

# Ferrite Cores

## For High Frequency Welding Impeder Cores

## IPH Series

### IMPEDERS FOR HIGH FREQUENCY WELDING

An impeder core is an essential accessory for the welding of tubes and pipes using high frequency waveguide heating. The characteristics and durability of the impeder core have a significant effect on the efficiency and stability of the welding process. Thanks to advances in technology and experience gained from manufacturing with IP1 (TDK's previous impeder material), the new IPH material provides high efficiency, energy savings, and long lifetimes.

### APPLICATIONS

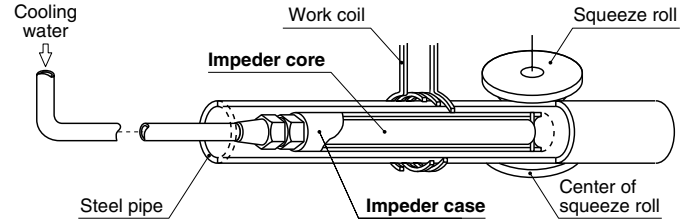
Pipe welding

### FEATURES

IPH has a much lower reluctance than IP1 (60% lower according to our measurements). The result is that internal heating, which reduces the saturation magnetic flux density, can be suppressed, and the welding process is very efficient.

### PIPE WELDING USING AN IMPEDER CORE

The impeder core concentrates the magnetic flux generated by the work coil into the area of the pipe joint. Consequently, use of an impeder core massively increases the efficiency of the welding process.



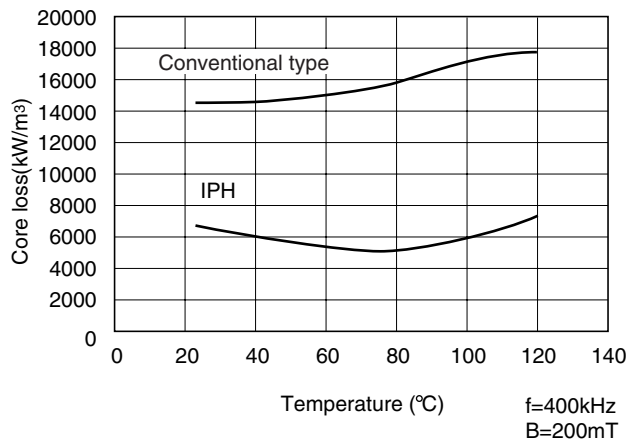
### CHARACTERISTICS OF THE MATERIAL IPH

Initial permeability ( $\mu$ )	1800±25%	(H=0.24A/m, f=100kHz, at23°C)
Saturation magnetic flux density (Bs)	≥ 490mT	(H=1194A/m, at23°C)
Core loss (Pcv)	≤ 10000kW/m <sup>3</sup> (f=400kHz, B=200mT, at100°C)	
Curie temperature (Tc)	>200°C	
Density (d)	4.8×10 <sup>3</sup> kg/m <sup>3</sup>	
Resistivity ( $\rho$ )	3.0Ω•m	

