

# Ferrite Cores

## For High Frequency Welding

### Impeder Cores

ZR, ZRH, ZRS, ZRSH Series

#### IMPEDER CORES 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

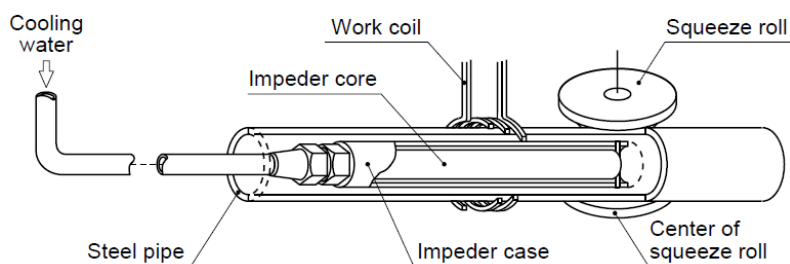
#### FEATURES

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.

#### IMPEDER CORES

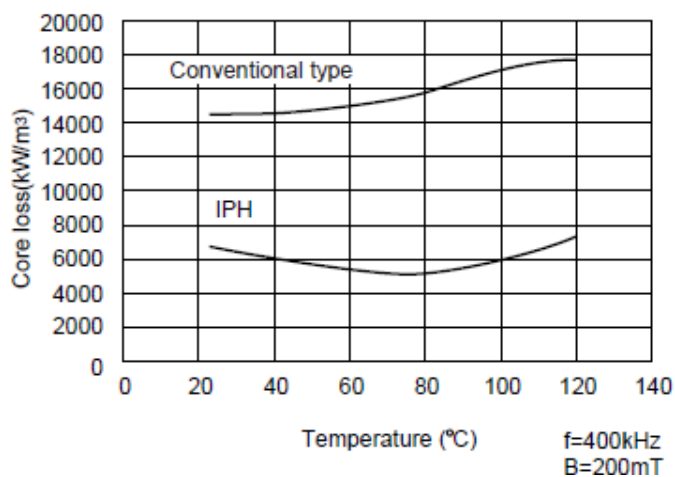


#### CHARACTERISTICS OF THE MATERIAL IPH\*

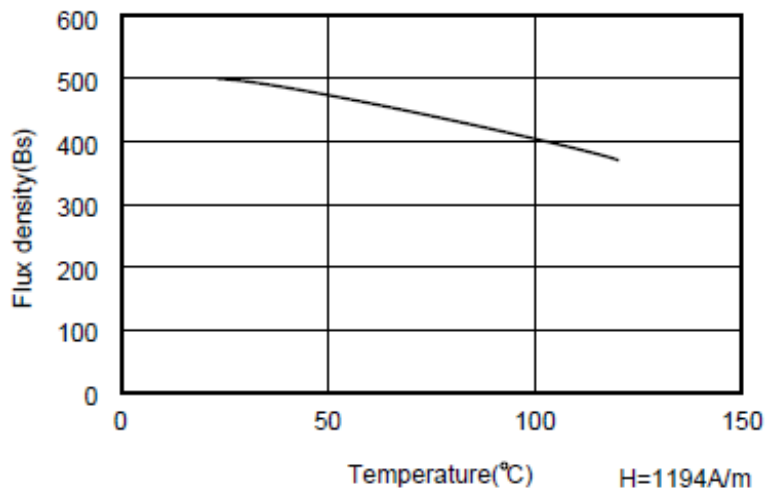
Initial permeability ( $\mu_i$ )	1800 $\pm$ 25%	(H=0.24A/m, f=100kHz, at23°C)
Saturation magnetic flux density (Bs)	500mT $\pm$ 10%	(H=1194A/m, at23°C)
Core loss (Pcv)	$\leq$ 10000kW/m <sup>3</sup>	(f=400kHz, B=200mT, at100°C)
Curie temperature (Tc)	>200°C	
Density (d)	4.8 $\times$ 10 <sup>3</sup> kg/m <sup>3</sup>	
Resistivity ( $\rho$ )	3.0 $\Omega$ ·m	

\*Measurements are based on a toroidal core

#### Core loss vs. Temperature



#### Saturation flux density vs. Temperature



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## For High Frequency Welding Impeder Cores

