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# STANDARD SPECIFICATIONS

FOR

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IMAGEFIBERS

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(For all sales offices)

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**Fujikura Ltd.**

## **STANDARD SPECIFICATIONS FOR IMAGEFIBERS**

### **1. General**

These specifications cover Fujikura's standard imagefibers for all sales offices and markets.

- 1) Imagefiber (FIG series)
- 2) Ultrathin imagefiber (FIGH series S-type, N-type, G-type and PI-type)
- 3) Radiation resistant imagefiber (FIGR series)

### **2. Material**

- Material of imagefiber shall be Silica based glass.
- Material of coating shall be as shown on Tables 1~8.

### **3. Specification**

- The specifications shall be as shown on Tables 1 to 8.
- End surface of imagefiber shall be polished for Fujikura's factory inspection purpose in case there is no specific requirement from buyer. Standard polishing level is "Polished for inspection"
- Fine polished imagefiber at end surface is also available. Buyer, who is need of fine polish, shall specify so in his inquiry.
- Polish method agreed by buyer and Fujikura shall be clearly mentioned in buyer's purchase order. End surface shall be polished for inspection in case it is not clearly mentioned in buyer's purchase order.

### **4. Packing**

- Packing shall be as per Fujikura standard.

### **5. Permissible Temperature**

- PI-type: Max.300 °C
- All types except PI-type: Max.150 °C

### **6. Length**

Standard maximum length per piece shall be as follows.

Number of picture elements	up to 20,000:	3,000 mm
	30,000 ~100,000:	1,000 mm

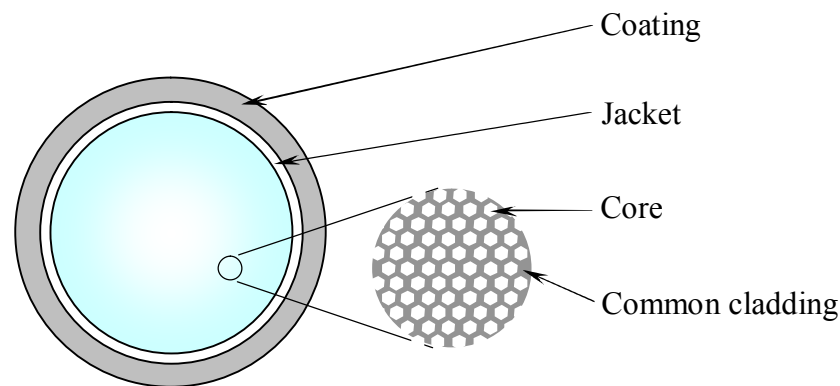
In case of longer length per piece: To be discussed.

Length per piece agreed by buyer and Fujikura shall be clearly mentioned in buyer's purchase order.

Length tolerance is defined as below,

$L \leq 0.5\text{m}$	+5mm / -0mm
$0.5\text{m} < L \leq 5\text{m}$	+1% / -0%
$L > 5\text{m}$	+2% / -0%

### 7. Cross section of structure



### 8. Instruction for use of our products

- Our products should not be bent under the minimum bending radius recommended by Fujikura.
- Our products should not be hit by hard objects, especially the end surface of fiber which is so delicate, it might be broken off on impact.
- Coating surface should not be wiped or scraped off by a cloth containing alcohol or other acid/alkaline solvent.
- Heat treatment should not be applied for our products.

### 9. Warranty

- Warranty period in respect of the conformity to this specification shall be 12 months from the date described in AIR WAY BILL.
- In case any non-conformity found during above mentioned warranty period and the cause having been clearly proven to be attributable to Fujikura, Fujikura shall deliver the defective section within reasonable time without any cost to buyer.
- In case buyer finds non-conformity during the above mentioned warranty period, buyer shall promptly deliver a non-conformity notice to Fujikura along with the product.

- d) It is guaranteed that the total number of lattice defects is less than 0.1% of the number of pixels. Lattice defect is defined as black area larger than one pixel in the image circle except edge area.
- e) For any application, all necessary test and evaluation for its application shall be done at customer's responsibility. Our products are not certified as medical device or any other special usage.

#### **10. Natural Twisting Angle**

- Natural twisting angle of imagefiber cannot be specified and guaranteed in case there is no specific requirement at the time of inquiry and the value agreed by buyer and Fujikura is not clearly mentioned in buyer's purchase order.

#### **11. Remarks**

- All specifications are subject to change without notice.
- Customized products are also available.
- All products shall not be stored in humid and high temperature conditions.

