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JIS C 5973 : 1998

**F04 Type connectors
for optical fiber cables**

ICS 33.180.20

Descriptors : fibre optics, fibre optic connectors, fibre optic cables

Reference number : JIS C 5973 : 1998 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS C 5973 : 1993** is replaced with **JIS C 5973 : 1998**.

In this revision, conformity of Japanese Industrial Standard with International standards has been taken into consideration.

Being in conformance with this Standard may come under the use of the following patent right:

Denomination of invention: Optical connector

Application for patent right: TOKU-KO-HEI 04-54926 (NTT, NEC,
FUJITSU, HITACHI)

This description does not affect the validity, scope and the like of the above patent right.

The holder of this patent right has assured the Japanese Industrial Standards Committee that he is willing to negotiate licences under reasonable and nondiscriminatory terms and conditions with any applicant.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The Minister of International Trade and Industry and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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F04 Type connectors for optical fiber cables

Introduction This Japanese Industrial Standard has been prepared based on **IEC 60874-14** *Connectors for optical fibres and cables—Part 14 : Sectional specification for fibre optic connector—Type SC* published in 1993 and **IEC 60874-19** *Connectors for optical fibres and cables—Part 19 : Sectional specification for fibre optic connector—Type SC-D(uplex)* published in 1995 without any modification in technical contents.

1 Scope This Japanese Industrial Standard specifies F04 type connectors for optical fiber cables of plug-adapter-plug or plug-receptacle configuration equipped with push-on type joint structure and ferrule array of 2.5 mm outside diameter of a slide-lock structure (hereafter referred to as “optical connectors”).

Remarks 1 Normative references to this Standard are given below. The most recent editions of these normative references shall apply.

JIS C 5961 *Test methods of connectors for optical fiber cables*

JIS C 5962 *General rules of connectors for optical fiber cables*

JIS C 6820 *General rules of optical fibers*

JIS C 6830 *Optical fiber cords*

JIS C 6831 *Jacketed optical fibers*

2 The International Standards corresponding to this Standard are given below.

IEC 60874-14 : 1993 *Connectors for optical fibres and cables—Part 14 : Sectional specification for fibre optic connector—Type SC*

IEC 60874-19 : 1995 *Connectors for optical fibres and cables—Part 19 : Sectional specification for fibre optic connector—Type SC-D(uplex)*

3 The items which this Standard describes as “not specified” are subject to agreement between the parties concerned with acceptance.

4 The IEC Standard number is based on the new numbering system of IEC Standards put in force on January 1st 1997, and the standards published before the said date are numbered by adding 60000 to the former number. This is only the change in the numbering system and the contents remain unchanged.

2 Definitions For the purpose of this Standard, in addition to the definitions stated in 2 of JIS C 5962, the following principal definition apply:

slide-lock structure Such a structure that the adapter and the plug are coupled and locked by inserting the plug into the adapter and the disengaging is performed by pulling the plug while releasing the lock by pulling a sliding piece attached to the plug.

3 Structure of type designation The type designation shall be structured as stated in 3.1 of JIS C 5962.

4 Classification and grading

4.1 Classification Optical connectors shall be classified (by means of type designation) as stated in Table 1.

Table 1 Classification of optical connectors

Type designation	Shape of optical connector	Number of acceptable optical fiber cords	Shape of ferrule array	Grade	Type designation of applicable optical fiber cord (see JIS C 6820)	Shape and dimensions
CNF04SPM123B1	Plug	1	M	B	OFC2.8-Y-SSMA-9.5/125	Attached Fig. 1
CNF04SPM124B1						
CNF04SPM125B1						
CNF04SPM126B1						
CNF04SPM127B1						
CNF04SPM128B1						
CNF04SPM129B1						
CNF04SPM123B2					OFC2.0-Y-SSMA-9.5/125	Attached Fig. 2
CNF04SPM124B2						
CNF04SPM125B2						
CNF04SPM126B2						
CNF04SPM127B2						
CNF04SPM128B2						
CNF04SPM129B2						
CNF04SPM123C1				C	OFC2.8-Y-SGI-50/125	Attached Fig. 3
CNF04SPM124C1						
CNF04SPM125C1						
CNF04SPM126C1						
CNF04SPM127C1						
CNF04SPM128C1						
CNF04SPM129C1						
CNF04SPM123C2					OFC2.0-Y-SGI-50/125	Attached Fig. 4
CNF04SPM124C2						
CNF04SPM125C2						
CNF04SPM126C2						
CNF04SPM127C2						
CNF04SPM128C2						
CNF04SPM129C2						
CNF04SPM124F1				F	OFC2.8-Y-SGI-50/125	Attached Fig. 5
CNF04SPM126F1						
CNF04SPM128F1						
CNF04SPM130F1						

Table 1 (continued)

Type designation	Shape of optical connector	Number of acceptable optical fiber cords	Shape of ferrule array	Grade	Type designation of applicable optical fiber cord (see JIS C 6820)	Shape and dimensions		
CNF04SPM124F2	Plug	1	M	F	OFC2.0-Y-SGI-50/125	Attached Fig. 6		
CNF04SPM126F2								
CNF04SPM128F2								
CNF04SPM130F2								
CNF04SPMX								
CNF04SP2M123B1	2	2		X	Not specified	(¹)		
CNF04SP2M124B1				B	OFC2.8-Y-SSMA-9.5/125	Attached Fig. 12		
CNF04SP2M125B1								
CNF04SP2M126B1								
CNF04SP2M127B1								
CNF04SP2M128B1								
CNF04SP2M129B1								
CNF04SP2M123B2							OFC2.0-Y-SSMA-9.5/125	Attached Fig. 13
CNF04SP2M124B2								
CNF04SP2M125B2								
CNF04SP2M126B2								
CNF04SP2M127B2								
CNF04SP2M128B2								
CNF04SP2M129B2								
CNF04SP2M123C1							C	OFC2.8-Y-SGI-50/125
CNF04SP2M124C1								
CNF04SP2M125C1								
CNF04SP2M126C1								
CNF04SP2M127C1								
CNF04SP2M128C1								
CNF04SP2M129C1								
CNF04SP2M123C2				OFC2.0-Y-SGI-50/125	Attached Fig. 15			
CNF04SP2M124C2								
CNF04SP2M125C2								
CNF04SP2M126C2								
CNF04SP2M127C2								
CNF04SP2M128C2								

