

BRAND : "WAVIN"

**PRODUCT : - CROSS-LINKED POLYETHYLENE PIPE
& FITTINGS (PEX)**

DESCRIPTION : PLUMBING INSTALLATION

Hot and Cold Water Systems

Tigris K1 = Plastic Press Fitting

Tigris M1 = Metal Press Fitting

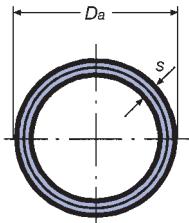
smartFIX = Plastic Push-fit Fitting



Contents

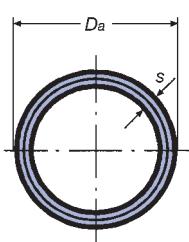
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1. Pipes


Wavin multi-layer composite pipe* in coils

Size	Product No.	Da mm	s mm	Length m/coil
16 x 2,0	0309.5452	16	2,00	100
16 x 2,0	0303.6758	16	2,00	200
20 x 2,25	0303.6766	20	2,25	100
25 x 2,5	0303.6790	25	2,50	50

*Can be used universally for plumbing and heating.


Wavin multi-layer composite pipe* in straight lengths

Size	Product No.	Da mm	s mm	Length m
16 x 2,0	0303.6804	16	2,00	5
20 x 2,25	0303.6782	20	2,25	5
25 x 2,5	0303.6812	25	2,50	5
32 x 3,0	0303.7045	32	3,00	5
40 x 4,0	0303.7053	40	4,00	5
50 x 4,5	0306.3593	50	4,50	5
63 x 6,0	0317.0334	63	6,00	5

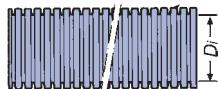
*Can be used universally for plumbing and heating.



Wavin multi-layer composite pipe
In coils • For radiator connection and underfloor
heating only (not for potable water)

Size	Product No.	Length m/coil
16 x 2,00	4429.6000	200
16 x 2,00	4469.5000	500

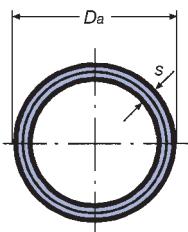
1. Pipes



Protective conduit* • in coils

Size	Product No.	Colour	Di mm	Length m/coil
20 (16 x 2,0)	4502.0000	black	20	50
23 (20 x 2,25)	4503.9000	black	23	50
29 (25 x 2,5)	2543.7000	black	29	50
36 (32 x 3,0)	4505.5000	black	36	25

* Corrugated protective conduit in PE-HD.



Wavin multi-layer composite pipe in coils • in black conduit

Size	Product No.	Protective Tube	Da mm	Length m
16 x 2,00	0309.6904	20	24	75
20 x 2,25	0309.6912	23	28	75

For many applications it is advised to fit the pipe with a protective conduit to reduce the possibility of mechanical damage to the pipe. The layer of air between the pipe and the conduit provides additional heat insulation and protection from condensation in accordance with DIN 1988. The corrugated conduit can also be supplied separately.



Wavin multi-layer composite pipe in coils • Pre-insulated – 9 mm

Size	Product No.	Length m/coil
16 x 2,00	0309.6920	50
20 x 2,25	0309.6939	50

For tap water and heating installations.
Pipe insulation: round extruded insulation in foamed PE with co-extruded, damp-proof PE film (colour red).
9-mm insulation for cold water pipes in accordance with DIN 1988 part 2 and heating pipes in accordance with energy saving regulations.
Resistant to ageing and allows pipe to be formed into bends.
Material class: B2, in accordance with DIN 4102.
Thermal conductivity: 0.040 W/m · K.
Provides continuous sound insulation.



**Wavin multi-layer composite pipe
In coils • Pre-insulated – 13 mm**

Size	Product No.	Length m/coil
16 x 2,00	0309.6947	50
20 x 2,25	0309.6955	50

For tap water and heating installations.
 Pipe insulation: round extruded insulation in foamed PE with co-extruded, damp-proof PE film (colour red).
 13-mm insulation for cold water pipes in accordance with DIN 1988 part 2 and heating pipes in accordance with energy saving regulations.
 Resistant to ageing and allows pipe to be formed into bends.
 Material class: B2, in accordance with DIN 4102.
 Thermal conductivity: 0.040 W/m · K.
 Provides continuous sound insulation.



**Wavin multi-layer composite pipe
In coils • Pre-insulated – 20 mm**

Size	Product No.	Length m/coil
NEW 16 x 2,00	3039730	100
NEW 20 x 2,25	3039729	50

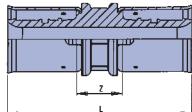


Fire protection tape BB-R90

Description	Product No.
Fire protection tape BB-R90	9050.1254

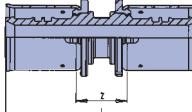
* Can also be used with other Wavin products such as Wavin AS (low noise) and Wavin PE Soil and Waste systems.

2. Fittings



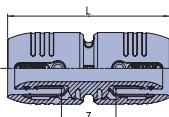
Tigris K1 • Couplings

Size	Product No.	L mm	Z mm
16	0303.6405	53	13
20	0303.6413	62	16
25	0303.6421	74	18
32	0303.6430	83	23
40	0303.6448	103	26
50	0306.2368	108	32
63	0317.0303	155	35



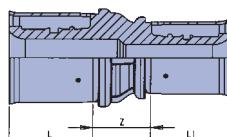
Tigris M1 • Couplings

Size	Product No.	L mm	Z mm
16	0317.0225	53	17
20	0317.0226	55	18
25	0317.0227	68	19
32	0317.0228	69	21
40	0317.0229	99	22
50	0317.0230	99	23
63	0317.0231	151	30



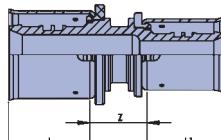
smartFIX • Couplings

Size	Product No.	L mm	Z mm
16	0313.3303	63	21
20	0313.3311	74	23
25	0313.3320	88	26

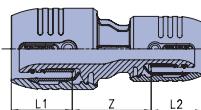


Tigris K1 • Reducers

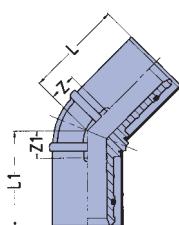
Size	Product No.	L mm	L1 mm	Z mm
20 x 16	0303.6456	20	19	15
25 x 16	0303.6464	26	19	17
25 x 20	0303.6472	26	20	18
32 x 20	0303.6480	26	20	20
32 x 25	0303.6499	26	21	20
40 x 32	0303.6502	26	26	24
50 x 32	0306.2414	26	26	28
50 x 40	0306.2430	38	38	35
63 x 40	0317.0307	60	38	42
63 x 50	0317.0306	60	38	36


