reading shall meet the following specification.

Fig. 19

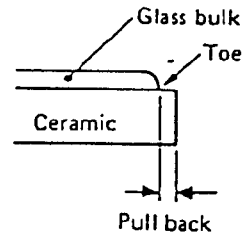
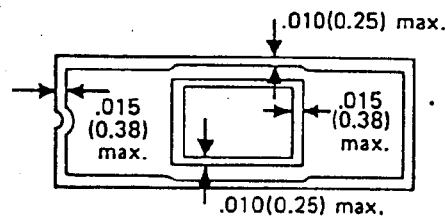


Fig. 20



2.3.11 Glass in the notch

Glass in the notch shall be permissible provided the notch can be identified.

2.4 Glass characteristics

2.4.1 Glass softening test

After the glazed piece is placed on a heater block at surface temperature of $530^{\circ}\text{C} \pm 10^{\circ}\text{C}$, glass shall soften within the following time period. The test defines that the mark made by tweezers on melted glass shall heal in 5 seconds.

8LD – 16LD BASE & CAP	25 seconds max.
18LD – 22LD BASE & CAP	30 seconds max.
24LD – 40LD BASE & CAP	35 seconds max.

2.4.2 Glass devitrifying test (only for devitrifying glass)

After the glazed piece is placed on a heater block at surface temperature of $530^{\circ}\text{C} \pm 10^{\circ}\text{C}$, glass shall not begin to devitrify within the following time period. The test defines that the mark made by tweezers on melted glass shall heal in 5 seconds.

8LD – 16LD BASE & CAP	40 seconds max.
18LD – 22LD BASE & CAP	45 seconds max.
24LD – 40LD BASE & CAP	50 seconds max.

2.4.3 Glass hermeticity

2.4.3.1 Lead frame attach

By using a heater block at surface temperature of $530^{\circ}\text{C} \pm 10^{\circ}\text{C}$, lead frame shall be attached to a base within 40 seconds.

2.4.3.2 Integrated circuit die attach

A die shall be attached to a frame attached base per the following manner:

<u>PRE-HEAT</u>	300°C
<u>DIE ATTACH</u>	
Heater Block	$450^{\circ}\text{C} \pm 10^{\circ}\text{C}$
Die Attach Time	40-60 seconds
Chip Size	.080" x .080" non gold back
Scrub	2 cycles
<u>ATMOSPHERE</u>	N ₂

2.4.3.3 Sealing

Cap shall be sealed with base after lead frame attach and die attach are completed. Recommendable sealing profile shall be in accordance with Kyocera technical information sheet.

2.4.3.4 Temperature cycle test

A sealed part is put into the environmental test per MIL-STD-883C method 1010 condition C 10 cycles.

2.4.3.5 Thermal shock test

A sealed part is put into the environmental test per MIL-STD-883C method 1011 condition C 5 cycles.

2.4.3.6 Fine leak and gross leak test

After temperature cycle test and or thermal shock test, the parts shall be subjected to hermeticity test per MIL-STD-883C method 1014, condition A and C. The criteria for leak are as follows:

8LD - 20LD	1×10^{-8} CC/sec. max.
22LD - 40LD	5×10^{-8} CC/sec. max.

2.4.4 Torque test

After fine and gross leak test, the parts shall be subjected to torque test MIL-STD-883C method 2024. Torque strength shall meet MIL-STD-883C method 2024.

3. Gold in Cavity

3.1 Material of gold

Gold paste which satisfies functional requirements shall be used.

3.2 Gold thickness

Scratch gold in the center part of die attach area. Measure the difference between A and B in Fig. 21-(2) by surface roughness analyzer.

Gold thickness shall be determined as below.

$$\text{Gold thickness} = A - B$$

Gold thickness shall be 120 microinches (3 microns) minimum.