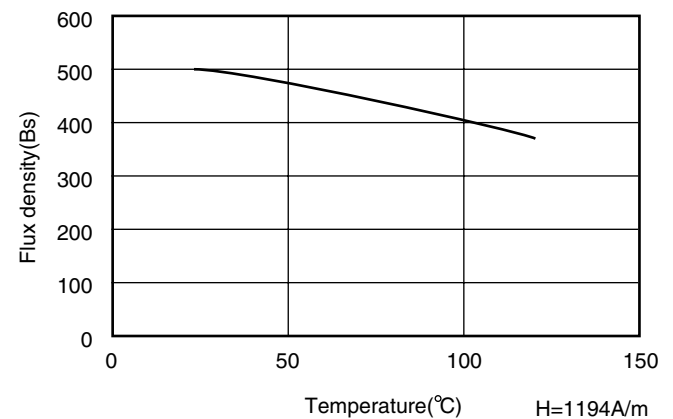
\*Measurements based on a toroidal core

### IMPEDER CORES

Core loss vs. Temperature



Saturation magnetic flux density vs. Temperature



# Ferrite Cores

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## IPH Series

### ZR TYPE FEATURES

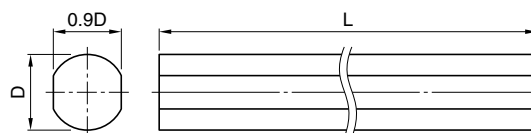
ZR type impeder cores have a truncated circular cross-section and are widely used in small pipes. In medium or large pipes, they can be combined to make a multiple-core impeder.

### CAUTION

Please take care to only use an impeder case with an appropriate internal diameter.

The smaller impeder case of recommended internal diameter may occur not to be inserted the impeder core.

Before using this product, please note that it is not guaranteed for use as anything other than an impeder.



Part No. (D×L)	External diameter D	Length L	Lengthwise structure	Recommended internal diameter of impeder case
IPH ZR3×200	3±0.20	200±3.0	One piece	4
IPH ZR4×200	4±0.20	200±3.0	One piece	5
IPH ZR5×200	5±0.25	200±3.0	One piece	6
IPH ZR6×200	6±0.25	200±3.0	One piece	7
IPH ZR7×200	7±0.20	200±3.0	One piece	8
IPH ZR8×200	8±0.20	200±3.0	One piece	9
IPH ZR9×200	9±0.25	200±3.0	One piece	10
IPH ZR10×200	10±0.25	200±3.0	One piece	11
IPH ZR11×200	11±0.30	200±3.0	One piece	12
IPH ZR12×200	12±0.30	200±3.0	One piece	13
IPH ZR13×200	13±0.35	200±3.0	One piece	14
IPH ZR14×200	14±0.35	200±3.0	One piece	15
IPH ZR15×200	15±0.40	200±3.0	One piece	16
IPH ZR16×200	16±0.40	200±3.0	One piece	17
IPH ZR17×200	17±0.45	200±3.0	One piece	18
IPH ZR18×200	18±0.45	200±3.0	One piece	19
IPH ZR19×200	19±0.50	200±3.0	One piece	20
IPH ZR20×200	20±0.50	200±3.0	One piece	21
IPH ZR21×200	21±0.55	200±3.0	One piece	22
IPH ZR22×200	22±0.55	200±3.0	One piece	23

Dimensions in mm

Part No. (D×L)	External diameter D	Length L	Lengthwise structure	Recommended internal diameter of impeder case
IPH ZR23×200	23±0.60	200±3.0	2 pieces joined	24
IPH ZR24×200	24±0.60	200±3.0	2 pieces joined	25
IPH ZR25×200	25±0.65	200±3.0	2 pieces joined	26
IPH ZR26×200	26±0.65	200±3.0	2 pieces joined	27
IPH ZR27×200	27±0.70	200±3.0	8 pieces joined	28
IPH ZR28×200	28±0.70	200±3.0	8 pieces joined	29
IPH ZR29×200	29±0.75	200±3.0	8 pieces joined	30
IPH ZR30×200	30±0.75	200±3.0	8 pieces joined	31
IPH ZR35×200	35±0.90	200±3.0	10 pieces joined	37
IPH ZR40×200	40±1.00	200±3.0	10 pieces joined	42

### PRODUCT IDENTIFICATION

$$\frac{\text{IPH}}{(1)} \frac{\text{ZR}}{(2)} \frac{10}{(3)} \times \frac{200}{(4)}$$

- (1) Material
- (2) Shape
- (3) External diameter D
- (4) Length L

# Ferrite Cores

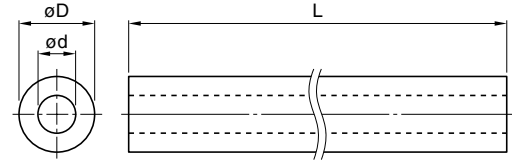
## For High Frequency Welding Impeder Cores

# IPH Series

### ZRH TYPE FEATURES

The ZRH type is tubular, with the center hole permitting the flow of cooling water. These impeder cores are used individually, in both small and large diameter pipes.