Tigris M1 • Reducers

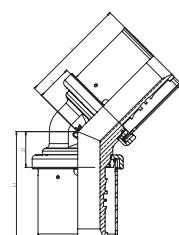
Size	Product No.	L mm	L1 mm	Z mm
20 x 16	0317.0233	19	18	18
25 x 20	0317.0235	25	19	19
32 x 25	0317.0237	24	25	20
40 x 25	0317.0238	38	25	19
40 x 32	0317.0239	39	24	20
50 x 32	0317.0241	38	24	20
50 x 40	0317.0242	38	38	21
63 x 40	0317.0243	59	39	25
63 x 50	0317.0244	59	38	25


smartFIX • Reducers

Size	Product No.	L1 mm	L2 mm	Z mm
20 x 16	0313.3362	26	21	29
25 x 16	0313.3370	31	21	35
25 x 20	0313.3389	31	26	34

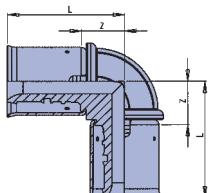

Tigris K1 • 45° elbow

Size	Product No.	L mm	Z mm
25	0307.5281	36	7
32	0307.5290	38	13
40	0307.5303	60	22
50	0306.2325	62	25
63	0317.0305	87	28


Tigris M1 • 45° elbow

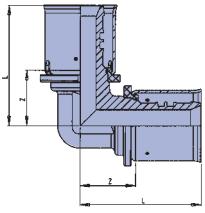
Size	Product No.	L mm	Z mm
NEW 40	4032558	60	22
NEW 50	4032559	62	25
NEW 63	4032560	87	28

2. Fittings



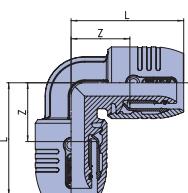
Tigris K1 • 90° elbow

Size	Product No.	L mm	Z mm
16	0303.6022	31	12
20	0303.6030	33	14
25	0303.6049	43	17
32	0303.6057	47	21
40	0303.6065	71	34
50	0306.2244	77	40
63	0317.0304	106	46



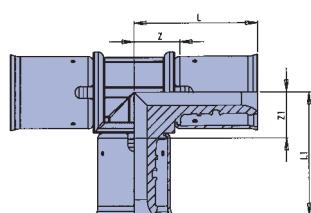
Tigris M1 • 90° elbow

Size	Product No.	L mm	Z mm
16	0317.0134	35	13
20	0317.0135	38	19
25	0317.0136	47	22
32	0317.0137	50	26
40	0317.0138	71	33
50	0317.0139	76	38
63	0317.0140	107	49



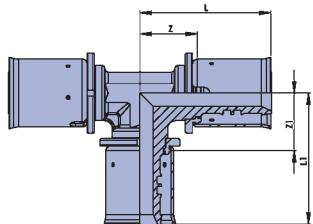
smartFIX • 90° elbow

Size	Product No.	L mm	Z mm
16	0313.3397	42	21
20	0313.3400	50	24
25	0313.3419	59	28

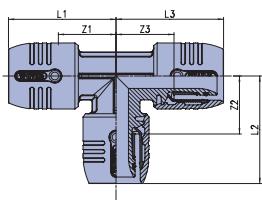


Tigris K1 • Equal Tee

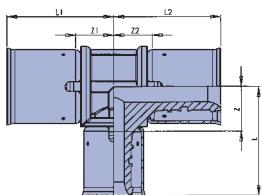
Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16	0303.6200	31	31	12	12
20	0303.6219	34	34	14	14
25	0303.6227	43	43	17	17
32	0303.6235	47	47	21	21
40	0303.6243	71	71	26	26
50	0306.2341	77	77	32	32
63	0317.0308	106	106	46	46


Tigris M1 • Equal Tee

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16	0317.0168	35	35	17	17
20	0317.0169	38	38	19	19
25	0317.0170	47	47	22	22
32	0317.0171	50	50	26	26
40	0317.0172	71	71	33	33
50	0317.0173	76	76	39	39
63	0317.0174	107	107	49	49

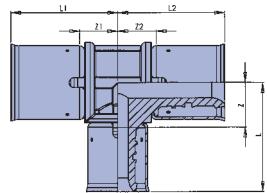

smartFIX • Equal Tee

Size	Product No.	L1-3 mm	Z1-3 mm
16	0313.3338	42	21
20	0313.3346	50	24
25	0313.3354	59	30


Tigris K1 • Reducing Tee

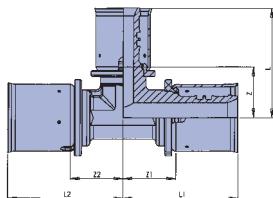
Size	Product No.	L mm	L1 mm	L2 mm	Z mm	Z1 mm	Z2 mm
16 x 20 x 16	0307.5206	34	32	32	14	14	14
20 x 16 x 16	0303.6251	33	33	30	14	12	11
20 x 16 x 20	0303.6260	33	33	33	14	12	12
20 x 20 x 16	0303.6278	35	35	32	14	14	13
20 x 25 x 20	0307.5214	40	36	36	15	16	16
25 x 16 x 16	0307.5222	34	38	30	16	13	12
NEW 25 x 16 x 20	3031027	35	38	32	15	10	10
NEW 25 x 16 x 25	0303.6286	35	39	39	16	13	13
NEW 25 x 20 x 16	3031028	37	40	33	15	12	12
NEW 25 x 20 x 20	0303.6294	37	41	35	17	15	14
NEW 25 x 20 x 25	0303.6308	37	41	41	16	15	15
NEW 25 x 25 x 20	3031029	43	43	37	15	15	15
NEW 25 x 32 x 25	0307.5230	42	46	46	17	21	21
32 x 16 x 32	0303.6316	39	39	39	20	32	32
NEW 32 x 20 x 25	3031030	40	40	40	19	12	12
32 x 20 x 32	0303.6324	41	41	41	20	15	15
32 x 25 x 25	0303.6332	47	43	42	21	17	16
32 x 25 x 32	0303.6340	47	43	43	21	17	17

2. Fittings



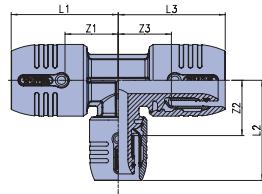
Tigris K1 • Reducing Tee (continue)

Size	Product No.	L	L1	L2	Z	Z1	Z2
		mm	mm	mm	mm	mm	mm
40 x 25 x 32	0317.0297	59	68	49	33	21	24
40 x 25 x 40	0303.6359	59	67	67	33	30	30
40 x 32 x 32	0303.6367	59	71	53	34	34	28
40 x 32 x 40	0303.6375	59	71	71	34	34	33
NEW	50 x 25 x 40	3031216	63,5	67	67	38,5	29
	50 x 25 x 50	0306.2333	64	68	68	39	31
	50 x 32 x 32	0317.0302	64	72	53	39	35
	50 x 32 x 40	0317.0300	65	71	71	40	33
	50 x 32 x 50	0317.0298	65	71	71	40	34
	50 x 40 x 40	0317.0301	79	73	73	42	36
	50 x 40 x 50	0306.2350	79	73	73	41	35
	63 x 25 x 50	0317.0311	70	91	67	45	31
	63 x 32 x 63	0317.0310	71	95	95	46	35
	63 x 40 x 63	0317.0309	84	95	95	46	35