### ZR TYPE

### FEATURES

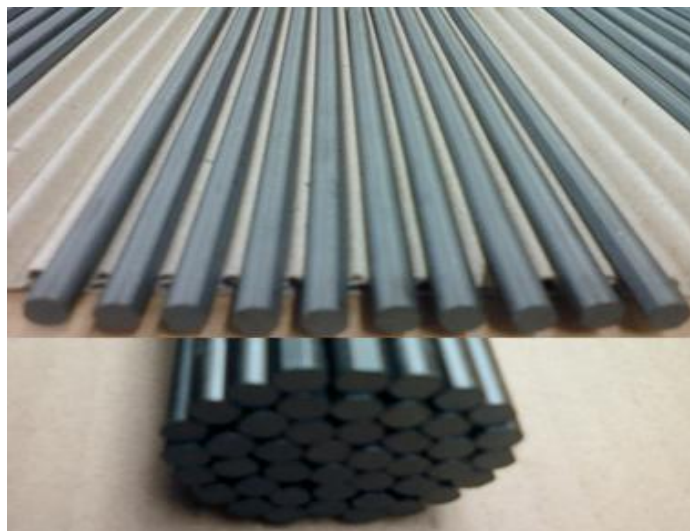
The ZR type impeder cores have a truncated circular cross-section and are widely used in small pipes. In medium or large pipes, they can be combined to make a multiple-core impeder.

### CAUTION

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

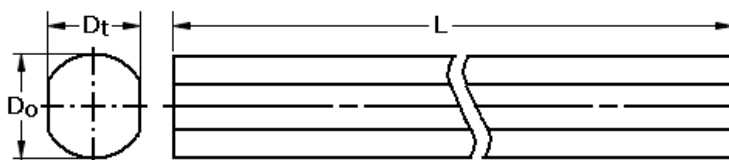
The impeder core may not be possible to insert into an impeder case, smaller than the recommended internal diameter.

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



### Overview of available sizes:

Overall length (L) of all the ZR type impeders, listed in the following table, is 200mm ± 3.0 or 7.874inch ± 0.118. For external diameter more than 22mm the overall length is realized by joining impeders of smaller lengths. Number of such pieces joined, lengthwise, for each type is mentioned against their Part No.s in the table.



Type	Part No.	External diameter(D <sub>o</sub> )		Truncated length(D <sub>t</sub> , Reference)		Number of pieces joined	Case internal diameter <sup>1)</sup>
		mm	inch	mm	inch		
ZR3/200	B67410Z0100X690	3±0.20	0.118±0.008	2.7	0.106	One piece	4
ZR4/200	B67410Z0101X690	4±0.20	0.157±0.008	3.6	0.142	One piece	5
ZR5/200	B67410Z0102X690	5±0.25	0.197±0.010	4.5	0.177	One piece	6
ZR6/200	B67410Z0103X690	6±0.25	0.236±0.010	5.4	0.213	One piece	7
ZR7/200	B67410Z0104X690	7±0.20	0.276±0.008	6.3	0.248	One piece	8
ZR8/200	B67410Z0105X690	8±0.20	0.315±0.008	7.2	0.283	One piece	9
ZR9/200	B67410Z0106X690	9±0.25	0.354±0.010	8.1	0.319	One piece	10
ZR10/200	B67410Z0107X690	10±0.25	0.394±0.010	9.0	0.354	One piece	11

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ZR TYPE

Overview of available sizes (continued):

