



FERRITE CORES

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 , the new IPH material provides high efficiency, energy savings, and long lifetimes.

APPLICATIONS

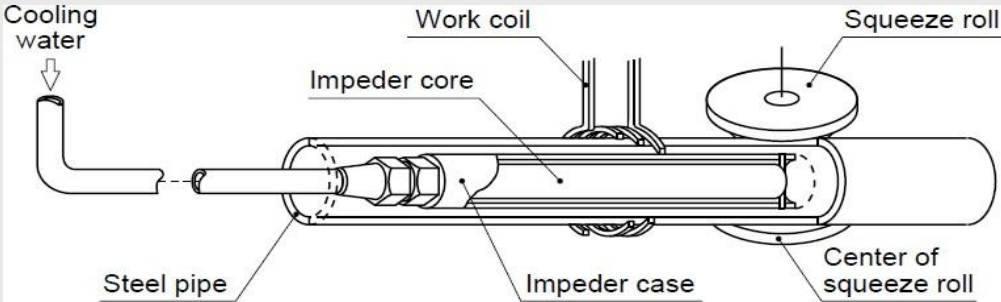
Pipe welding

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.

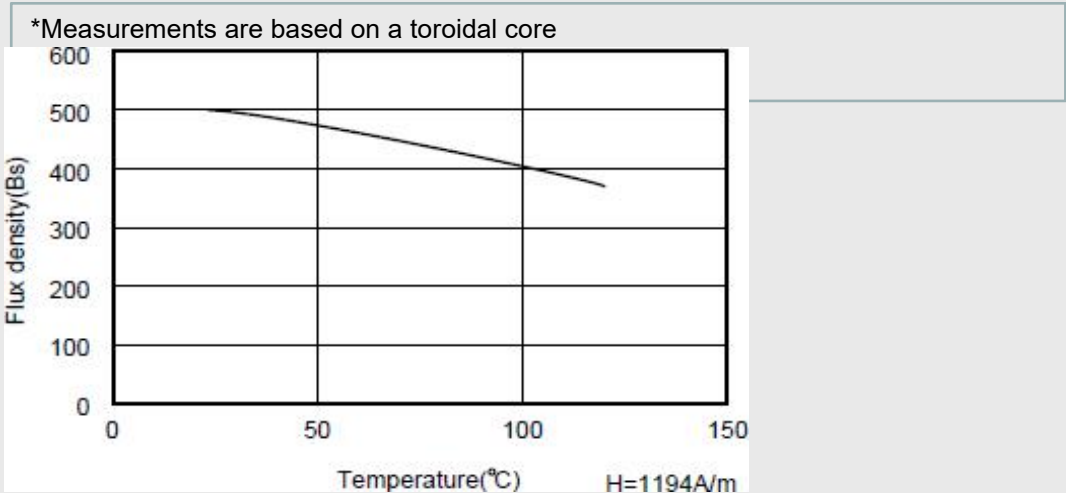
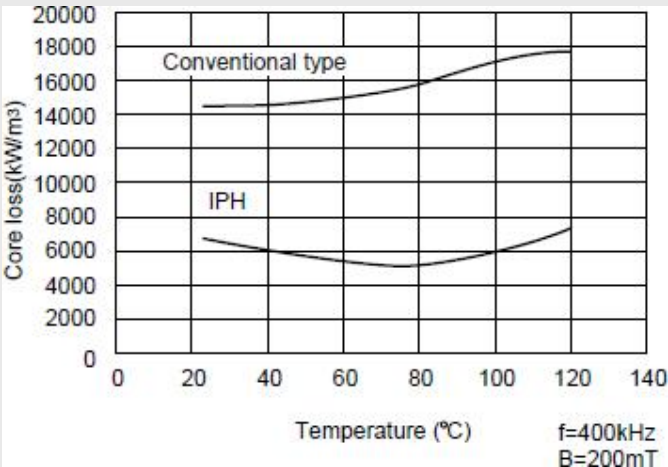
PIPE WELDING USING AN IMPEDER CORE