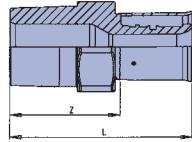


Tigris M1 • Reducing Tee

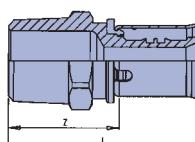
Size	Product No.	L	L1	L2	Z	Z1	Z2
		mm	mm	mm	mm	mm	mm
16 x 20 x 16	0317.0177	38	36	36	19	19	19
20 x 16 x 16	0317.0178	36	36	38	19	19	19
20 x 16 x 20	0317.0179	36	38	38	19	19	19
20 x 20 x 16	0317.0180	38	36	38	19	19	19
20 x 25 x 20	0317.0181	45	40	40	20	22	22
25 x 16 x 25	0317.0184	39	45	45	21	20	20
25 x 20 x 20	0317.0186	40	45	38	22	19	20
25 x 20 x 25	0317.0187	40	45	45	22	20	20
32 x 20 x 32	0317.0192	43	48	48	25	24	24
32 x 25 x 25	0317.0194	50	47	48	20	16	17
32 x 25 x 32	0317.0195	50	48	48	20	18	28
NEW	40 x 20 x 40	4041168	50	65	65	31	26
	40 x 25 x 40	0317.0198	56	65	65	26	26
	40 x 32 x 40	0317.0200	56	65	65	26	26
	50 x 40 x 50	0317.0210	76	71	71	37	33
	63 x 40 x 63	0317.0211	85	93	93	47	35
	63 x 50 x 63	4034542	83	98	98	44	38


smartFIX • Reducing Tee

Size	Product No.	L	L1	L2	Z	Z1	Z2
		mm	mm	mm	mm	mm	mm
16 x 20 x 16	0316.4918	44	50	44	20	24	20
20 x 16 x 16	0313.3427	48	44	42	22	20	21
20 x 16 x 20	0313.3435	48	47	48	22	20	22
20 x 20 x 16	0313.3443	50	50	44	24	24	20
20 x 25 x 20	0316.4934	52	57	52	24	26	24
25 x 16 x 16	0316.4926	58	47	39	26	20	21
25 x 16 x 25	0313.3451	55	47	55	24	26	24
25 x 20 x 20	0313.3460	57	50	52	26	27	24
25 x 20 x 25	0313.3478	57	52	57	26	27	26

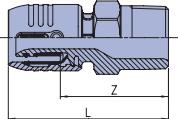

Tigris K1 • Male Transition Couplers

Size	Product No.	L mm	Z mm
16 x 1/2"	0303.6510	49	30
20 x 1/2"	0303.6529	50	30
20 x 3/4"	0303.6537	55	35
25 x 3/4"	0303.6545	62	36
25 x 1"	0303.6553	68	42
32 x 1"	0303.6561	68	42
32 x 1 1/4"	0303.6570	74	48
40 x 1 1/4"	0303.6588	90	53
50 x 1 1/2"	0306.2465	95	57


Tigris M1 • Male Transition Couplers

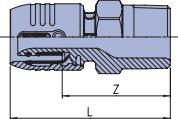
Size	Product No.	L mm	Z mm
16 x 1/2"	0317.0247	47	29
16 x 3/4"	4032676	44	26
20 x 1/2"	0317.0249	48	30
20 x 3/4"	0317.0250	51	32
25 x 3/4"	0317.0251	57	33
25 x 1"	0317.0252	61	36
32 x 1"	0317.0253	61	37
32 x 1 1/4"	0317.0254	63	39
NEW 40 x 1 1/4"	4032683	79	42
	0317.0255	79	42
50 x 1 1/2"	0317.0256	79	25
63 x 2"	0317.0257	108	50

2. Fittings



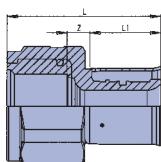
smartFIX • Male Transition Couplers

Size	Product No.	L mm	Z mm
16 x 1/2"	0313.3613	60	39
20 x 1/2"	0313.3621	66	40
20 x 3/4"	0313.3630	71	45



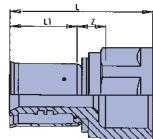
smartFIX • Male Transition Couplers • Metal

Size	Product No.	L mm	Z mm
16 x 1/2"	0313.3648	60	39
20 x 1/2"	0313.3656	66	40
20 x 3/4"	0313.3664	71	45
25 x 3/4"	0313.3672	78	47
25 x 1"	0313.3680	84	53

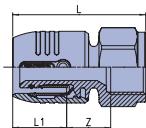


Tigris K1 • Female Transition Couplers

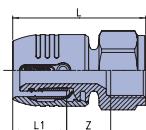
Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0303.6596	43	19	9
20 x 1/2"	0303.6600	44	20	10
20 x 3/4"	0303.6618	47	20	11
NEW 20 x 1"	3031057	51	20	11
25 x 3/4"	0303.6626	54	26	12
25 x 1"	0316.4933	58	26	12
NEW 25 x 1 1/4"	3031058	68	26	18
32 x 1"	0303.6634	58	26	13
40 x 1 1/4"	0307.5265	77	44	13


Tigris M1 • Female Transition Couplers

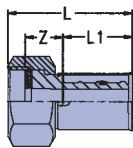
Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0317.0259	41	18	10
NEW 16 x 3/4"	4041973	42	18	11
20 x 1/2"	0317.0260	42	19	10
20 x 3/4"	0317.0262	44	19	11
25 x 3/4"	0317.0263	50	25	11
NEW 25 x 1"	4032692	58	25	13
32 x 1"	0317.0266	58	24	16
NEW 32 x 1 1/4"	4032695	60	24	13
NEW 40 x 1"	4041974	77	38	18
40 x 1 1/2"	0317.0268	77	38	19
50 x 1 1/2"	0317.0270	75	38	17
63 x 2"	0317.0271	102	59	20


smartFIX • Female Transition Couplers

Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0316.8295	56	21	20
20 x 1/2"	0316.8296	62	26	21
20 x 3/4"	0316.8297	65	26	21
25 x 3/4"	0316.8298	72	31	21
25 x 1"	0316.8299	75	31	21


smartFIX • Female Transition Couplers
• Metal

Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0313.3699	56	21	20
20 x 1/2"	0313.3702	62	26	21
20 x 3/4"	0313.3710	62	26	21
25 x 3/4"	0313.3729	84	31	21
25 x 1"	0313.3737	84	31	21

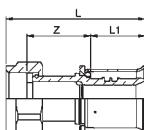


Tigris K1 • Female Threaded Connections*

Size	Product No.	L mm	L1 mm	Z mm
16 x 3/4"	0303.6642	40	19	12
20 x 3/4"	0303.6650	41	20	12
20 x 1 1/2"	0314.2159	45	20	14
25 x 1"	0303.6669	50	26	14
25 x 1 1/2"	0314.2140	51	26	15
32 x 1 1/4"	0303.6677	51	26	15
32 x 1 1/2"	0314.2132	71	26	15
40 x 1 1/2"	0303.6685	72	39	22
50 x 2 3/8"	0306.2503	83	39	26

Gives detachable screw connections for surface-mounted connection to fittings.

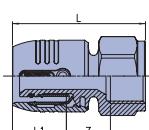
*with flat sealing washer.