Type	Part No.	External diameter(D <sub>o</sub> )		Truncated length(D <sub>t</sub> , Reference)		Number of pieces joined	Case internal diameter <sup>1)</sup>
ZR11/200	B67410Z0108X690	11±0.30	0.433±0.012	9.9	0.390	One piece	12
ZR12/200	B67410Z0109X690	12±0.30	0.472±0.012	10.8	0.425	One piece	13
ZR13/200	B67410Z0110X690	13±0.35	0.512±0.014	11.7	0.461	One piece	14
ZR14/200	B67410Z0111X690	14±0.35	0.551±0.014	12.6	0.496	One piece	15
ZR15/200	B67410Z0112X690	15±0.40	0.591±0.016	13.5	0.531	One piece	16
ZR16/200	B67410Z0113X690	16±0.40	0.630±0.016	14.4	0.567	One piece	17
ZR17/200	B67410Z0114X690	17±0.45	0.669±0.018	15.3	0.602	One piece	18
ZR18/200	B67410Z0115X690	18±0.45	0.709±0.018	16.2	0.638	One piece	19
ZR19/200	B67410Z0116X690	19±0.50	0.748±0.020	17.1	0.673	One piece	20
ZR20/200	B67410Z0117X690	20±0.50	0.787±0.020	18.0	0.709	One piece	21
ZR21/200	B67410Z0118X690	21±0.55	0.827±0.022	18.9	0.744	One piece	22
ZR22/200	B67410Z0119X690	22±0.55	0.866±0.022	19.8	0.780	One piece	23
ZR23/200	B67410Z0120X690	23±0.60	0.906±0.024	20.7	0.815	2 pieces	24
ZR24/200	B67410Z0121X690	24±0.60	0.945±0.024	21.6	0.850	2 pieces	25
ZR25/200	B67410Z0122X690	25±0.65	0.984±0.026	22.5	0.886	2 pieces	26
ZR26/200	B67410Z0123X690	26±0.65	1.024±0.026	23.4	0.921	2 pieces	27
ZR27/200	B67410Z0124X690	27±0.70	1.063±0.028	24.3	0.957	8 pieces	28
ZR28/200	B67410Z0125X690	28±0.70	1.102±0.028	25.2	0.992	8 pieces	29
ZR29/200	B67410Z0126X690	29±0.75	1.142±0.030	26.1	1.028	8 pieces	30
ZR30/200	B67410Z0127X690	30±0.75	1.181±0.030	27.0	1.063	8 pieces	31
ZR35/200	B67410Z0128X690	35±0.90	1.378±0.035	31.5	1.240	10 pieces	37
ZR40/200	B67410Z0129X690	40±1.00	1.575±0.039	36.0	1.417	10 pieces	42

<sup>1)</sup> Recommended value

# Ferrite Cores

ZR, ZRH, ZRS, ZRSH Series

## For High Frequency Welding Impeder Cores

### 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 use an impeder case with an appropriate internal diameter only.

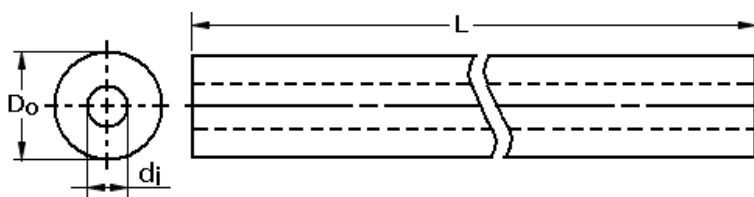
The impeder core may not be possible to insert into an impeder case, smaller than the recommended internal diameter.

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



### Overview of available sizes:

Overall length (L) of all the ZRH type impeders, listed in the following table, is 200mm ± 3.0 or 7.874inch ± 0.118. For external diameter more than 22mm the overall length is realized by joining impeders of smaller lengths. Number of such pieces joined, lengthwise, for each type is mentioned against their Part No.s in the table.



Type	Part No.	External diameter (D <sub>o</sub> )		Internal diameter (d <sub>i</sub> )		Number of pieces joined	Case internal diameter <sup>1)</sup>
		mm	inch	mm	inch		mm
ZRH6/200/3	B67410Z0200X690	6±0.25	0.236±0.010	3±0.20	0.118±0.008	One piece	7
ZRH7/200/3	B67410Z0201X690	7±0.25	0.276±0.010	3±0.20	0.118±0.008	One piece	8
ZRH8/200/4	B67410Z0202X690	8±0.25	0.315±0.010	4±0.20	0.157±0.008	One piece	9
ZRH9/200/4	B67410Z0203X690	9±0.30	0.354±0.012	4±0.20	0.157±0.008	One piece	10

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### ZRH TYPE

Overview of available sizes (continued):