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(μ i)	$1800 \pm 25\%$	($H=0.24A/m, f=100kHz$, at $23^\circ C$)
Saturation magnetic flux density (Bs)	$500mT \pm 10\%$	($H=1194A/m$, at $23^\circ C$)
Core loss(Pcv)	$\leq 10000kW/m^3$	($f=400kHz, B=200mT$, at $100^\circ C$)
Curie temperature(T_c)	$>200^\circ C$	
Density(d)	$4.810^3kg/m^3$	
Resistivity(ρ)	$3.0\cdot m$	



Ferrite cores

ZR TYPE

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

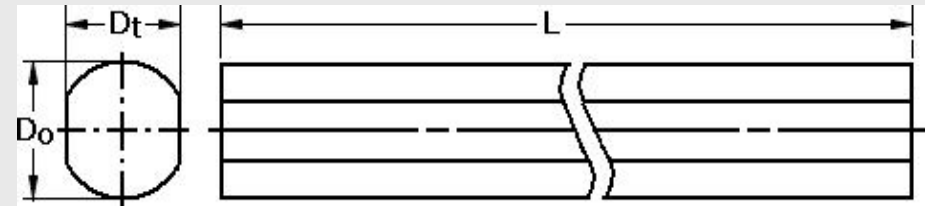
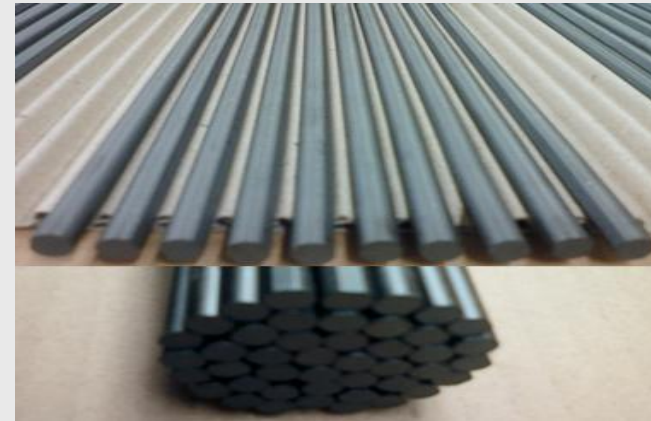
Please take care to use an impeder case with an appropriate internal diameter only.

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 \pm 3.0 or 7.874inch \pm 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	External diameter(D _o)		Truncated length (D _t Reference)		Number of pieces joined	Case internal diameter ¹⁾
	mm	inch	mm	inch		mm
ZR3/200	3 \pm 0.20	0.118 \pm 0.008	2.7	0.106	One piece	4
ZR4/200	4 \pm 0.20	0.157 \pm 0.008	3.6	0.142	One piece	5
ZR5/200	5 \pm 0.25	0.197 \pm 0.010	4.5	0.177	One piece	6
ZR6/200	6 \pm 0.25	0.236 \pm 0.010	5.4	0.213	One piece	7
ZR7/200	7 \pm 0.20	0.276 \pm 0.008	6.3	0.248	One piece	8
ZR8/200	8 \pm 0.20	0.315 \pm 0.008	7.2	0.283	One piece	9
ZR9/200	9 \pm 0.25	0.354 \pm 0.010	8.1	0.319	One piece	10
ZR10/200	10 \pm 0.25	0.394 \pm 0.010	9	0.354	One piece	11

Overview of available sizes (continued):