Table 1 (concluded)

Type designation	Shape of optical connector	Number of acceptable optical fiber cords	Shape of ferrule array	Grade	Type designation of applicable optical fiber cord (see JIS C 6820)	Shape and dimensions	
CNF04SP2M129C2	Plug	2	M	C	OFC2.0-Y-SGI-50/125	Attached Fig. 15	
CNF04SP2M124F1				F	OFC2.8-Y-SGI-50/125	Attached Fig. 16	
CNF04SP2M126F1							
CNF04SP2M128F1							
CNF04SP2M130F1							
CNF04SP2M124F2					OFC2.0-Y-SGI-50/125	Attached Fig. 17	
CNF04SP2M126F2							
CNF04SP2M128F2							
CNF04SP2M130F2							
CNF04SP2MX				X	Not specified	(²)	
CNF04PAFB	Adapter	1	F-F	B	—	Attached Fig. 7	
CNF04PAFC				C			
CNF04PAFB-1				B		Attached Fig. 8	
CNF04PAFC-1				C			
CNF04FX				X			(³)
CNF04PA2FB		2		B	—	Attached Fig. 18	
CNF04PA2FC				C			
CNF042FX				X		(⁴)	
CNF04DRF-1	Receptacle	1	F	—	—	Attached Fig. 9	
CNF04DRF-2				—		Attached Fig. 10	
CNF04DRF-3				—		Attached Fig. 11	
CNF04DR2F		2		—	—	Attached Fig. 19	

Notes (¹) The shape and dimensions shall be as stated in Fig. 1.

(²) The shape and dimensions shall be as stated in Fig. 4.

(³) The shape and dimensions shall be as stated in Fig. 2.

(⁴) The shape and dimensions shall be as stated in Fig. 5.

4.2 Grade Grades of optical connectors shall be as follows:

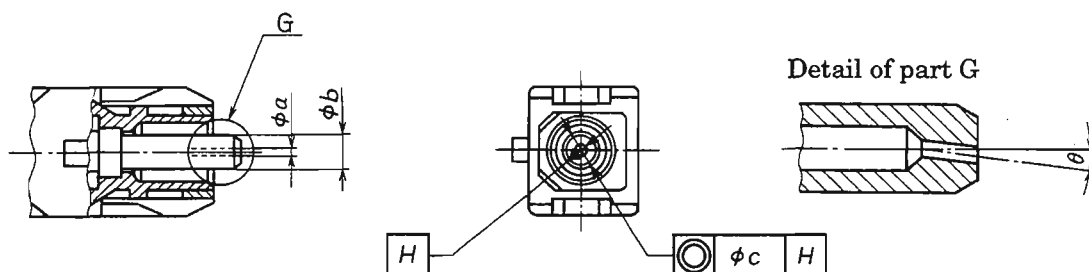
(1) **Plug** Grades of plugs shall be as stated in Table 2.

Table 2 Grades of plugs

Grade	Insertion loss dB		Dimensions of ferrule mm			Angle θ°
	OFC2.8-Y-SSMA-9.5/125 OFC2.0-Y-SSMA-9.5/125	OFC2.8-Y-SGI-50/125 OFC2.0-Y-SGI-50/125	Tolerances on dimension a	Dimension b	Dimension c	
B	0.8 max. ⁽⁵⁾ , 0.5 max. ⁽⁶⁾	—	$+0.001$ 0	2.499 ± 0.0005	0.0014 max.	.5 max.
C	—	0.6 max. ⁽⁵⁾ , 0.3 max. ⁽⁶⁾		2.499 ± 0.001	0.004 max.	
F	—	1.5 max. ⁽⁵⁾ , 1.2 max. ⁽⁶⁾	$+0.002$ 0	$2.499^{+0.001}_{-0.002}$	0.01 max.	.0 max.
X	Not specified					

Notes (5) The value in such a case is shown that a plug which accepts ground-plane connection and a master optical connector which accepts ground-plane connection are connected.

(6) The value in such a case is shown that a plug which accepts PC connection and a master optical connector which accepts PC connection are connected.



(2) **Adapter** Grades of adapters shall be as stated in Table 3.

Table 3 Grades of adapters

Grade	Insertion loss dB	
	OFC2.8-Y-SSMA-9.5/125 OFC2.0-Y-SSMA-9.5/125	OFC2.8-Y-SGI-50/125 OFC2.0-Y-SGI-50/125
B	0.6 max. ⁽³⁾ , 0.3 max. ⁽⁴⁾	—
C	—	0.5 max. ⁽³⁾ , 0.2 max. ⁽⁴⁾
X	Not specified	

(3) **Receptacle** Grades of receptacles are not specified.

5 Performances The performances shall be as stated in Table 4. However, for connectors of grade X the performances shall be as agreed between the parties concerned with acceptance.