Tigris M1 • Female Threaded Connections*

Size	Product No.	L mm	L1 mm	Z mm
NEW 16 x 1/2"	4032700	46	19	19
NEW 20 x 1/2"	4032703	55	20	27
NEW 20 x 3/4"	4032704	51	20	21
NEW 25 x 3/4"	4041979	52	26	22
NEW 25 x 1"	4032706	59	26	22

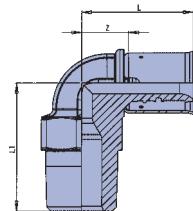
*with flat sealing washer.



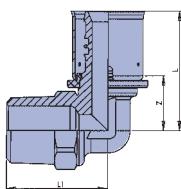
smartFIX • Female Threaded Connections*

Size	Product No.	L mm	L1 mm	Z mm
16 x 3/4"	0313.3800	50	21	30
20 x 3/4"	0313.3818	63	26	37

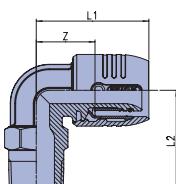
*with flat sealing washer.


Tigris K1 • Transition elbow 90° Male

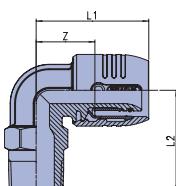
Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0303.6073	33	38	14
20 x 1/2"	0307.5338	34	41	15
20 x 3/4"	0303.6081	37	45	18
25 x 3/4"	0303.6090	44	47	18
32 x 1"	0303.6103	49	57	23


Tigris M1 • Transition elbow 90° Male

Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2"	0317.0142	36	30	19
20 x 1/2"	0317.0143	37	32	19
20 x 3/4"	0317.0144	40	33	21
25 x 3/4"	0317.0145	47	35	23
NEW	25 x 1"	51	40	23
NEW	32 x 1"	51	42	27
NEW	40 x 1 1/4"	72	50	34
NEW	50 x 1 1/2"	80	56	41
NEW	63 x 2"	108	70	49

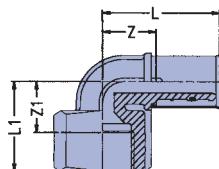

smartFIX • Transition elbow 90° Male*

Size	Product No.	L1 mm	L2 mm	Z mm
16 x 1/2"	0313.3486	43	40	22
20 x 1/2"	0313.3494	50	41	24
20 x 3/4"	0313.3508	50	46	24
25 x 3/4"	0313.3516	59	49	28


smartFIX • Transition elbow 90° Male
• Metal

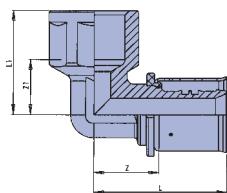
Size	Product No.	L1 mm	L2 mm	Z mm
16 x 1/2"	0313.3524	43	40	22
20 x 1/2"	0313.3532	50	41	24
20 x 3/4"	0313.3540	50	46	24
25 x 3/4"	0313.3559	59	47	28

2. Fittings



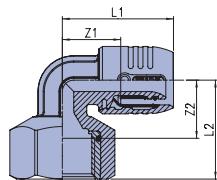
Tigris K1 • Transition elbow 90° Female

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16 x 1/2"	0303.6111	38	33	19	18
20 x 1/2"	0303.6120	39	35	19	20
20 x 3/4"	0303.6138	42	38	22	21
25 x 3/4"	0303.6146	49	40	23	23
32 x 1"	0303.6154	55	47	29	28



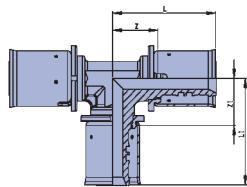
Tigris M1 • Transition elbow 90° Female

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16 x 1/2"	0317.0148	39	30	21	17
20 x 1/2"	0317.0149	40	32	21	18
20 x 3/4"	0317.0150	44	31	25	17
25 x 3/4"	0317.0151	49	33	25	18
NEW	25 x 1"	53	33	25	18
NEW	32 x 1"	54	39	30	22
NEW	40 x 1 1/4"	74	41	35	23
	40 x 1 1/2"	79	45	40	26
	50 x 1 1/2"	79	50	41	31
NEW	63 x 2"	108	66	49	40

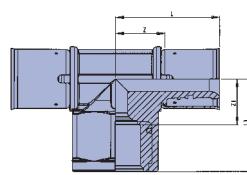


smartFIX • Transition elbow 90° Female

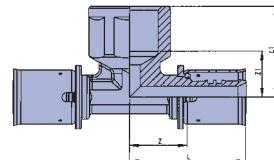
Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
Plastic					
16 x 1/2"	0313.3567	43	22	36	20
20 x 1/2"	0313.3575	50	24	38	22
20 x 3/4"	0313.3583	50	24	41	24
Metal					
25 x 3/4"	0313.3591	62	28	40	24
25 x 1"	0313.3605	64	28	42	26


Tigris M1 • Threaded Tee - Male

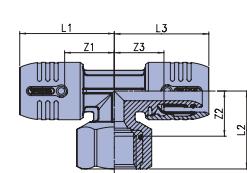
Size	Product No.	L mm	L1 mm	Z mm
16 x 1/2" x 16	0317.0221	36	30	15
20 x 1/2" x 20	0317.0222	37	32	15
20 x 3/4" x 20	0317.0223	40	33	17


Tigris K1 • Threaded Tee - Female

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16 x 1/2" x 16	0303.6383	38	33	19	18
20 x 1/2" x 20	0307.5249	38	35	19	19
20 x 3/4" x 20	0303.6391	42	38	22	21
25 x 1/2" x 25	0314.5085	49	40	23	23
25 x 3/4" x 25	0307.5257	49	40	23	23

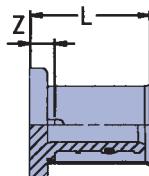

Tigris M1 • Threaded Tee - Female

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
16 x 1/2" x 16	0317.0212	39	30	21	17
20 x 1/2" x 20	0317.0213	40	32	21	18
20 x 3/4" x 20	0317.0214	44	31	25	17
25 x 1/2" x 25	0317.0215	46	31	21	17
25 x 3/4" x 25	0317.0216	49	33	25	18
NEW	32 x 1/2" x 32	4041167	48	33	24
NEW	32 x 1" x 32	0317.0217	54	39	25
NEW	40 x 3/4" x 40	4041980	62	39	30
NEW	40 x 1" x 40	0317.0218	69	42	31
NEW	50 x 1" x 50	0317.0219	71	45	32
NEW	63 x 2" x 63	0317.0220	110	62	51


smartFIX • Threaded Tee - Female

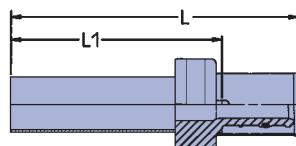
Size	Product No.	L mm	L1 mm	L2 mm	Z mm	Z1 mm	Z2 mm
16 x 1/2" x 16	0313.3745	42	36	42	21	20	21
20 x 1/2" x 20	0313.3753	50	38	50	24	22	24
20 x 3/4" x 20	0313.3761	50	41	50	24	23	24

2. Fittings



Tigris K1 • End stoppers

Size	Product No.	L mm	Z mm
16	0313.2510	33	12
20	0313.2528	38	12
25	0313.2340	44	14



NEW

Tigris K1/M1 • Press-fit transitions to copper, steel and stainless steel

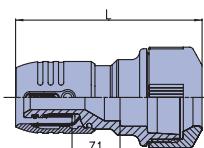
Size	Product No.	L mm	Z1 mm
16 x 15	0313.2277	66	43
20 x 15	0316.0955	74	45
20 x 18	0313.2285	76	46
20 x 22	4037451	74	47
25 x 22	0313.2293	80	49
25 x 28	0316.8434	93	63

No soldering! For copper-side pressing, the specifications of the copper fitting manufacturer with respect to press shape, pressing jaws and drive machines must be followed.