Type	External diameter(D _o)		Truncated length(D _t Reference)		Number of pieces joined	Case internal diameter ¹⁾
ZR11/200	11 ± 0.30	0.433 ± 0.012	9.9	0.39	One piece	12
ZR12/200	12 ± 0.30	0.472 ± 0.012	10.8	0.425	One piece	13
ZR13/200	13 ± 0.35	0.512 ± 0.014	11.7	0.461	One piece	14
ZR14/200	14 ± 0.35	0.551 ± 0.014	12.6	0.496	One piece	15
ZR15/200	15 ± 0.40	0.591 ± 0.016	13.5	0.531	One piece	16
ZR16/200	16 ± 0.40	0.630 ± 0.016	14.4	0.567	One piece	17
ZR17/200	17 ± 0.45	0.669 ± 0.018	15.3	0.602	One piece	18
ZR18/200	18 ± 0.45	0.709 ± 0.018	16.2	0.638	One piece	19
ZR19/200	19 ± 0.50	0.748 ± 0.020	17.1	0.673	One piece	20
ZR20/200	20 ± 0.50	0.787 ± 0.020	18	0.709	One piece	21
ZR21/200	21 ± 0.55	0.827 ± 0.022	18.9	0.744	One piece	22
ZR22/200	22 ± 0.55	0.866 ± 0.022	19.8	0.78	One piece	23
ZR23/200	23 ± 0.60	0.906 ± 0.024	20.7	0.815	2 pieces	24
ZR24/200	24 ± 0.60	0.945 ± 0.024	21.6	0.85	2 pieces	25
ZR25/200	25 ± 0.65	0.984 ± 0.026	22.5	0.886	2 pieces	26
ZR26/200	26 ± 0.65	1.024 ± 0.026	23.4	0.921	2 pieces	27
ZR27/200	27 ± 0.70	1.063 ± 0.028	24.3	0.957	8 pieces	28
ZR28/200	28 ± 0.70	1.102 ± 0.028	25.2	0.992	8 pieces	29
ZR29/200	29 ± 0.75	1.142 ± 0.030	26.1	1.028	8 pieces	30
ZR30/200	30 ± 0.75	1.181 ± 0.030	27	1.063	8 pieces	31
ZR35/200	35 ± 0.90	1.378 ± 0.035	31.5	1.24	10 pieces	37
ZR40/200	40 ± 1.00	1.575 ± 0.039	36	1.417	10 pieces	42

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

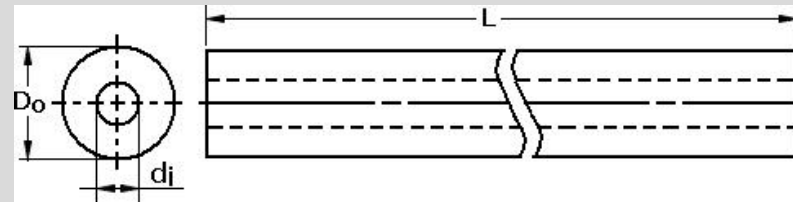
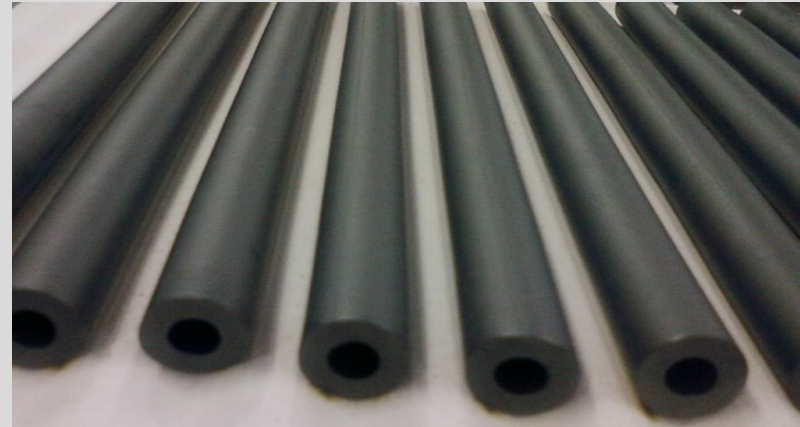
Please take care to use an impeder case with an appropriate internal diameter only.