Table 4 Performances

Number	Item	Test method (JIS C 5961)	Conditions to be applied	Performances
1	Fitting	4 (Appearance and structure)	Test item: fitting	The specimens shall mate without any mechanical abnormality.
2	Insertion loss	6.1 (Insertion loss)	Test method: method 3, or method 4 (for plugs) method 5 (for adapters) Kind of light source: silica glass multimode optical fiber: A or B silica glass singlemode optical fiber: E or F	As stated in Table 2 and Table 3.
3	Resistance to vibration	7.1 (Resistance to vibration)	Frequency range: 10 Hz to 55 Hz Amplitude (zero to peak): 0.75 mm Test duration per one axial direction: 30 min Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
4	Resistance to shock	7.2 (Resistance to shock)	Peak acceleration and duration : 981 m/s ² (100 G) : 6 ms Number of shocks: 5 Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
5	Repetitive operation	7.3 (Repetitive operation)	Number of repetitive operations: 500 Initial measurement item: insertion loss Final measurement item: insertion loss	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Specimens shall mate without any mechanical abnormality.
6	Ferrule withdrawal force	7.4 (Ferrule withdrawal force)	Diameter and its accuracy of pin gauge: ø2.499 ± 0.000 5 mm	Ferrule withdrawal force: 2.0 N to 5.9 N

Table 4 (continued)

Number	Item	Test method (JIS C 5961)	Conditions to be applied	Performances
7	Ferrule compression force	7.5 (Ferrule compression force)	Ferrule compression force is specified. Position of ferrule tip: optical reference plane (see Fig. 1)	Ferrule compression force: 7.8 N to 11.8 N
8	Robustness of coupling mechanism (axial direction)	7.6 [Robustness of coupling mechanism (axial direction)]	Magnitude of tensile force: 68.6 N Applicable optical fiber cord: length 1 m to 2 m Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
9	Robustness against fall (connector with optical fiber cord)	7.10 [Robustness against fall (connector with optical fiber cord)]	Number of falls: 5 Height of fall: 1 000 mm Pre-conditioning: attach the cap Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Table 2. Insertion loss (finally measured value): As stated in Table 5. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
10	Robustness of optical fiber cord clamp (pull in axial direction)	7.11 [Robustness of optical fiber cord clamp (pull in axial direction)]	Test method: method 2 Applicable optical fiber cord: length 1 m to 2 m Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Table 2. Insertion loss (finally measured value): As stated in Table 5. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
11	Robustness of optical fiber cord clamp (bending)	7.12 [Robustness of optical fiber cord clamp (bending)]	Magnitude of tensile force: 4.9 N Number of bends: 100 Applicable optical fiber cord: length 1 m to 2 m Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Table 2. Insertion loss (finally measured value): As stated in Table 5. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.

Table 4 (continued)

Number	Item	Test method (JIS C 5961)	Conditions to be applied	Performances
12	Engagement and separation forces	7.13 (Engagement and separation forces)	—	Engagement force: for single-core connector 19.6 N max. for two-core connector 29.4 N max. Separation force: for single-core connector 19.6 N max. for two-core connector 29.4 N max.
13	Robustness of optical fiber cord clamp (twist)	7.17 [Robustness of optical fiber cord clamp (twist)]	Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Table 2. Insertion loss (finally measured value): As stated in Table 5. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
14	Resistance to corrosion (salt spray)	8.1 (Salt spray)	Test duration: 48 h Final measurement item: appearance	Appearance: No remarkable corrosion.
15	Change of temperature	8.2 (Change of temperature)	Test method: Nb High temperature: 70 °C Low temperature: -25 °C Duration of standing at each temperature: 30 min Rate of change of temperature: 3 °C/min Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
16	Damp heat (cyclic)	8.4 [Damp heat (cyclic)]	Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.

Table 4 (concluded)

Number	Item	Test method (JIS C 5961)	Conditions to be applied	Performances
17	Resistance to dry heat	8.5 (Resistance to dry heat)	Test temperature: 70 °C Test duration: 240 h Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.
18	Resistance to cold	8.6 (Resistance to cold)	Test temperature: -25 °C Test duration: 240 h Initial measurement item: insertion loss Final measurement items: insertion loss and mechanical damage	Insertion loss (initially measured value): As stated in Tables 2 and 3. Insertion loss (finally measured value): As stated in Tables 5 and 6. Mechanical damage: Free from such detrimental damage as deformation, crack and loosening.

Table 5 Insertion loss after test (plug)

Grade	Insertion loss (finally measured value) dB	
	OFC2.8-Y-SSMA-9.5/125 OFC2.0-Y-SSMA-9.5/125	OFC2.8-Y-SGI-50/125 OFC2.0-Y-SGI-50/125
B	1.0 max. ⁽⁵⁾ , 0.7 max. ⁽⁶⁾	—
C	—	0.8 max. ⁽⁵⁾ , 0.5 max. ⁽⁶⁾
F	—	1.7 max. ⁽⁵⁾ , 1.4 max. ⁽⁶⁾
X	Not specified	

Notes ⁽⁵⁾ The value in such a case is shown that a plug which accepts ground-plane connection and a master optical connector which accepts ground-plane connection are connected.

⁽⁶⁾ The value in such a case is shown that a plug which accepts PC connection and a master optical connector which accepts PC connection are connected.

Table 6 Insertion loss after test (adapter)

Grade	Insertion loss (finally measured value) dB	
	OFC2.8-Y-SSMA-9.5/125 OFC2.0-Y-SSMA-9.5/125	OFC2.8-Y-SGI-50/125 OFC2.0-Y-SGI-50/125
B	0.8 max. ⁽⁷⁾ , 0.5 max. ⁽⁸⁾	—
C	—	0.7 max. ⁽⁷⁾ , 0.4 max. ⁽⁸⁾
X	Not specified	

Notes ⁽⁷⁾ The value in such a case is shown that master optical connectors which accept ground-plane connection are connected each other.