A service bit can be passed through the center hole, but please be very careful when using a service bit, as the condition of the center hole may make insertion of the bit difficult.



### CAUTION

Please take care to only use an impeder case with an appropriate internal diameter.

The smaller impeder case of recommended internal diameter may occur not to be inserted the impeder core.

Before using this product, please note that it is not guaranteed for use as anything other than an impeder.

Dimensions in mm

Part No. (D×L×d)	External Diameter D	Length L	Internal diameter d	Lengthwise structure	Recommended internal diameter of impeder case
IPH ZRH6×200×3	6±0.25	200±3.0	3±0.2	One piece	7
IPH ZRH7×200×3	7±0.25	200±3.0	3±0.2	One piece	8
IPH ZRH8×200×4	8±0.25	200±3.0	4±0.2	One piece	9
IPH ZRH9×200×4	9±0.30	200±3.0	4±0.2	One piece	10
IPH ZRH10×200×5	10±0.30	200±3.0	5±0.25	One piece	11
IPH ZRH11×200×5	11±0.35	200±3.0	5±0.25	One piece	12
IPH ZRH12×200×6	12±0.35	200±3.0	6±0.25	One piece	13
IPH ZRH13×200×6	13±0.40	200±3.0	6±0.25	One piece	14
IPH ZRH14×200×7	14±0.40	200±3.0	7±0.25	One piece	15
IPH ZRH15×200×7	15±0.45	200±3.0	7±0.25	One piece	16
IPH ZRH16×200×8	16±0.50	200±3.0	8±0.25	One piece	17
IPH ZRH17×200×8	17±0.50	200±3.0	8±0.25	One piece	18
IPH ZRH18×200×9	18±0.55	200±3.0	9±0.30	One piece	19
IPH ZRH19×200×9	19±0.55	200±3.0	9±0.30	One piece	20
IPH ZRH20×200×10	20±0.60	200±3.0	10±0.30	One piece	21
IPH ZRH21×200×10	21±0.60	200±3.0	10±0.30	One piece	22
IPH ZRH22×200×11	22±0.65	200±3.0	11±0.35	One piece	23
IPH ZRH23×200×11	23±0.60	200±3.0	11±0.30	8 pieces joined	24
IPH ZRH24×200×12	24±0.60	200±3.0	12±0.30	8 pieces joined	25
IPH ZRH25×200×12	25±0.65	200±3.0	12±0.30	8 pieces joined	26
IPH ZRH26×200×13	26±0.65	200±3.0	13±0.35	8 pieces joined	27
IPH ZRH27×200×13	27±0.70	200±3.0	13±0.35	8 pieces joined	28
IPH ZRH28×200×14	28±0.70	200±3.0	14±0.35	8 pieces joined	29
IPH ZRH29×200×14	29±0.75	200±3.0	14±0.35	8 pieces joined	30
IPH ZRH30×200×15	30±0.75	200±3.0	15±0.40	8 pieces joined	31
IPH ZRH32×200×16	32±0.80	200±3.0	16±0.40	8 pieces joined	34
IPH ZRH34×200×17	34±0.85	200±3.0	17±0.45	8 pieces joined	36
IPH ZRH36×200×18	36±0.90	200±3.0	18±0.45	8 pieces joined	38
IPH ZRH38×200×19	38±0.95	200±3.0	19±0.50	8 pieces joined	40
IPH ZRH40×200×20	40±1.00	200±3.0	20±0.50	8 pieces joined	42
IPH ZRH42×200×21	42±1.05	200±3.0	21±0.55	8 pieces joined	44
IPH ZRH44×200×22	44±1.10	200±3.0	22±0.55	8 pieces joined	46
IPH ZRH46×200×23	46±1.15	200±3.0	23±0.60	8 pieces joined	48
IPH ZRH48×200×24	48±1.20	200±3.0	24±0.60	8 pieces joined	50
IPH ZRH50×200×25	50±1.25	200±3.0	25±0.65	8 pieces joined	52
IPH ZRH52×200×26	52±1.30	200±3.0	26±0.65	8 pieces joined	54
IPH ZRH54×200×27	54±1.35	200±3.0	27±0.70	8 pieces joined	56
IPH ZRH56×200×28	56±1.40	200±3.0	28±0.70	10 pieces joined	58
IPH ZRH58×200×29	58±1.45	200±3.0	29±0.75	10 pieces joined	60
IPH ZRH60×200×30	60±1.50	200±3.0	30±0.75	10 pieces joined	62
IPH ZRH65×200×32	65±1.65	200±3.0	32±0.80	10 pieces joined	67
IPH ZRH70×200×35	70±1.75	200±3.0	35±0.90	10 pieces joined	73
IPH ZRH75×200×38	75±1.90	200±3.0	38±0.95	10 pieces joined	78
IPH ZRH80×200×40	80±2.00	200±3.0	40±1.00	10 pieces joined	83