-----End of Specification-----

# IMAGEFIBER SPECIFICATIONS

(FIGH series N-type 6K-15K and G-type 6K)

Tables 1

Item	FIGH-06-350G	FIGH-06-400N	FIGH-10-500N	FIGH-15-600N
Number of picture elements	6000 ± 600	6000 ± 600	10000 ± 1000	15000 ± 1500
Imagecircle diameter (μm)	325 ± 20	370 ± 25	460 ± 25	550 ± 30
Fiber diameter (μm)	350 ± 20	400 ± 25	500 ± 25	600 ± 30
Coating diameter (μm)	420 ± 30	500 ± 30	600 ± 35	700 ± 35
Minimum bending radius (mm)	35 <sup>*1</sup> ( 20 <sup>*2</sup> )	40 <sup>*1</sup> ( 20 <sup>*2</sup> )	50 <sup>*1</sup> ( 25 <sup>*2</sup> )	60 <sup>*1</sup> ( 30 <sup>*2</sup> )
Coating material	Silicone resin (Black)			
Lattice defect (%)	< 0.1			
Uncircularity (%)	< 5			

\*1:Minimum bending radius in storage

\*2:Recommending bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

(FIGH series N-type 30K and G-type 17K, 30K, 40K)

Tables 2

Item	FIGH-17-600G	FIGH-30-800G	FIGH-30-850N	FIGH-40-920G
Number of picture elements	17000 ± 1700	30000 ± 3000	30000 ± 3000	40000 ± 4000
Imagecircle diameter (μm)	560 ± 30	750 ± 40	790 ± 50	854 ± 30
Fiber diameter (μm)	600 ± 30	800 ± 40	850 ± 50	920 ± 30
Coating diameter (μm)	680 ± 35	950 ± 50	950 ± 50	1,030 ± 40
Minimum bending radius (mm)	60 <sup>*1</sup> ( 30 <sup>*2</sup> )	80 <sup>*1</sup> ( 40 <sup>*2</sup> )	90 <sup>*1</sup> ( 50 <sup>*2</sup> )	100 <sup>*1</sup> ( 70 <sup>*2</sup> )
Coating material	Silicone resin (Black)			
Lattice defect (%)	< 0.1			
Uncircularity (%)	< 5			

\*1:Minimum bending radius in storage

\*2:Recommending bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

(FIGH series N-type 50K-100K)

Tables 3

Item	FIGH-50-1100N	FIGH-60-1200N	FIGH-100-1500N
Number of picture elements	50000 ± 5000	60000 ± 6000	100000 ± 10000
Imagecircle diameter (μm)	1,025 ± 80	1,116 ± 50	1,400 ± 120
Fiber diameter (μm)	1,100 ± 80	1,200 ± 50	1,500 ± 120
Coating diameter (μm)	1,200 ± 100	1,275 ± 80	1,700 ± 150
Minimum bending radius (mm)	110 <sup>*1</sup> ( 80 <sup>*2</sup> )	150 <sup>*1</sup> ( 100 <sup>*2</sup> )	200 <sup>*1</sup> ( 130 <sup>*2</sup> )
Coating material	Silicone resin (Black)		
Lattice defect (%)	< 0.1		
Uncircularity (%)	< 5		

\*1:Minimum bending radius in storage

\*2:Recommending bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

Tables 4

(FIGH series S-type 1.6K-3K)

Item	FIGH-016-160S	FIGH-03-200S	FIGH-03-215S
Number of picture elements	1600 ± 160	3000 ± 300	3000 ± 300
Imagecircle diameter (μm)	145 ± 15	186 ± 15	190 ± 20
Fiber diameter (μm)	160 ± 20	200 ± 15	215 ± 25
Coating diameter (μm)	210 ± 30	250 ± 20	285 ± 30
Minimum bending radius (mm)	20 <sup>*1</sup> ( 10 <sup>*2</sup> )	25 <sup>*1</sup> ( 15 <sup>*2</sup> )	25 <sup>*1</sup> ( 15 <sup>*2</sup> )
Coating material	Silicone resin (Black)		
Lattice defect (%)	< 0.1		
Uncircularity (%)	< 5		

\*1:Minimum bending radius in storage

\*2:Recommended bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)



# IMAGEFIBER SPECIFICATIONS

(FIGH series S-type 6K-30K)

Tables 5

Item	FIGH-06-280S	FIGH-06-300S	FIGH-10-350S	FIGH-30-650S
Number of picture elements	6000 ± 600	6000 ± 600	10000 ± 1000	30000 ± 3000
Imagecircle diameter (μm)	252 ± 20	270 ± 20	325 ± 20	600 ± 30
Fiber diameter (μm)	280 ± 20	300 ± 25	350 ± 25	650 ± 30
Coating diameter (μm)	340 ± 30	400 ± 30	450 ± 30	750 ± 50
Minimum bending radius (mm)	30 <sup>*1</sup> ( 15 <sup>*2</sup> )	30 <sup>*1</sup> ( 15 <sup>*2</sup> )	35 <sup>*1</sup> ( 20 <sup>*2</sup> )	70 <sup>*1</sup> ( 35 <sup>*2</sup> )
Coating material	Silicone resin (Black)			
Lattice defect (%)	< 0.1			
Uncircularity (%)	< 5			