⁽⁸⁾ The value in such a case is shown that master optical connectors which accept PC connection are connected each other.

6 Construction, shapes and dimensions The construction, shapes and dimensions of optical connectors shall be as given in Figs. 1 to 6.

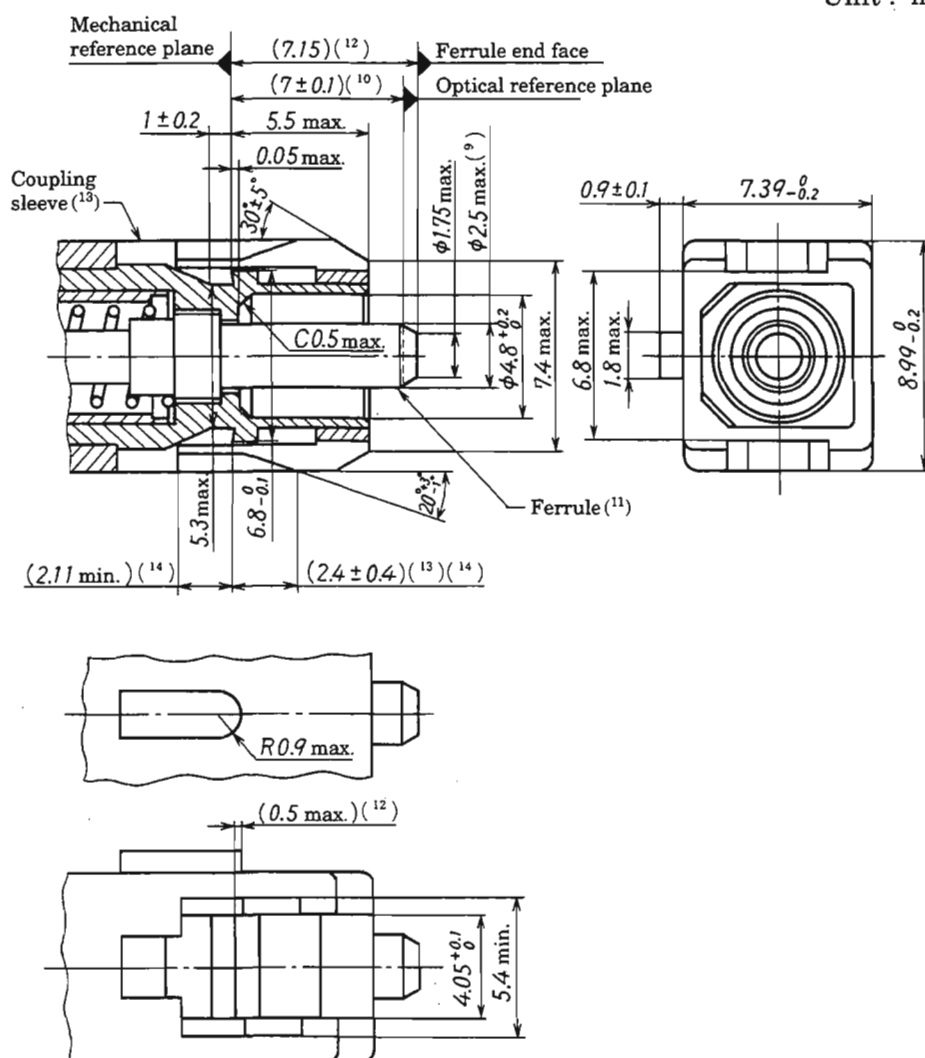
The individual dimensions shall be as stated in Attached Figs. 1 to 19 which are specified in Table 1. When the dimension of a part is specified in Figs. 1 to 6 and Attached Figs. 1 to 19, Attached Figs. 1 to 19 precede.

The dimension of metal part refers to the dimension after surface treatment. The dimensional test shall be as specified in 5 of JIS C 5961.

The construction and shapes of parts for which dimensions are not specified are exemplified for informative reference.

Dimensional tolerances of parts for which dimensional tolerances are not specified shall be as stated in 5.1 of JIS C 5961.