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 $200\text{mm} \pm 3.0$ or $7.874\text{inch} \pm 0.118$. 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	Externaldiameter(D_o)		Internaldiameter(d_i)		Numberofpieces joined	Case internal diameter ¹⁾
	mm	inch	mm	inch		mm
ZRH6/200/3	6 ± 0.25	0.236 ± 0.010	3 ± 0.20	0.118 ± 0.008	Onepiece	7
ZRH7/200/3	7 ± 0.25	0.276 ± 0.010	3 ± 0.20	0.118 ± 0.008	Onepiece	8
ZRH8/200/4	8 ± 0.25	0.315 ± 0.010	4 ± 0.20	0.157 ± 0.008	Onepiece	9
ZRH9/200/4	9 ± 0.30	0.354 ± 0.012	4 ± 0.20	0.157 ± 0.008	Onepiece	10

Overview of available sizes (continued):

Type	External diameter(D _o)		Internal diameter(d _i)		Number of pieces joined	Case internal diameter ¹⁾
	mm	inch	mm	inch		
ZRH10/200/5	10±0.30	0.394±0.012	5±0.25	0.197±0.010	One piece	11
ZRH11/200/5	11±0.35	0.433±0.014	5±0.25	0.197±0.010	One piece	12
ZRH12/200/6	12±0.35	0.472±0.014	6±0.25	0.236±0.010	One piece	11
ZRH13/200/6	13±0.40	0.512±0.016	6±0.25	0.236±0.010	One piece	12
ZRH14/200/7	14±0.40	0.551±0.016	7±0.25	0.276±0.010	One piece	11
ZRH15/200/7	15±0.45	0.591±0.018	7±0.25	0.276±0.010	One piece	12
ZRH16/200/8	16±0.50	0.630±0.020	8±0.25	0.315±0.010	One piece	11
ZRH17/200/8	17±0.50	0.669±0.020	8±0.25	0.315±0.010	One piece	12
ZRH18/200/9	18±0.55	0.709±0.022	9±0.30	0.354±0.012	One piece	11
ZRH19/200/9	19±0.55	0.748±0.022	9±0.30	0.354±0.012	One piece	12
ZRH20/200/10	20±0.60	0.787±0.024	10±0.30	0.394±0.012	One piece	11
ZRH21/200/10	21±0.60	0.827±0.024	10±0.30	0.394±0.012	One piece	12
ZRH22/200/11	22±0.65	0.866±0.026	11±0.35	0.433±0.014	One piece	23
ZRH23/200/11	23±0.60	0.906±0.024	11±0.30	0.433±0.012	8 pieces	24
ZRH24/200/12	24±0.60	0.945±0.024	12±0.30	0.472±0.012	8 pieces	25
ZRH25/200/12	25±0.65	0.984±0.026	12±0.30	0.472±0.012	8 pieces	26
ZRH26/200/13	26±0.65	1.024±0.026	13±0.35	0.512±0.014	8 pieces	27
ZRH27/200/13	27±0.70	1.063±0.028	13±0.35	0.512±0.014	8 pieces	28
ZRH28/200/14	28±0.70	1.102±0.028	14±0.35	0.551±0.014	8 pieces	29
ZRH29/200/14	29±0.75	1.142±0.030	14±0.35	0.551±0.014	8 pieces	30
ZRH30/200/15	30±0.75	1.181±0.030	15±0.40	0.591±0.016	8 pieces	31
ZRH32/200/16	32±0.80	1.260±0.031	16±0.40	0.630±0.016	8 pieces	34
ZRH34/200/17	34±0.85	1.339±0.033	17±0.45	0.669±0.018	8 pieces	36

Overview of available sizes (continued):