### PRODUCT IDENTIFICATION

$$\frac{\text{IPH}}{(1)} \frac{\text{ZRH}}{(2)} \frac{10}{(3)} \times \frac{200}{(4)} \times \frac{5}{(5)}$$

- (1) Material
- (2) Shape
- (3) External diameter D
- (4) Length L
- (5) Internal diameter d

# Ferrite Cores

## For High Frequency Welding Impeder Cores

## IPH Series

### ZRS TYPE FEATURES

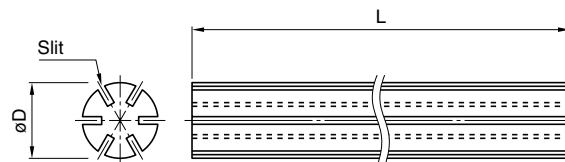
The ZRS type features deep grooves which permit improved cooling by ensuring that the entire core is optimally cooled.

### CAUTION

Please take care to only use an impeder case with an appropriate internal diameter.

The smaller impeder case of recommended internal diameter may occur not to be inserted the impeder core.

Before using this product, please note that it is not guaranteed for use as anything other than an impeder.



Dimensions in mm

Part No. (D×L)	External diameter D	Length L	Number of slit	Lengthwise structure	Recommended internal diameter of impeder case
IPH ZRS5×200	5±0.25	200±3.0	6	One piece	6
IPH ZRS6×200	6±0.25	200±3.0	6	One piece	7
IPH ZRS7×200	7±0.25	200±3.0	6	One piece	8
IPH ZRS8×200	8±0.25	200±3.0	6	One piece	9
IPH ZRS9×200	9±0.30	200±3.0	6	One piece	10
IPH ZRS10×200	10±0.30	200±3.0	8	One piece	11
IPH ZRS11×200	11±0.35	200±3.0	8	One piece	12
IPH ZRS12×200	12±0.35	200±3.0	8	One piece	13
IPH ZRS13×200	13±0.40	200±3.0	8	One piece	14
IPH ZRS14×200	14±0.40	200±3.0	8	One piece	15
IPH ZRS15×200	15±0.45	200±3.0	8	One piece	16
IPH ZRS16×200	16±0.50	200±3.0	8	One piece	17
IPH ZRS17×200	17±0.50	200±3.0	8	One piece	18
IPH ZRS18×200	18±0.55	200±3.0	8	One piece	19
IPH ZRS19×200	19±0.55	200±3.0	8	One piece	20
IPH ZRS20×200	20±0.60	200±3.0	8	One piece	21
IPH ZRS21×200	21±0.60	200±3.0	8	One piece	22
IPH ZRS22×200	22±0.55	200±3.0	8	8 pieces joined	23
IPH ZRS23×200	23±0.60	200±3.0	8	8 pieces joined	24
IPH ZRS24×200	24±0.60	200±3.0	8	8 pieces joined	25
IPH ZRS25×200	25±0.65	200±3.0	8	8 pieces joined	26
IPH ZRS30×200	30±0.75	200±3.0	8	8 pieces joined	31