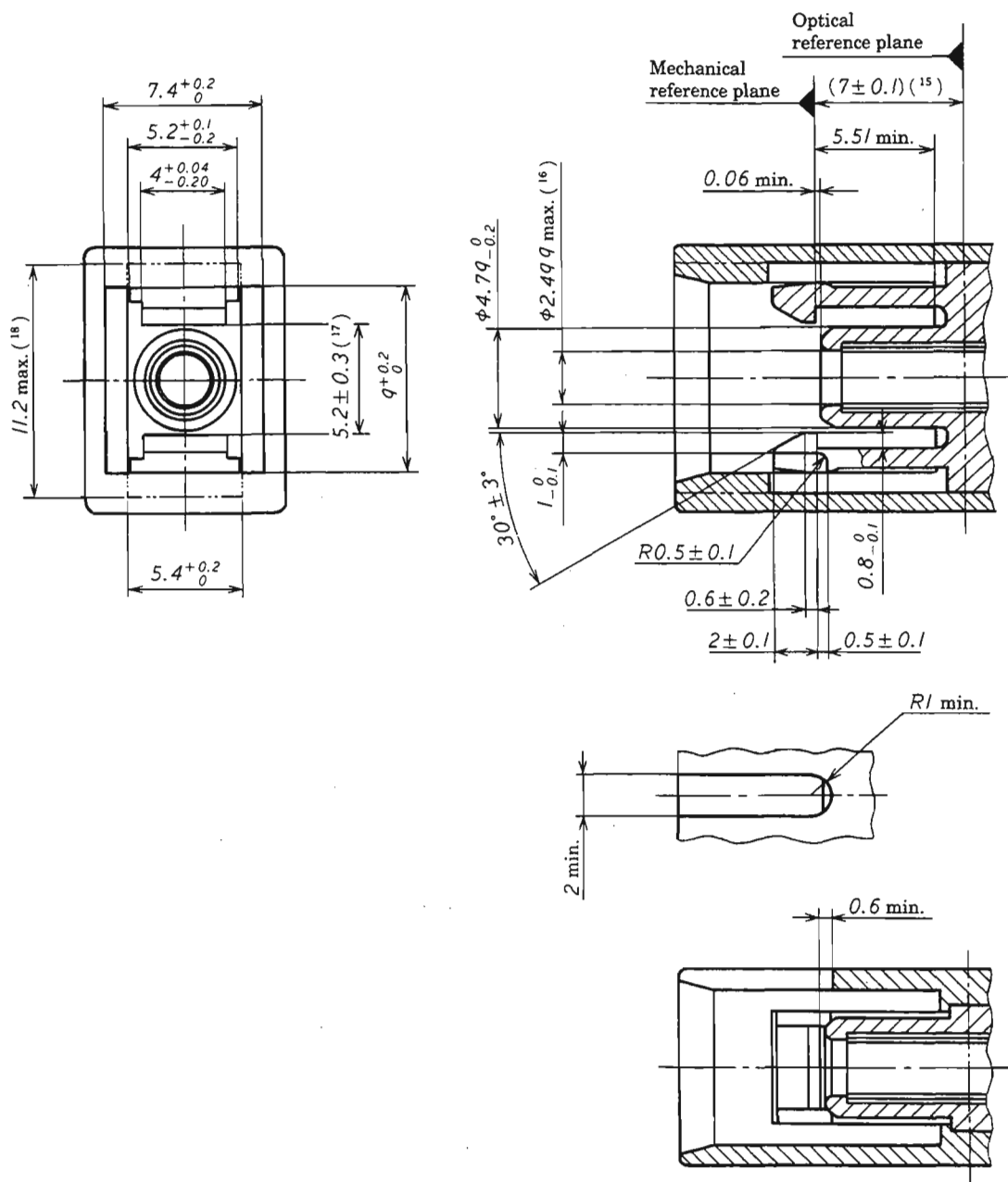
Unit : mm



- Notes (9) The shape of external periphery up to 1.2 mm from ferrule end face is optional.
- (10) This dimension is the design distance from the mechanical reference plane to the ferrule end face under optically connected state with the mating optical connector, and this is not the subject of the measurement.
- (11) The ferrule shall be so constructed that it can be displaced leftwards in the figure against the elastic force.
- (12) This dimension is the minimum necessary dimension after grinding of the ferrule end face and this is not the subject of measurement.
- (13) The coupling sleeve shall be so constructed that release of coupling with the adapter is possible by moving it to the left in this figure when separation from the adapter is desired.
- (14) This dimension is given under such a state that the coupling sleeve is moved to the left side in this figure, and is not the subject of measurement.

Fig. 1 Optical connector mating part (plug)