\*1:Minimum bending radius in storage

\*2:Recommending bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

(FIGH series PI-type 6K-40K)

Tables 6

Item	FIGH-06-300PI	FIGH-10-500PI	FIGH-30-850PI	FIGH-35-900PI	FIGH-40-900PI
Number of picture elements	6000 ± 600	10000 ± 1000	30000 ± 3000	35000 ± 3500	40000 ± 4000
Imagecircle diameter (μm)	270 ± 20	460 ± 25	790 ± 50	830 ± 50	830 ± 50
Fiber diameter (μm)	300 ± 25	500 ± 25	850 ± 50	900 ± 50	900 ± 50
Coating diameter (μm)	350 ± 30	550 ± 35	900 ± 50	950 ± 50	950 ± 50
Minimum bending radius (mm)	30* <sup>1</sup> (15* <sup>2</sup> )	50* <sup>1</sup> (25* <sup>2</sup> )	120* <sup>1</sup> (60* <sup>2</sup> )	120* <sup>1</sup> (60* <sup>2</sup> )	120* <sup>1</sup> (60* <sup>2</sup> )
Coating material	Polyimide (Black)				
Lattice defect (%)	< 0.1				
Uncircularity (%)	< 5				

\*1:Minimum bending radius in storage

\*2:Recommended bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

(FIG series 10K-30K)

Tables 7

Item	FIG-10	FIG-20	FIG-30
Number of picture elements	10000 ± 1000	20000 ± 2000	30000 ± 3000
Imagecircle diameter (μm)	1100 ± 100	1800 ± 100	2200 ± 150
Fiber diameter (μm)	1240 ± 100	2000 ± 100	2400 ± 150
Coating diameter (μm)	1600 ± 100	2200 ± 100	2600 ± 150
Minimum bending radius (mm)	225* <sup>1</sup> (150* <sup>2</sup> )	300* <sup>1</sup> (200* <sup>2</sup> )	375* <sup>1</sup> (250* <sup>2</sup> )
Coating material	Epoxy Resin		
Lattice defect (%)	< 0.1		
Uncircularity (%)	< 5		

\*1:Minimum bending radius in storage

\*2:Recommended bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

# IMAGEFIBER SPECIFICATIONS

Tables 8

(FIGR series 10K-30K)

Item	FIGR-10	FIGR-20	FIGR-30
Number of picture elements	10000 ± 1000	20000 ± 2000	30000 ± 3000
Imagecircle diameter (μm)	1100 ± 100	1400 ± 100	1850 ± 150
Fiber diameter (μm)	1200 ± 100	1500 ± 100	2000 ± 150
Coating diameter (μm)	1500 ± 100	1900 ± 150	2400 ± 200
Minimum bending radius (mm)	300 <sup>*1</sup> ( 200 <sup>*2</sup> )	375 <sup>*1</sup> ( 250 <sup>*2</sup> )	450 <sup>*1</sup> ( 300 <sup>*2</sup> )
Coating material	Epoxy resin		
Lattice defect (%)	< 0.1		
Uncircularity (%)	< 5		

\*1:Minimum bending radius in storage

\*2:Recommended bending radius in use for short period of time.

(For your reference only, possible breakages due to static fatigue)

Product Name : IMAGEFIBERS (For all sales offices)

History of Revision

DCR no.	Rev.	Content of Revision		Writer	Approved	Revised date
		Item	Description and Reason for change			
B-07D9045			Initial release	Suzaki	Seto	07.07.20
	A	6/9,8/9	Amended due to error in description Image circle diameter of FIGH-016-160S was 140±15um now 145±15um, and Fiber diameter of FIG-10 was 1250±100um now 1240±100um	Suzaki	Seto	08.12.08
	B	9/9	Minimum bending radius of FIGR-30 changed from 350mm to 300mm.	Lin	Suzaki	09.12.10
	C	8/9, 9/9	Added minimum bending radius in storage.	Lin	Suzaki	10.10.25
	D		Added new image fibers	Lin	Suzaki	11.09.01
	E		Removed extra page	Lin	Suzaki	11.10.14
	F	3, 6	Added Polishing level and length tolerances	Sato	Suzaki	12.8.7
	G		FIGH-70-1300N eliminated and FIGH-60-1200N added.	Sato	Suzaki	13.2.26
	H		FIGH-50-1100PI eliminated FIGH-35-900PI and FIGH-40-900PI added FIG-50 eliminated	Toriya	Suzaki	14.1.28
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END