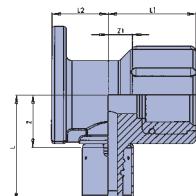
Tigris K1/M1 • Push-fit transitions to copper and Hep2O PB pipe

Size	Product No.
16 x 15	3052945
20 x 22	3052946
25 x 22	3052947
25 x 28	3052948
32 x 28	3052949

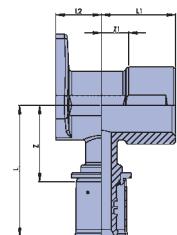


smartFIX • Push-fit transitions to copper and Hep2O PB pipe

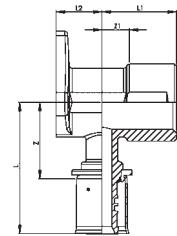
Size	Product No.	L mm	Z1 mm
16 x 15	0313.3834	11	59
20 x 22	0313.3842	18	75
25 x 28	0316.4942	18	89


Tigris K1 • 90° Female wall plate elbow

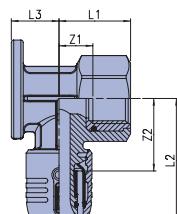
Size	Product No.	L	L1	L2	Z	Z1
		mm	mm	mm	mm	m
16 x 1/2"	0303.6162	38	30	20	21	16
20 x 1/2"	0303.6170	39	20	20	26	18
20 x 3/4"	0303.6189	42	19	19	27	18


NEW
Tigris M1 • 90° Female wall plate elbow

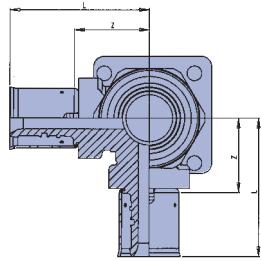
Size	Product No.	L	L1	L2	Z	Z1
		mm	mm	mm	mm	m
16 x 1/2"	0317.0158	46	26	16	28	13
20 x 1/2"	0317.0160	47	28	18	29	15
20 x 3/4"	0317.0161	47	29	18	29	15
25 x 3/4"	4042087	51	29	26	29	15


NEW
NEW
Tigris M1 - Extended Female wall plate elbow

Size	Product No.	L	L1	L2	Z	Z1
		mm	mm	mm	mm	m
16 x 1/2"	4032587	47	36	16	28	23
20 x 1/2"	4041169	48	34	18	29	21


smartFIX • 90° Female wall plate elbow

Size	Product No.	L1	Z1	L2	Z2	L3
		mm	mm	mm	mm	m
Plastic						
16 x 1/2"	0313.3770	33	12	50	30	18
20 x 1/2"	0313.3788	30	14	56	31	20
20 x 3/4"	0313.3796	33	17	60	35	20

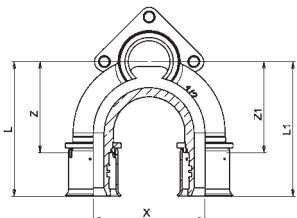

Tigris K1 • 90° Female Double wall plate elbow

Size	Product No.	L	Z
		mm	mm
16 x 1/2" x 16	0306.3500	42	23
20 x 1/2" x 20	0306.3518	40	19

For fitting connections.

 Single/multiple fixing of the wall plate elbow to the retaining plate
 with self-tapping screws: 4.2 x 13 mm (without sound insulation)
 4.2 x 19 mm (with sound insulation)

2. Fittings



Tigris M1 • 180° Female Double wall plate

Size	Product No.	L mm	Z mm
NEW 16 x 1/2" x 16	4032590	59	40
NEW 20 x 1/2" x 20	4032591	60	41



Tigris Inline Circulation Connection Kit

Size	Product No.
NEW 40 x 32 mm	3040808
NEW 50 x 32 mm	3040819

Only on project specific request.
Other dimensions possible.



Tigris Inline Circulation Pipe PE-Xc

Size	Product No.	Length
NEW 8 mm	4041209	100
NEW 12 mm	4041208	100

Tigris Inline Circulation Fitting

Size	Product No.
NEW 1" x 3/4" for 8 mm PE-Xc-pipe	4041206
NEW 1 1/2" x 3/4" for 12 mm PE-Xc-pipe	4041207



Soundinsulation • for wall plate

Size	Product No.
NEW Tigris M1 double wall plate female 180° 16 x 1/2"	4041218
NEW Tigris M1 wall plate female 16 x 1/2"	4041219
NEW Tigris M1 wall plate female 20 x 3/4"	4041220
NEW Tigris K1 wall plate female 16 x 1/2"	4041220
NEW smartFIX wall plate female 16 x 1/2"	4041220

* From EPDM.


Tigris K1 • Retaining plates for washstand

Type	Product No.	Actual dimension
76,5	0313.8879	76,5
153	0313.8887	153*

*Galvanised, 1.5 mm.

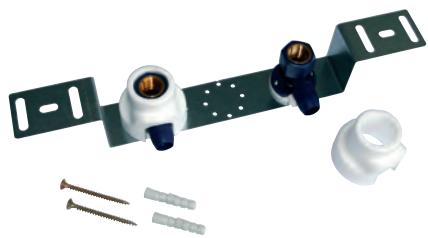
Inc. 2 pre-installed 16 mm x 1/2" Female wall plate elbows and sound insulation. Inc. retaining point for wastewater pipe DN40 and wall fixing set. In the case of dry construction systems, additional fixings must be used and the specifications of the system manufacturer must be observed.


Tigris K1 • Retaining plates for baths or shower trays

Type	Product No.	Actual dimension
153/76,5	0313.8895	153

* Galvanised, 1.5 mm.

Inc. 2 pre-installed 16 mm x 1/2" Female wall plate elbows and sound insulation. Inc. wall fixing set. In the case of dry construction systems, additional fixings must be used and the specifications of the system manufacturer must be observed.