Type	Part No.	External diameter (D <sub>o</sub> )		Internal diameter (d <sub>i</sub> )		Number of pieces joined	Case internal diameter <sup>1)</sup>
		mm	inch	mm	inch		mm
ZRH10/200/5	B67410Z0204X690	10±0.30	0.394±0.012	5±0.25	0.197±0.010	One piece	11
ZRH11/200/5	B67410Z0205X690	11±0.35	0.433±0.014	5±0.25	0.197±0.010	One piece	12
ZRH12/200/6	B67410Z0206X690	12±0.35	0.472±0.014	6±0.25	0.236±0.010	One piece	11
ZRH13/200/6	B67410Z0207X690	13±0.40	0.512±0.016	6±0.25	0.236±0.010	One piece	12
ZRH14/200/7	B67410Z0208X690	14±0.40	0.551±0.016	7±0.25	0.276±0.010	One piece	11
ZRH15/200/7	B67410Z0209X690	15±0.45	0.591±0.018	7±0.25	0.276±0.010	One piece	12
ZRH16/200/8	B67410Z0210X690	16±0.50	0.630±0.020	8±0.25	0.315±0.010	One piece	11
ZRH17/200/8	B67410Z0211X690	17±0.50	0.669±0.020	8±0.25	0.315±0.010	One piece	12
ZRH18/200/9	B67410Z0212X690	18±0.55	0.709±0.022	9±0.30	0.354±0.012	One piece	11
ZRH19/200/9	B67410Z0213X690	19±0.55	0.748±0.022	9±0.30	0.354±0.012	One piece	12
ZRH20/200/10	B67410Z0214X690	20±0.60	0.787±0.024	10±0.30	0.394±0.012	One piece	11
ZRH21/200/10	B67410Z0215X690	21±0.60	0.827±0.024	10±0.30	0.394±0.012	One piece	12
ZRH22/200/11	B67410Z0216X690	22±0.65	0.866±0.026	11±0.35	0.433±0.014	One piece	23
ZRH23/200/11	B67410Z0217X690	23±0.60	0.906±0.024	11±0.30	0.433±0.012	8 pieces	24
ZRH24/200/12	B67410Z0218X690	24±0.60	0.945±0.024	12±0.30	0.472±0.012	8 pieces	25
ZRH25/200/12	B67410Z0219X690	25±0.65	0.984±0.026	12±0.30	0.472±0.012	8 pieces	26
ZRH26/200/13	B67410Z0220X690	26±0.65	1.024±0.026	13±0.35	0.512±0.014	8 pieces	27
ZRH27/200/13	B67410Z0221X690	27±0.70	1.063±0.028	13±0.35	0.512±0.014	8 pieces	28
ZRH28/200/14	B67410Z0222X690	28±0.70	1.102±0.028	14±0.35	0.551±0.014	8 pieces	29
ZRH29/200/14	B67410Z0223X690	29±0.75	1.142±0.030	14±0.35	0.551±0.014	8 pieces	30
ZRH30/200/15	B67410Z0224X690	30±0.75	1.181±0.030	15±0.40	0.591±0.016	8 pieces	31
ZRH32/200/16	B67410Z0225X690	32±0.80	1.260±0.031	16±0.40	0.630±0.016	8 pieces	34
ZRH34/200/17	B67410Z0226X690	34±0.85	1.339±0.033	17±0.45	0.669±0.018	8 pieces	36

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ZRH TYPE

Overview of available sizes (continued):

Type	Part No.	External diameter (D <sub>o</sub> )		Internal diameter (d <sub>i</sub> )		Number of pieces joined	Case internal diameter <sup>1)</sup>
		mm	inch	mm	inch		mm
ZRH36/200/18	B67410Z0227X690	36±0.90	1.417±0.035	18±0.45	0.709±0.018	8 pieces	38
ZRH38/200/19	B67410Z0228X690	38±0.95	1.496±0.037	19±0.50	0.748±0.020	8 pieces	40
ZRH40/200/20	B67410Z0229X690	40±1.00	1.575±0.039	20±0.50	0.787±0.020	8 pieces	42
ZRH42/200/21	B67410Z0230X690	42±1.05	1.654±0.041	21±0.55	0.827±0.022	8 pieces	44
ZRH44/200/22	B67410Z0231X690	44±1.10	1.732±0.043	22±0.55	0.866±0.022	8 pieces	46
ZRH46/200/23	B67410Z0232X690	46±1.15	1.811±0.045	23±0.60	0.906±0.024	8 pieces	48
ZRH48/200/24 <sup>2)</sup>	B67410Z0233X690	48±1.20	1.890±0.047	24±0.60	0.945±0.024	8 pieces	50

1) Recommended value

2) Length=200 ± 1.5

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## ZRS TYPE

### FEATURES

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

### CAUTION

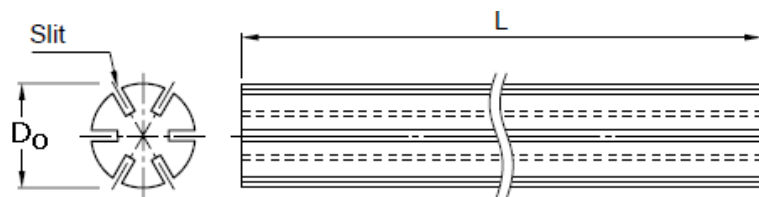
Please take care to use an impeder case with an appropriate internal diameter only.