### PRODUCT IDENTIFICATION

IPH ZRS 10 × 200  
(1) (2) (3) (4)

- (1) Material
- (2) Shape
- (3) External diameter D
- (4) Length L

# Ferrite Cores

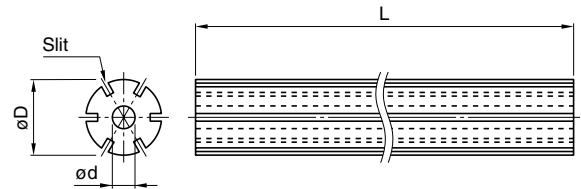
## IPH Series

### For High Frequency Welding Impeder Cores

#### ZRSH TYPE

##### FEATURES

The ZRSH type combines the features of the ZRS type and the ZRH type, with a center hole permitting the flow of cooling water. A service bit can be passed through the center hole, but please be very careful when using a service bit, as the condition of the center hole may make insertion of the bit difficult.



##### CAUTION

Please take care to only use an impeder case with an appropriate internal diameter.

The smaller impeder case of recommended internal diameter may occur not to be inserted the impeder core.

Before using this product, please note that it is not guaranteed for use as anything other than an impeder.

Dimensions in mm

Part No. (D×L×d)	External Diameter D	Length L	Internal diameter d	Number of slit	Lengthwise structure	Recommended internal diameter of impeder case
IPH ZRSH10×200×3	10±0.30	200±3.0	3±0.20	8	One piece	11
IPH ZRSH11×200×3	11±0.35	200±3.0	3±0.20	8	One piece	12
IPH ZRSH12×200×3	12±0.35	200±3.0	3±0.20	8	One piece	13
IPH ZRSH13×200×5	13±0.40	200±3.0	5±0.25	8	One piece	14
IPH ZRSH14×200×5	14±0.40	200±3.0	5±0.25	8	One piece	15
IPH ZRSH15×200×5	15±0.45	200±3.0	5±0.25	8	One piece	16
IPH ZRSH16×200×5	16±0.50	200±3.0	5±0.25	8	One piece	17
IPH ZRSH17×200×5	17±0.50	200±3.0	5±0.25	8	One piece	18
IPH ZRSH18×200×5	18±0.55	200±3.0	5±0.25	8	One piece	19
IPH ZRSH19×200×6	19±0.55	200±3.0	6±0.25	8	One piece	20
IPH ZRSH20×200×6	20±0.60	200±3.0	6±0.25	8	One piece	21
IPH ZRSH21×200×6	21±0.60	200±3.0	6±0.25	8	One piece	22
IPH ZRSH22×200×6	22±0.65	200±3.0	6±0.25	8	One piece	23
IPH ZRSH23×200×6	23±0.60	200±3.0	6±0.25	8	8 pieces joined	24
IPH ZRSH25×200×10	25±0.65	200±3.0	10±0.25	8	8 pieces joined	26
IPH ZRSH26×200×13	26±0.65	200±3.0	13±0.35	8	8 pieces joined	27
IPH ZRSH27×200×13	27±0.70	200±3.0	13±0.35	8	8 pieces joined	28
IPH ZRSH28×200×13	28±0.70	200±3.0	13±0.35	8	8 pieces joined	29
IPH ZRSH30×200×15	30±0.75	200±3.0	15±0.40	8	8 pieces joined	31
IPH ZRSH40×200×20	40±1.0	200±3.0	20±0.50	8	8 pieces joined	42

#### PRODUCT IDENTIFICATION

$$\frac{\text{IPH}}{(1)} \frac{\text{ZRSH}}{(2)} \frac{10}{(3)} \times \frac{200}{(4)} \times \frac{5}{(5)}$$

- (1) Material
- (2) Shape
- (3) External diameter D
- (4) Length L
- (5) Internal diameter d