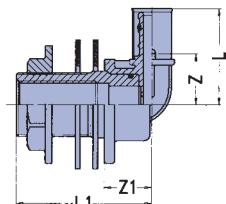

smartFIX • Retaining plates for baths or shower connections

Type	Product No.
153/76,5	0314.6316


Tigris M1 • Retaining plates for baths or shower connections

Type	Product No.
NEW	153/16 x 1/2"
NEW	153/20 x 1/2"

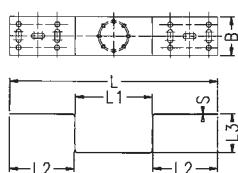
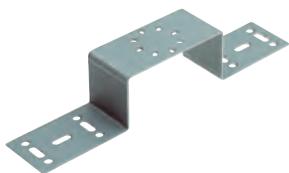
2. Fittings



**Tigris K1 • 90° Female wall plate elbow
for dry wall construction***

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm
NEW 16 x 1/2" 39 mm	3023502	43	60	23	21
NEW 16 x 1/2" 48 mm	3023535	43	68	23	21
NEW 16 x 1/2" 59 mm	3023503	43	80	23	21

* Adjustable with cap nut and sound insulation inserts
for different wall thicknesses



Single retaining plates

Description	Product No.	L mm	L1 mm	L2 mm	Z mm	Z1 mm	Z2 mm
Single retaining plates	0303.6820	270	100	85	50	50	2

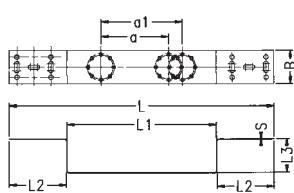
In steel, galvanised. For Wavin Tigris K1 / Tigris M1 / smartFiX wall plate elbows.

In the case of dry construction systems, additional fixings are required and the specifications of the system manufacturer must be observed.

Fix the wall plate elbows with self-tapping screws:

4.2 x 13 mm (with no sound insulation)

4.2 x 19 mm (with sound insulation)



Multiple retaining plates

Typ	Product No.	L mm	L1 mm	L2 mm	L3 mm	B mm	S mm	a mm	a1 mm
76,5/153	0303.6839	423	253	85	50	50	2	76,5	153
100/120	0303.6847	390	220	85	50	50	2	100	120

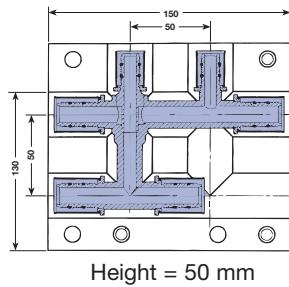
In steel, galvanised. For Wavin Tigris K1 / Tigris M1 / smartFiX wall plate elbows.

In the case of dry construction systems, additional fixings are required and the specifications of the system manufacturer must be observed.

Fix the wall plate elbows with self-tapping screws:

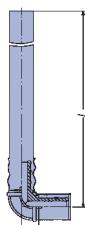
4.2 x 13 mm (with no sound insulation)

4.2 x 19 mm (with sound insulation)


Tigris K1 • Junction fitting

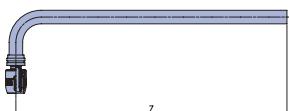
Size	Product No.
16 x 16 x 16	0309.7021
20 x 16 x 16	0309.7048
20 x 16 x 20	0309.7030
20 x 20 x 16	0314.7592

Enables radiator connections without visible junctions, inc. insulation box consisting of top and bottom sections in expanded polypropylene (WLG = 035) with 13 mm insulation. Complies with the requirements of the energy saving regulation in the area of pipe junctions and wall openings.

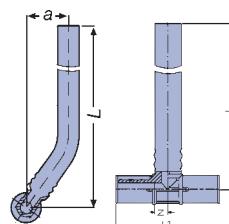

Tigris K1 • Radiator connection pipes*

Type	Product No.	Z mm	L mm
16/300	0311.5364	-	300

* Angle with 15 x 1.0 mm integrated, nickel-plated copper pipe for connecting radiators.


smartFIX • Radiator connection pipes

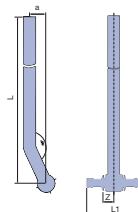
Size	Product No.	Z mm
16 x 15/300	0313.3826	300


Tigris K1 • Radiator T connection*

Type	Product No.	Z mm	a mm	L mm	L1 mm
16/300	0312.6005	12	29	300	62
20/300	0312.6021	12	30	300	74

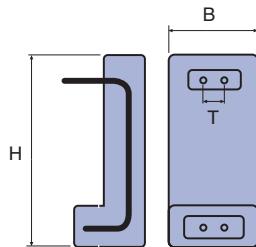
* T-piece with 15 x 1.0 mm integrated, nickel-plated, offset copper pipe for connecting radiators.

2. Fittings



smartFIX • Radiator T connection

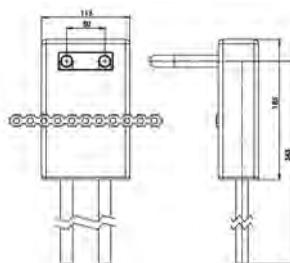
Size	Product No.	L mm	L1 mm	a mm	z mm
16 x 15 / 300	0314.7428	300	84	29	12



Radiator connecting block

Type	Product No.	H mm	B mm	T mm
16	0311.8452	240	110	50

Radiator connecting curve in Wavin Tigris pipe 16 x 2.00 mm; Pipe spacing 50 mm horizontal, 200 mm vertical; suitable for all common valve radiators; Insulation box in neopor (WLG035), 100% compliant with energy saving regulation.



Radiator connecting block

Type	Product No.	H mm	B mm	T mm
Vario	0314.5255	565	116	50

Radiator connecting curve in Wavin Tigris pipe 16 x 2.00 mm; Pipe spacing 50 mm horizontal, for variable connection heights; suitable for all common valve radiators; Insulation box in neopor (WLG035), 100% compliant with energy saving regulation.



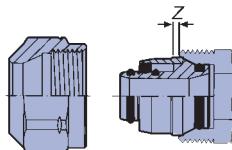
Tigris K1 • Radiator assembly fittings for the wall

Type	Product No.
16 x 15 / 230	0316.8859



Tigris K1 • Radiator assembly fittings for the floor

Type	Product No.
16 x 15 / 330	0316.8840



**Tigris K1 • Female Threaded connections
“EUROCONE”***

Size	Product No.	Z mm
16 x 3/4"	4887.9000	2
20 x 3/4"	4200.5000	2

* For Tigris K1 heating fittings with 3/4" male thread (Eurocone).

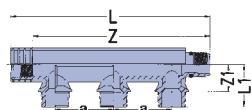


Tigris K1/Tigris M1/smartFIX • Stop-ends

Size	Product No.
16	0309.7056
20	0309.7064
25	0309.7072

Reusable stopper for pressure testing Wavin multi-layer composite pipe in accordance with DIN 1988 part 2 and DIN 18380.

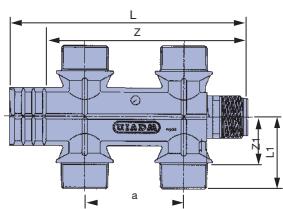
3. Plastic Manifolds and Accessories



Plumbing and heating manifolds

- Single-sided

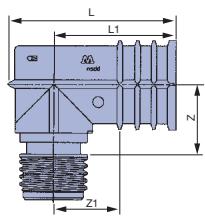
Size	Product No.	L mm	L1 mm	Z mm	Z1 mm	a mm
2-port	0306.1817	133	39	112	26	55
3-port	0306.1833	188	39	167	26	55



Plumbing and heating manifolds

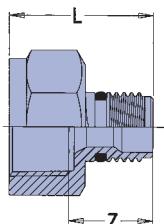
- Double-sided

Size	Product No.	L mm	L1 mm	Z mm	Z1 mm	a mm
4-port	0313.5829	135	39	110	26	55



Manifold elbow

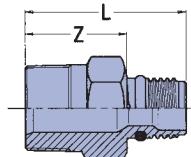
Size	Product No.	L mm	Z mm	L1 mm	Z1 mm
90°	0313.5853	59	18	38	16
270°	0313.5861	59	18	38	16



Manifold threaded transition fitting - female*

Size	Product No.	L mm	Z mm
3/4"	0306.1850	45	29

* For 3/4" threaded transitions on alternative pipe systems.