The impeder core may not be possible to insert into an impeder case, smaller than the recommended internal diameter. Before using this product, please note that it is not guaranteed for use as anything other than an impeder.



### Overview of available sizes:

Overall length (L) of all the ZRS type impeders, listed in the following table, is 200mm ± 3.0 or 7.874inch ± 0.118. For external diameter more than 21mm the overall length is realized by joining impeders of smaller lengths. Number of such pieces joined, lengthwise, for each type is mentioned against their Part No.s in the table.



Type	Part No.	External diameter (D <sub>o</sub> )		Number of slits	Number of pieces joined	case internal diameter <sup>1)</sup>
		mm	inch			mm
ZRS5/200	B67410Z0300X690	5±0.25	0.197±0.010	6	One piece	6
ZRS6/200	B67410Z0301X690	6±0.25	0.236±0.010	6	One piece	7
ZRS7/200	B67410Z0302X690	7±0.25	0.276±0.010	6	One piece	8
ZRS8/200	B67410Z0303X690	8±0.25	0.315±0.010	6	One piece	9
ZRS9/200	B67410Z0304X690	9±0.30	0.354±0.012	6	One piece	10

## Ferrite Cores

For High Frequency Welding  
Impeder Cores

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### ZRS TYPE

Overview of available sizes (continued):

Type	Part No.	External diameter (D <sub>o</sub> )		Number of slits	Number of pieces joined	case internal diameter <sup>1)</sup>
		mm	inch			mm
ZRS10/200	B67410Z0305X690	10±0.30	0.394±0.012	8	One piece	11
ZRS11/200	B67410Z0306X690	11±0.35	0.433±0.014	8	One piece	12
ZRS12/200	B67410Z0307X690	12±0.35	0.472±0.014	8	One piece	13
ZRS13/200	B67410Z0308X690	13±0.40	0.512±0.016	8	One piece	14
ZRS14/200	B67410Z0309X690	14±0.40	0.551±0.016	8	One piece	15
ZRS15/200	B67410Z0310X690	15±0.45	0.591±0.018	8	One piece	16
ZRS16/200	B67410Z0311X690	16±0.50	0.630±0.020	8	One piece	17
ZRS17/200	B67410Z0312X690	17±0.50	0.669±0.020	8	One piece	18
ZRS18/200	B67410Z0313X690	18±0.55	0.709±0.022	8	One piece	19
ZRS19/200	B67410Z0314X690	19±0.55	0.748±0.022	8	One piece	20
ZRS20/200	B67410Z0315X690	20±0.60	0.787±0.024	8	One piece	21
ZRS21/200	B67410Z0316X690	21±0.60	0.827±0.024	8	One piece	22
ZRS22/200	B67410Z0317X690	22±0.55	0.866±0.022	8	8 pieces	23
ZRS23/200	B67410Z0318X690	23±0.60	0.906±0.024	8	8 pieces	24
ZRS24/200	B67410Z0319X690	24±0.60	0.945±0.024	8	8 pieces	25
ZRS25/200	B67410Z0320X690	25±0.65	0.984±0.026	8	8 pieces	26
ZRS30/200	B67410Z0321X690	30±0.75	1.181±0.030	8	8 pieces	31
ZRS27/200	B67410Z0322X690	27±0.75	1.063±0.030	8	8 pieces	28
ZRS7.5/200	B67410Z0323X690	7.5±0.25	0.295±0.010	6	One pieces	9

<sup>1)</sup> Recommended value



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## 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 use an impeder case with an appropriate internal diameter only.

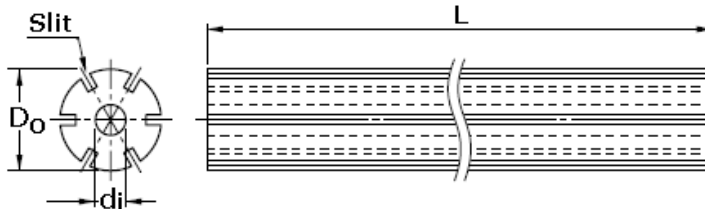
The impeder core may not be possible to insert into an impeder case, smaller than the recommended internal diameter.