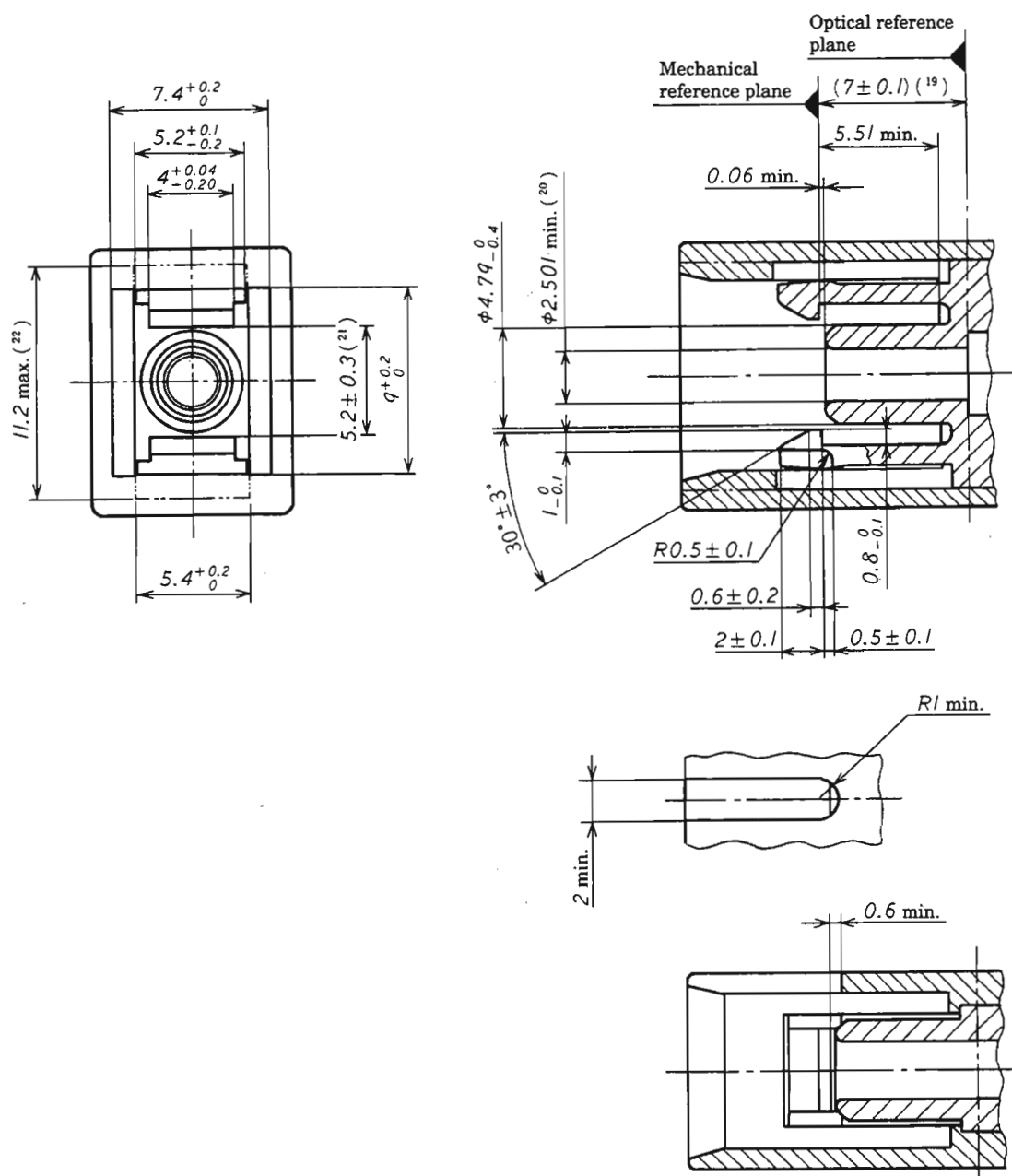
Unit : mm



- Notes (15) This dimension is the design distance from the mechanical reference plane to the ferrule end face in the adapter under optically connected state engaged with the plug, and is not the subject of measurement.
- (16) This dimension is given when an elastic sleeve is used, and shall be not less than $\phi 2.501$ mm in the case of a non-elastic sleeve.
- (17) The adapter shall be so constructed that this part opens at least 6.8 mm when the plug is mated and separated.
- (18) The shape shown by the double dots and single dash line is allowed.

Fig. 2 Optical connector mating part (adapter)

Unit : mm



Notes ⁽¹⁹⁾ This dimension is the design distance from the mechanical reference plane to the ferrule end face in the receptacle under optically connected state engaged with the plug, and is not the subject of measurement.

A stopper for the ferrule end face to butt against may be provided at the optical reference plane.

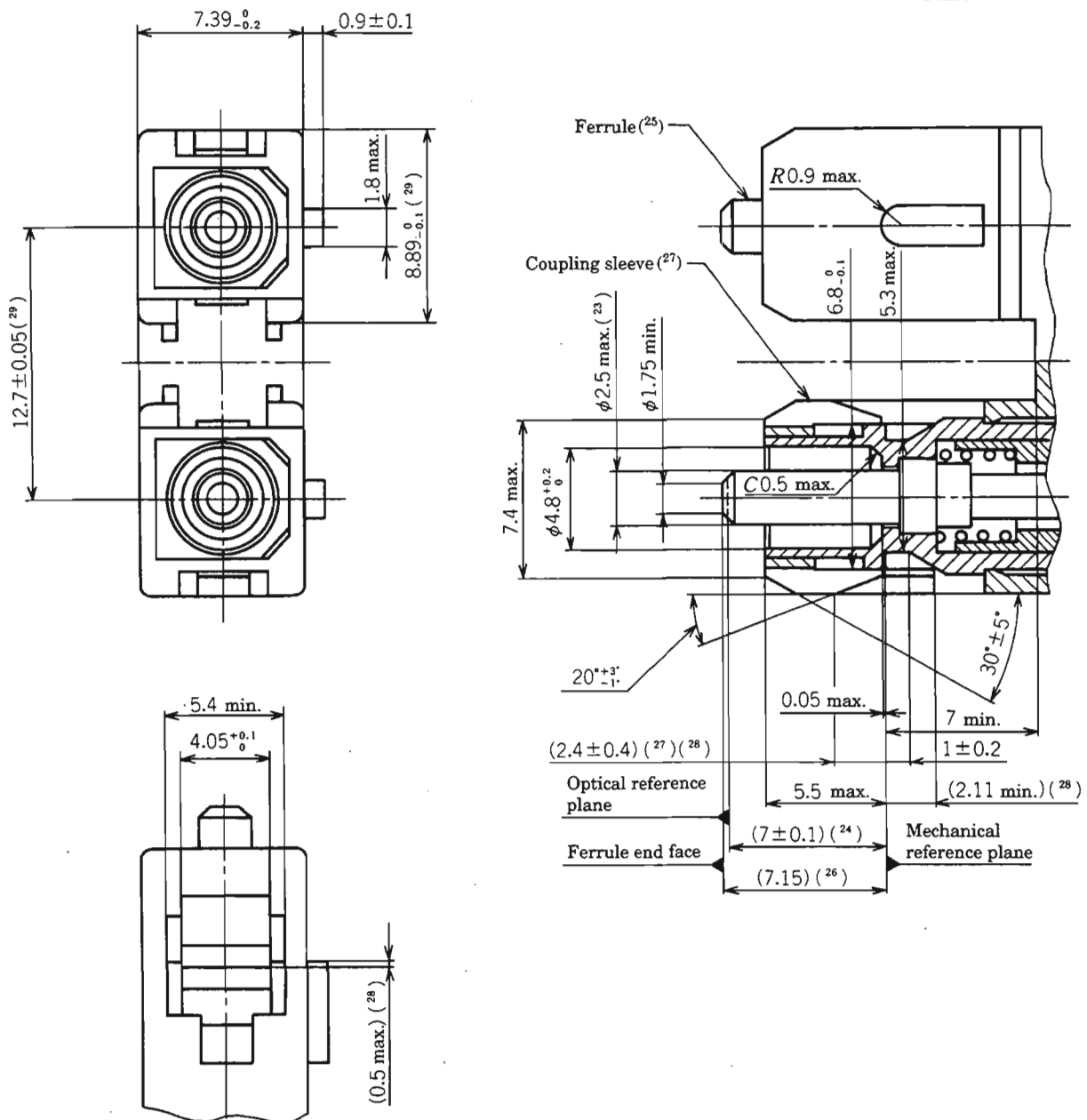
⁽²⁰⁾ This dimension is given when a non-elastic sleeve is used, and shall be not more than $\phi 2.499 \text{ mm}$ in the case of an elastic sleeve.