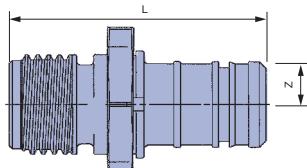

Manifold threaded transition fitting - male*

Size	Product No.	L mm	Z mm
3/4"	0308.2946	57	34
1"	0308.2954	62	40

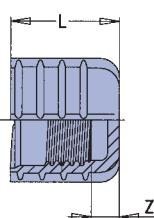
For 3/4" and 1" threaded transitions on alternative pipe systems


smartFIX • Manifold couplers

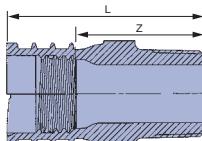
Size	Product No.	L mm	Z mm
20	0316.4950	58	8
25	0316.4969	64	10


Tigris K1 • Manifold couplers

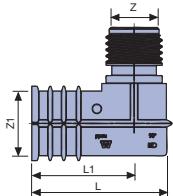
Size	Product No.	L mm	Z mm
20	0313.9336	58	8
25	0313.9344	61	8
32	0313.9352	67	8


Manifold caps

Description	Product No.	L mm	Z mm
Manifold caps	0306.1868	28	7

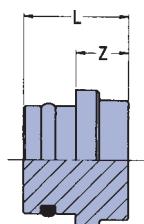

Threaded manifold connector

Type	Product No.	L mm	Z mm
3/4"	0313.5845	59	41



Tigris K1 • 90° manifold connecting elbow

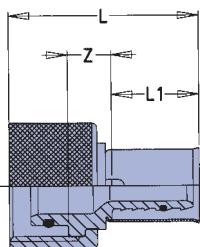
Type	Product No.	L mm	Z mm	L1 mm	Z1 mm
¾" inlet	0313.5837	58	21	42	25



Manifold stoppers*

Description	Product No.	L mm	Z mm
Manifold stoppers	0307.5273	18	9

* For manifold outlet.



Tigris K1 • Manifold outlet adapter*

Size	Product No.	L mm	L1 mm	Z mm
16	0306.7190	46	21	11
20	0306.7203	52	27	11

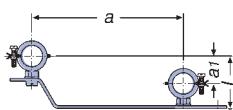
* Includes cap nut for connecting Wavin Tigris multi-layer composite pipes.



smartFIX • Manifold outlet adapter*

Size	Product No.	L mm	L1 mm	Z mm
16	0316.4977	42	24	10
20	0316.4985	63	30	15

* Includes cap nut for connecting Wavin Tigris multi-layer composite pipes.



Manifold holders*

Description	Product No.	L mm	L1 mm	Z mm
Manifold holders	4803.8000	210	38	73

* In steel, galvanised.

For PPSU manifolds, consisting of a fixing rail with two pipe clamps including sound insulation insert.

4. Tools and Accessories



Battery Press tool ACO202

	Description	Product No.
NEW	Battery Press tool ACO202	4046766

For perfect connections of Wavin Tigris K1/M1 press-fittings.
Packed in a plastic case including battery and charger,
without press jaws.



Electro-Hydraulic press tool ECO202

	Description	Product No.
NEW	Electro-Hydraulic press tool ECO202	4046767

Zur einwandfreien Herstellung von Wavin Tigris-K1-/M1-Pressverbindungen. Verpackt in einem Kunststoffkoffer,
ohne Pressbacken.



Battery Press tool "Mini" ACO102

	Description	Product No.
NEW	Battery Press tool "Mini" ACO102	4046765

For perfect connections of Wavin Tigris K1/M1 press-fittings.
Packed in a plastic case including battery and charger,
without press jaws. Suitable for dimensions 16-40 mm.



Spare battery • for battery press tool ACO202

	Description	Product No.
NEW	Spare battery 1,5 Ah for ACO202	4046768
NEW	Spare battery 3,0 Ah for ACO202	4046769



Spare battery • for battery press tool "Mini" ACO102

	Description	Product No.
NEW	Spare battery 1,5 Ah for ACO102	4046770
NEW	Spare battery 3,0 Ah for ACO102	4046771

4. Tools and Accessories



Battery charger 230 V for ACO202

Description	Product No.
NEW Battery charger 230 V LGL 1 for ACO202	4046772



Battery charger 230 V for "Mini" ACO102

Description	Product No.
NEW Battery charger 230 V LGL 1 for ACO102	4046773



Tigris K1/M1 • Pressing jaws

	Size	Product No.
NEW	16	4046691
NEW	20	4046694
NEW	25	4046695
NEW	32	4046756
NEW	40	4046758
NEW	50	4046759
NEW	63	4035779

Pressing jaws to use with press tools
ACO202, ECO202, UAP3L and UNP2.



Tigris K1/M1 • Pressing jaws for the "Mini" ACO102

	Size	Product No.
NEW	16	4046556
NEW	20	4046557
NEW	25	4046558
NEW	32	4046559
NEW	40	4046560


Case for pressing jaws 16 – 32 mm

Description	Product No.
NEW Case for pressing jaws 16 – 32 mm	3024362

* With room for each pressing jaw 16, 20, 25 and 32 mm.
Without pressing jaws.


Hand pressing tool

Size	Product No.
NEW 16/20*	0305.2842
NEW 16 mm insert	0305.2850
NEW 20 mm insert	0305.2869

* Basic tool without inserts.
For perfect connections of Wavin Tigris K1 press-fittings from 16 mm to 20 mm. Packed in a metal case.


**Tigris • Pipe cutter
Inc. hold function**

Description	Product No.
Pipe cutter 16 – 25 mm inc. hold function	0317.0497
NEW Replacement blade for pipe cutter	4037386


Tigris • Pipe cutter

Description	Product No.
Pipe cutter 16 – 63 mm	4485.7000
Replacement blade for pipe cutter	5097.0000


Tigris • Handle for calibrating pin

Description	Product No.
Power click handle for calibrating pin	0313.2552

4. Tools and Accessories



Tigris • Handle for calibrating pin

Description	Product No.
Power click handle for calibrating pin	0317.0489



Tigris • Calibrating pin*

Size	Product No.
16	0305.3083
20	0305.3091
25	0305.3105
32	0305.3113

* Can also be used with battery screwdriver.



Tigris • Calibrating pin

Size	Product No.
40	0316.8808
50	0316.8816
63	0317.0365



Tigris • Star calibrator

Description	Product No.
Star calibrator 16, 20, 25 mm	0316.8382



Tigris • Calibrating set*

Description	Product No.
Wavin calibrating set 16 – 32 mm	0313.2544

* In case, inc. handle.