Type	External diameter (D _o)		Internal diameter (d _i)		Number of pieces joined	Case internal diameter ¹⁾
	mm	inch	mm	inch		mm
ZRH36/200/18	36 ± 0.90	1.417 ± 0.035	18 ± 0.45	0.709 ± 0.018	8 pieces	38
ZRH38/200/19	38 ± 0.95	1.496 ± 0.037	19 ± 0.50	0.748 ± 0.020	8 pieces	40
ZRH40/200/20	40 ± 1.00	1.575 ± 0.039	20 ± 0.50	0.787 ± 0.020	8 pieces	42
ZRH42/200/21	42 ± 1.05	1.654 ± 0.041	21 ± 0.55	0.827 ± 0.022	8 pieces	44
ZRH44/200/22	44 ± 1.10	1.732 ± 0.043	22 ± 0.55	0.866 ± 0.022	8 pieces	46
ZRH46/200/23	46 ± 1.15	1.811 ± 0.045	23 ± 0.60	0.906 ± 0.024	8 pieces	48
ZRH48/200/24 ²⁾	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

ZRS TYPE FEATURES

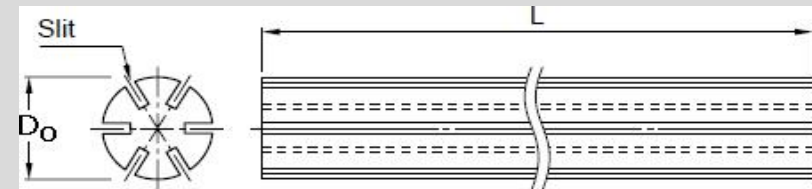
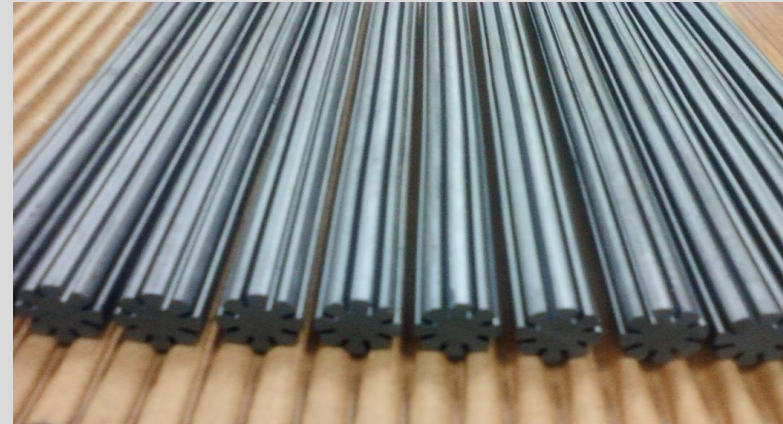
The ZRS type features deep grooves which permit improved cooling by ensuring that the entire core is optimally cooled.

CAUTION

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

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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 impeder, listed in the following table, is $200\text{mm} \pm 3.0$ or $7.874\text{inch} \pm 0.118$. For external diameter more than 21mm the overall length is realized by joining impeder of smaller lengths. Number of such pieces joined, lengthwise, for each type is mentioned against their Part No.s in the table.

Type	External diameter (Do)		Internal diameter (di)		Number of slits	Number of pieces joined	case internal diameter ¹⁾
	mm	inch	mm	inch			mm
ZRSH10/200/3	10 ± 0.30	0.394 ± 0.012	3 ± 0.20	0.118 ± 0.008	8	One piece	11
ZRSH11/200/3	11 ± 0.35	0.433 ± 0.014	3 ± 0.20	0.118 ± 0.008	8	One piece	12
ZRSH12/200/3	12 ± 0.35	0.472 ± 0.014	3 ± 0.20	0.118 ± 0.008	8	One piece	13
ZRSH13/200/5	13 ± 0.40	0.512 ± 0.016	5 ± 0.25	0.197 ± 0.010	8	One piece	14
ZRSH14/200/5	14 ± 0.40	0.551 ± 0.016	5 ± 0.25	0.197 ± 0.010	8	One piece	15
ZRSH15/200/5	15 ± 0.45	0.591 ± 0.018	5 ± 0.25	0.197 ± 0.010	8	One piece	16
ZRSH16/200/5	16 ± 0.50	0.630 ± 0.020	5 ± 0.25	0.197 ± 0.010	8	One piece	17
ZRSH17/200/5	17 ± 0.50	0.669 ± 0.020	5 ± 0.25	0.197 ± 0.010	8	One piece	18