⁽²¹⁾ The receptacle shall be so constructed that this part opens at least 6.8 mm when the plug is mated and separated.

⁽²²⁾ The shape shown by the double dots and single dash line is allowed.

Fig. 3 Optical connector mating part (receptacle)

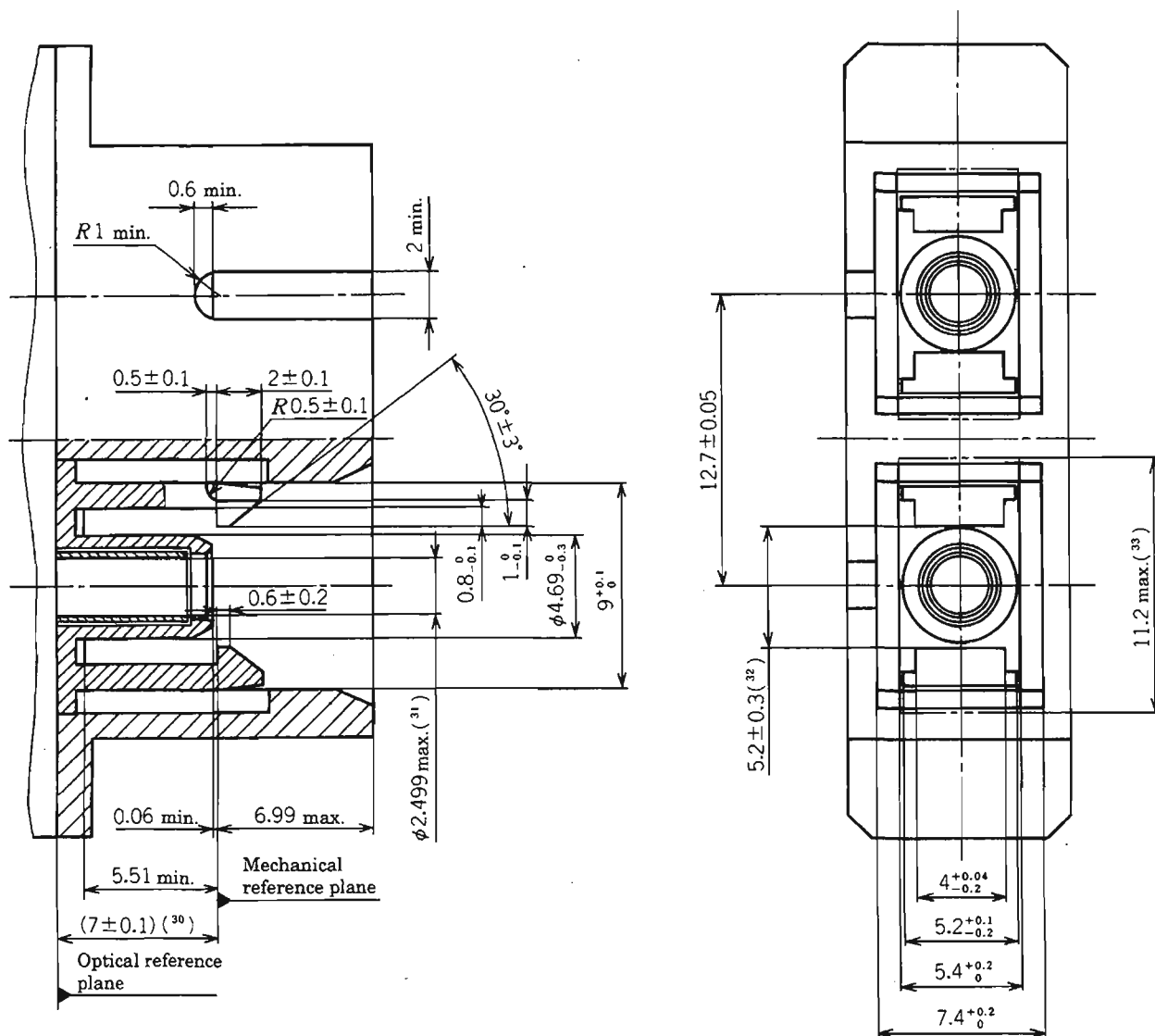
Unit : mm



- Notes (23) The shape of external periphery up to 1.2 mm from the ferrule end face is optional.
- (24) This dimension is the design distance from the mechanical reference plane to the ferrule end face under optically connected state engaged with the mating optical connector and is not the subject of measurement.
- (25) The ferrule shall be so constructed that it can be displaced rightwards in the figure against the elastic force.
- (26) This dimension is the minimum necessary dimension after grinding of the ferrule end face and this is not the subject of measurement.
- (27) The coupling sleeve shall be so constructed that release of coupling with the adapter is possible by moving it to the right in this figure when separation from the adapter is desired.
- (28) This dimension is given under such state that the coupling sleeve is moved to the right side in this figure, and is not the subject of measurement.
- (29) This dimension is not applicable when two individual plugs are freely connected.