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



### Overview of available sizes:

Overall length (L) of all the ZRSH type impeders, listed in the following table, is 200mm ± 3.0 or 7.874inch ± 0.118. For external diameter more than 22mm the overall length is realized by joining impeders of smaller lengths. Number of such pieces joined, lengthwise, for each type is mentioned against their Part No.s in the table.



Type	Part No.	External diameter (D <sub>o</sub> )		Internal diameter (d <sub>i</sub> )		Number of slits	Number of pieces joined	case internal diameter <sup>1)</sup>
		mm	inch	mm	inch			mm
ZRSH10/200/3	B67410Z0400X690	10±0.30	0.394±0.012	3±0.20	0.118±0.008	8	One piece	11
ZRSH11/200/3	B67410Z0401X690	11±0.35	0.433±0.014	3±0.20	0.118±0.008	8	One piece	12
ZRSH12/200/3	B67410Z0402X690	12±0.35	0.472±0.014	3±0.20	0.118±0.008	8	One piece	13
ZRSH13/200/5	B67410Z0403X690	13±0.40	0.512±0.016	5±0.25	0.197±0.010	8	One piece	14
ZRSH14/200/5	B67410Z0404X690	14±0.40	0.551±0.016	5±0.25	0.197±0.010	8	One piece	15
ZRSH15/200/5	B67410Z0405X690	15±0.45	0.591±0.018	5±0.25	0.197±0.010	8	One piece	16
ZRSH16/200/5	B67410Z0406X690	16±0.50	0.630±0.020	5±0.25	0.197±0.010	8	One piece	17
ZRSH17/200/5	B67410Z0407X690	17±0.50	0.669±0.020	5±0.25	0.197±0.010	8	One piece	18

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### ZRSH TYPE

#### Overview of available sizes (continued):

Type	Part No.	External diameter (D <sub>o</sub> )		Internal diameter (d <sub>i</sub> )		Number of slits	Number of pieces joined	case internal diameter <sup>1)</sup>
		mm	inch	mm	inch			mm
ZRSH18/200/5	B67410Z0408X690	18±0.55	0.709±0.022	5±0.25	0.197±0.010	8	One piece	19
ZRSH19/200/6	B67410Z0409X690	19±0.55	0.748±0.022	6±0.25	0.236±0.010	8	One piece	20
ZRSH20/200/6	B67410Z0410X690	20±0.60	0.787±0.024	6±0.25	0.236±0.010	8	One piece	21
ZRSH21/200/6	B67410Z0411X690	21±0.60	0.827±0.024	6±0.25	0.236±0.010	8	One piece	22
ZRSH22/200/6	B67410Z0412X690	22±0.65	0.866±0.026	6±0.25	0.236±0.010	8	One piece	23
ZRSH23/200/6	B67410Z0413X690	23±0.70	0.906±0.028	6±0.25	0.236±0.010	8	8 pieces	24
ZRSH25/200/10	B67410Z0414X690	25±0.65	0.984±0.026	10±0.25	0.394±0.010	8	8 pieces	26
ZRSH26/200/13	B67410Z0415X690	26±0.65	1.024±0.026	13±0.35	0.512±0.014	8	8 pieces	27
ZRSH27/200/13	B67410Z0416X690	27±0.70	1.063±0.028	13±0.35	0.512±0.014	8	8 pieces	28
ZRSH28/200/13	B67410Z0417X690	28±0.70	1.102±0.028	13±0.25	0.512±0.010	8	8 pieces	29
ZRSH30/200/15	B67410Z0418X690	30±0.75	1.181±0.030	15±0.40	0.591±0.016	8	8 pieces	31
ZRSH40/200/20	B67410Z0419X690	40±1.00	1.575±0.039	20±0.50	0.787±0.020	8	8 pieces	42

<sup>1)</sup> Recommended value

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## Compilation of ordering code:

	First block					Second block				Third block						
	B	6	7	4	1	0	Z	0	1	0	7	X	6	9	0	
↓		↓						↓		↓			↓	↓		
Code for passive components		Family of soft ferrite cores					Impeder core	*1.. -- ZR type *2.. -- ZRH type *3.. --ZRS type *4..-- ZRSH type		Serial numbers 00 - 99 for sizes of each types			Dummy character	Code number for material		