Ferrite cores

ZRS TYPE

Overview of available sizes (continued):

Type	External diameter(D _o)		Internal diameter(d _i)		Number of slits	Number of pieces joined	case internal diameter ¹⁾
	mm	inch	mm	inch			mm
ZRSH18/200/5	18±0.55	0.709±0.022	5±0.25	0.197±0.010	8	Onepiece	19
ZRSH19/200/6	19±0.55	0.748±0.022	6±0.25	0.236±0.010	8	Onepiece	20
ZRSH20/200/6	20±0.60	0.787±0.024	6±0.25	0.236±0.010	8	Onepiece	21
ZRSH21/200/6	21±0.60	0.827±0.024	6±0.25	0.236±0.010	8	Onepiece	22
ZRSH22/200/6	22±0.65	0.866±0.026	6±0.25	0.236±0.010	8	Onepiece	23
ZRSH23/200/6	23±0.70	0.906±0.028	6±0.25	0.236±0.010	8	8pieces	24
ZRSH25/200/10	25±0.65	0.984±0.026	10±0.25	0.394±0.010	8	8pieces	26
ZRSH26/200/13	26±0.65	1.024±0.026	13±0.35	0.512±0.014	8	8pieces	27
ZRSH27/200/13	27±0.70	1.063±0.028	13±0.35	0.512±0.014	8	8pieces	28
ZRSH28/200/13	28±0.70	1.102±0.028	13±0.25	0.512±0.010	8	8pieces	29
ZRSH30/200/15	30±0.75	1.181±0.030	15±0.40	0.591±0.016	8	8pieces	31
ZRSH40/200/20	40±1.00	1.575±0.039	20±0.50	0.787±0.020	8	8pieces	42

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

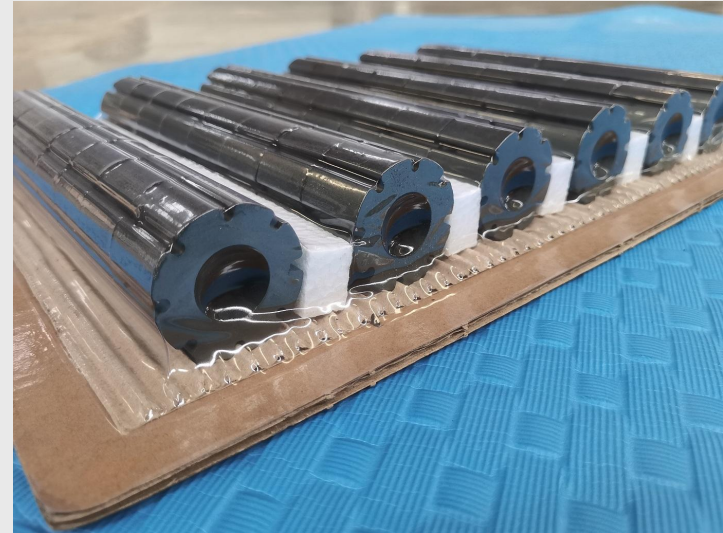
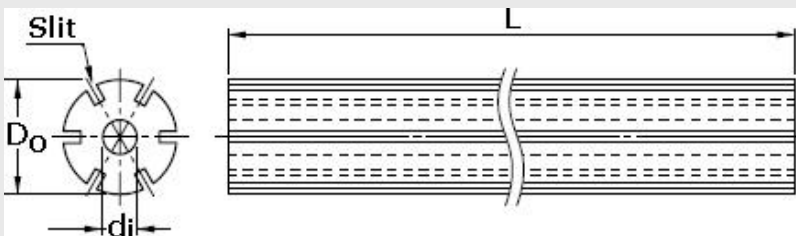
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Overview of available sizes:

Overall length (L) of all the ZRSH type impeders, listed in the following table, is $200\text{mm} \pm 3.0$ or $7.874\text{inch} \pm 0.118$. 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.