Fig. 4 Optical connector mating part (two-core plug)

Unit : mm



Notes (30) This dimension is the design distance from the mechanical reference plane to the ferrule end face in the adapter under optically connected state engaged with the plug, and is not the subject of measurement.

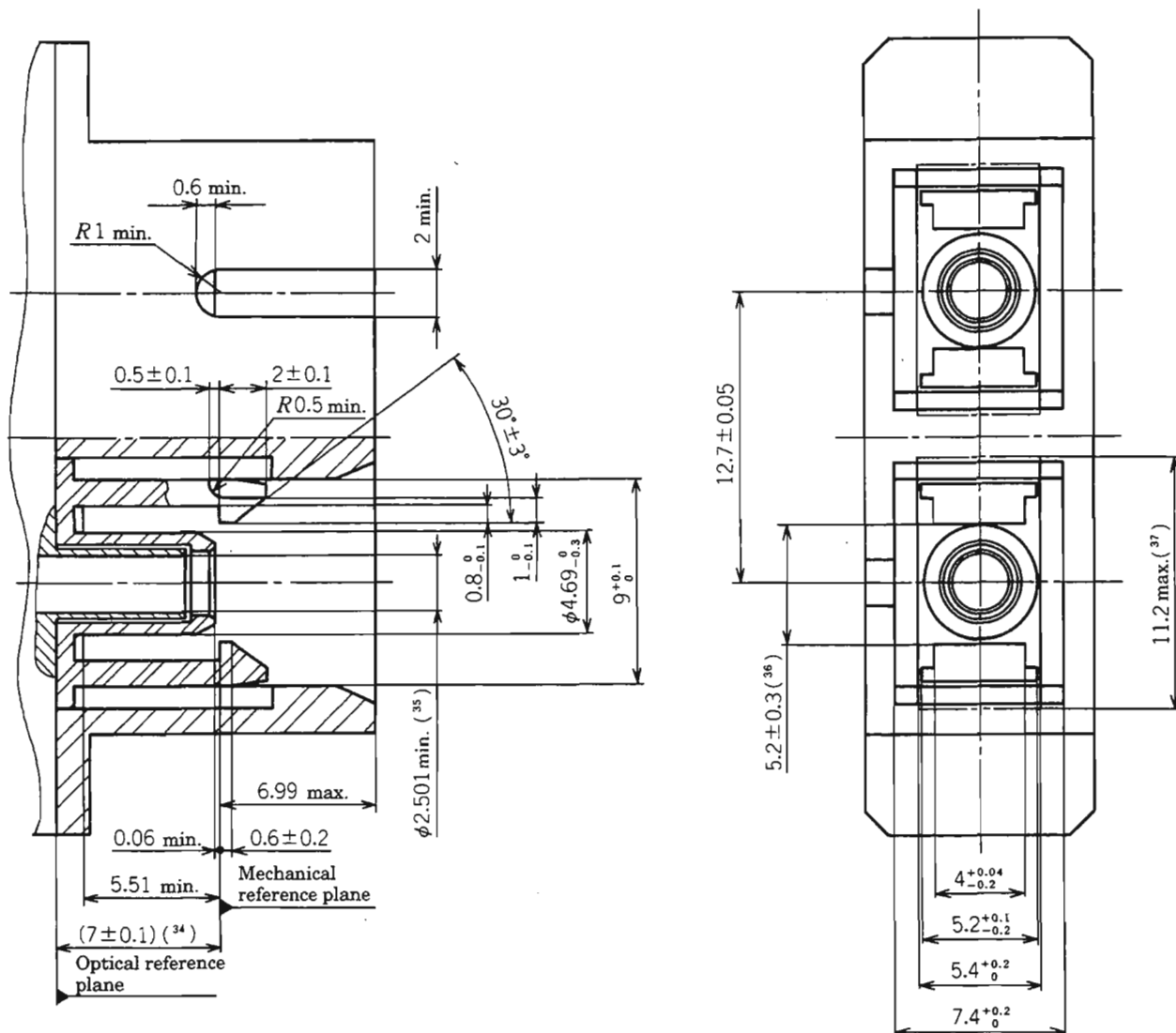
(31) This dimension is given when an elastic sleeve is used, and shall be at least $\phi 2.501$ mm in the case of a non-elastic sleeve.

(32) The adapter shall be so constructed that this part opens at least $\phi 6.8$ mm when the plug is mated and separated.

(33) The shape shown by the double dots and single dash line is allowed.

Fig. 5 Optical connector mating part (two-core adapter)

Unit : mm



Notes (34) This dimension is the design distance from the mechanical reference plane to the ferrule end face in the receptacle under optically connected state engaged with the plug, and is not the subject of measurement.

(35) This dimension is given when a non-elastic sleeve is used and shall be not more than $\phi 2.499$ mm in the case of an elastic sleeve.

(36) The receptacle shall be so constructed that this part opens at least 6.8 mm when the plug is mated and separated.

(37) The shape shown by the double dots and single dash line is allowed.

Fig. 6 Optical connector mating part (two-core receptacle)

7 Tests The tests shall be as specified below. However, for grade X the tests are subject to agreement between the parties concerned with acceptance.

- (1) **Standard conditions of test site** The standard conditions of test site shall be as specified in **6.1** of **JIS C 5962**.
- (2) **Test items** The test items shall be as stated in Attached Table 1 based on the provision in **6.3** of **JIS C 5962**.

8 Markings The markings shall be as specified in **7** of **JIS C 5962**.