Fig. 21-(1)

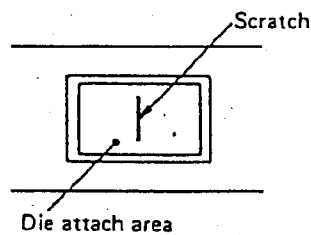
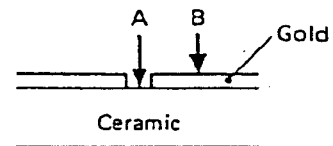


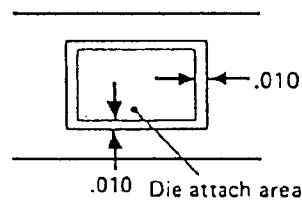
Fig. 21-(2)



3.3 Visual test for gold

3.3.1 The minimum gold die attach area, as defined in Fig. 23, shall be free of glass splatter, foreign material (exceeding .005 (0.13) in dia.) and gold lump (exceeding .010 (0.25) in dia.).

Fig. 22

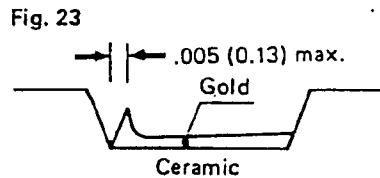


3.3.2 Bare spot in die attach area

The minimum die attach area shall be free of bare spot (exceeding .005 (0.13) in dia.)

3.3.3 Gold pull back from the cavity wall

Gold pull back from the cavity wall shall not exceed .005 (0.13).



3.3.4 Excessive gold on sealing area

Excessive gold on sealing area shall not exceed .005 (0.13). Excessive gold on sealing area and gold in die attach area shall not be connected.

3.4 Gold characteristics

Die attach shall be performed per 2.4.3.2.

3.4.1 Die wettability

Gold-silicon eutectic shall be formed around at least 75% of the die periphery.

3.4.2 Die shear test

After die attached base is sealed with a cap, the sealed unit shall be subjected to thermal shock test per MIL-STD-883C method 1011, condition A 5 cycles and decapped. Subsequently, the parts shall be subjected to die shear test MIL-STD-883C method 2019.1.

4. Uv Window

4.1 Visual

4.1.1 Crack

There shall be no cracks in the lens area and no separation between the ceramic and lens glass material.

4.1.2 Foreign material/bubble

A. Non critical lens area

Foreign material/bubble shall not exceed .015 (0.38).

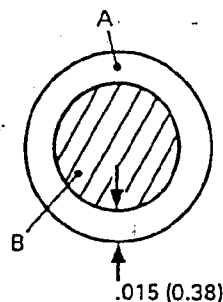
Foreign material/bubble measuring between .010 – .015 (0.25 – 0.38) shall not exceed 5 in number.

B. Critical lens area

Foreign material/bubble shall not exceed .010 (0.25).

Foreign material/bubble measuring between .005 – .010 (0.13 – 0.25) shall not exceed 5 in number.

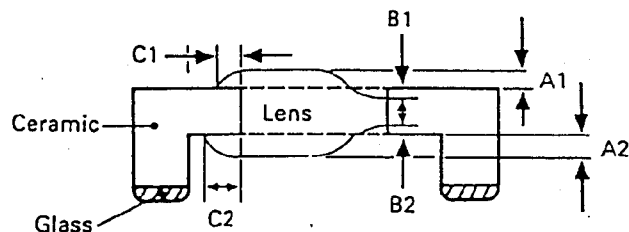
Fig. 24



4.1.3 Lens glass protrusion and overflow

Lens glass protrusion and overflow shall be specified as follows:

Fig. 25



inch (mm)					
A1	B1	C1	A2	B2	C2
.010 (0.25)	.004 (0.10)	.020 (0.50)	.016 (0.40)	.004 (0.10)	*

* Lens glass shall be allowed to contact with cavity wall unless lens glass shall not contact with seal glass.

4.2 Transmissivity

The transmissivity of uv lens must be $\geq 60\%$ at 2537 Å wavelength.

5. Sampling Plan

Applicable level and AQL are as follows:

Group	Level	AQL	REMARKS
Dimensional	S-3	0.65%	
Visual	II	0.65%	Noncumulative
	II	1.0 %	Cumulative
Functional hermeticity others	I S-3	0.15% 0.65%	