Ferrite cores

ZRS TYPE

Type	External diameter (Do)		Internal diameter (di)		Number of slits	Number of pieces joined	case internal diameter ¹⁾
	mm	inch	mm	inch			mm
ZRSH10/200/3	10 ± 0.30	0.394 ± 0.012	3 ± 0.20	0.118 ± 0.008	8	One piece	11
ZRSH11/200/3	11 ± 0.35	0.433 ± 0.014	3 ± 0.20	0.118 ± 0.008	8	One piece	12
ZRSH12/200/3	12 ± 0.35	0.472 ± 0.014	3 ± 0.20	0.118 ± 0.008	8	One piece	13
ZRSH13/200/5	13 ± 0.40	0.512 ± 0.016	5 ± 0.25	0.197 ± 0.010	8	One piece	14
ZRSH14/200/5	14 ± 0.40	0.551 ± 0.016	5 ± 0.25	0.197 ± 0.010	8	One piece	15
ZRSH15/200/5	15 ± 0.45	0.591 ± 0.018	5 ± 0.25	0.197 ± 0.010	8	One piece	16
ZRSH16/200/5	16 ± 0.50	0.630 ± 0.020	5 ± 0.25	0.197 ± 0.010	8	One piece	17
ZRSH17/200/5	17 ± 0.50	0.669 ± 0.020	5 ± 0.25	0.197 ± 0.010	8	One piece	18

ZRSH TYPE

Overview of available sizes (continued):

Type	External diameter (Do)		Internal diameter (di)		Number of slits	Number of pieces joined	case internal diameter ¹⁾
	mm	inch	mm	inch			mm
ZRSH18/200/5	18 ± 0.55	0.709 ± 0.022	5 ± 0.25	0.197 ± 0.010	8	One piece	19
ZRSH19/200/6	19 ± 0.55	0.748 ± 0.022	6 ± 0.25	0.236 ± 0.010	8	One piece	20
ZRSH20/200/6	20 ± 0.60	0.787 ± 0.024	6 ± 0.25	0.236 ± 0.010	8	One piece	21
ZRSH21/200/6	21 ± 0.60	0.827 ± 0.024	6 ± 0.25	0.236 ± 0.010	8	One piece	22
ZRSH22/200/6	22 ± 0.65	0.866 ± 0.026	6 ± 0.25	0.236 ± 0.010	8	One piece	23
ZRSH23/200/6	23 ± 0.70	0.906 ± 0.028	6 ± 0.25	0.236 ± 0.010	8	8 pieces	24
ZRSH25/200/10	25 ± 0.65	0.984 ± 0.026	10 ± 0.25	0.394 ± 0.010	8	8 pieces	26
ZRSH26/200/13	26 ± 0.65	1.024 ± 0.026	13 ± 0.35	0.512 ± 0.014	8	8 pieces	27
ZRSH27/200/13	27 ± 0.70	1.063 ± 0.028	13 ± 0.35	0.512 ± 0.014	8	8 pieces	28
ZRSH28/200/13	28 ± 0.70	1.102 ± 0.028	13 ± 0.25	0.512 ± 0.010	8	8 pieces	29
ZRSH30/200/15	30 ± 0.75	1.181 ± 0.030	15 ± 0.40	0.591 ± 0.016	8	8 pieces	31
ZRSH40/200/20	40 ± 1.00	1.575 ± 0.039	20 ± 0.50	0.787 ± 0.020	8	8 pieces	42

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