Tigris • Calibrating set with pipe cutter

Description	Product No.
Calibrating set with pipe cutter	0314.8351


Tigris • Internal bending spring

Size	Product No.
16	4829.1000
20	7137.4000
25	4831.3000


Tigris • External bending spring

Size	Product No.
16	0313.2447
20	0313.2463
25	0313.2471

External bending spring to create curves up to 90° in Wavin multi-layer composite pipe.


Tigris • Bending pliers

Size	Product No.
16/20/25	0313.2455

Bending pliers to create pipe curves up to 90° in the Wavin multi-layer composite pipes of sizes 16, 20 and 25 mm.
Light, handy device, includes bending templates and case.
Weight: approx. 3.6 kg (complete set)


Tigris • Pipe bending tool

Size	Product No.
NEW 16	4043224
NEW 20	4043225

Notes



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Notes

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Hot and Cold Water Systems

Wavin Tigris K1
Wavin Tigris M1
Wavin smartFIX





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The Tigris Hot and Cold Water System 1 pipe - 3 types of fittings

The flexible pipe system for all hot & cold water and heating applications.

Which type of fitting you use is entirely up to you.

1. Wavin Multi-Layer Composite Pipe

Three Wavin fitting types are designed for use with one Wavin multi-layer composite pipe. Wavin Tigris K1, Wavin Tigris M1 and Wavin smartFIX use either Press-fit or Push-fit technology.

All three systems fulfil the requirements for hot and cold water installations and radiator heating systems. They meet all drinking water quality requirements and are physiologically harmless.

1.1. The Wavin multi-layer composite pipe

The Wavin multi-layer composite pipe for plumbing and heating comprises an internal cross-linked polyethylene layer (PE-Xc), an external layer in PE and an intermediate butt welded aluminium layer. The three layers are uniformly connected together by means of bonding agents. This produces a pipe structure with a total of five layers.

As well as being diffusion-proof, the uniform plastic-metal construction offers additional advantages:

- ⦿ The pipe is dimensionally stable, resistant to unwanted movement yet flexible.
- ⦿ With easy bending, the installation is easy and time required can be reduced to a minimum.
- ⦿ The permanent connection of the plastic pipes to the aluminium pipe means that the length expansion is determined by the metal. It is roughly equal to that of copper, i.e. it is minimal (see page 20 for more information).



Figure 1: Multi-layer composite pipe structure.

Advantages in practice:

- ⦿ Low weight
- ⦿ Dimensions from 16 mm to 63 mm
- ⦿ Significantly fewer fittings needed due to the ease of pipe bending and long pipe coils
- ⦿ Easy bending with dimensional stability is ideal for tight installation situations
- ⦿ Quick and safe assembly
- ⦿ Diffusion-proof
- ⦿ Suitability for all water qualities
- ⦿ Free of encrustation
- ⦿ Physiologically harmless
- ⦿ Corrosion resistant
- ⦿ Minimum length expansion
- ⦿ Pressure and temperature resistant

1.2. Technical specifications

Wavin multi-layer composite pipe

Pipe material	Internal layer is electron-beam crosslinked polyethylene (PE-Xc), external layer is PE, with an aluminium layer between, connected by special bonding agents
Pipe colour	White
Max. constant operating temperature*	85°C
Max. shortterm load**	100°C
Max. constant operating pressure	10 bar (where Tmax. = 70°C)
Coefficient of thermal expansion	0.025 – 0.030 mm/m K
Thermal conductivity	0.4 W/m K
Pipe roughness	0.007 mm

* At a max. operating pressure of 6 bar.

** At max. 100 hours in 50 years.

1.3. The Wavin multi-layer composite pipe for radiator heating and underfloor heating

The Wavin multi-layer composite pipe can be used for both radiator and floor heating systems. Being 100% resistant to oxygen diffusion, temperature resistant, supple and flexible, it offers outstanding properties for all types of heating installations.

Aluminium thickness

The aluminium layer in the Wavin pipe is manufactured using butt-welding technology. This gives a secure aluminium layer with no variation in thickness of the aluminium or the finished pipe and ensures a reliable seal when the pipe is connected to the fittings.

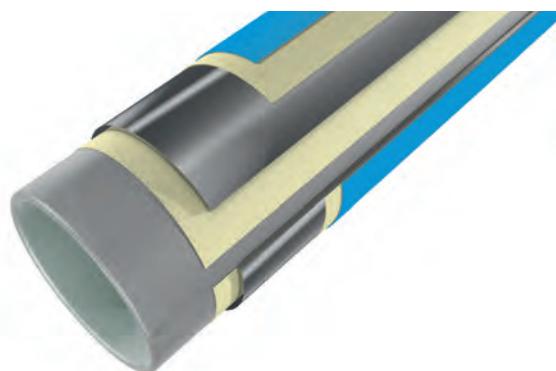
Corrosion resistance

The plastic internal and external layers offer minimal surface friction for water as a result of their low roughness. Deposits and corrosion are things of the past.

It can be safely used in mixed installations as there is no risk of electrochemical corrosion. Moreover, the plastic outer sheath allows embedding of the Wavin multi-layer composite pipe directly in the screed.

Limited length expansion

The internal aluminium layer has a decisive effect on the thermal length expansion of the composite pipe. As a result of the permanent connection with the plastic layers, the length expansion is determined by the expansion co-efficient of the aluminium layer and therefore roughly equal to that of a metal pipe.



1.4. Additional protective measures

Thermal overloading of the composite pipe network must be avoided by taking appropriate safety precautions including the use of suitably regulated equipment and monitoring equipment.

Protection from UV radiation

The plastic outer sheath of the composite pipe provides adequate protection from indirect UV radiation inside buildings and no further measures are required. However, the pipes must not be constantly subjected to direct UV radiation (solar radiation outdoors) without suitable protective sheathing.

Installation

The Wavin pipe can be handled by a single installer. Optimal aluminium thickness means it can be bent by hand for pipes up to 20 mm diameter. Bending springs and bending pliers may be used to assist and should always be used for diameters 25 mm and above. Furthermore, the Wavin pipe can be installed with the polymer fittings from the Wavin Tigris K1 press fitting range and the Wavin smartFiX push-fit fitting system. It can equally be used with the metal fittings of the Tigris M1 press fitting range.

Accessories and Tools

The pipe ends must be calibrated and de-burred using the Wavin calibration tool. The pipe can then safely be inserted and connected to all three Wavin fittings types i.e. Tigris K1, Tigris M1 and smartFIX.

2. Wavin Tigris K1 Press Fitting System

2.1. PPSU Wavin Tigris K1 press fitting with defined leak function

The Wavin Tigris K1 press fitting is made of the high technical performance plastic polyphenylsulfone (PPSU), which is resistant to high temperatures (heat shape resistance > 200 °C, processing temperature 360°C), corrosion and encrustation. Its extremely high notched impact strength and lack of sensitivity to stress cracks make the fitting extremely robust and insensitive to impacts. The performance of PPSU has already been proven over many years in aircraft engineering, medical sterilisation technology, chemical plants and automotive engineering as well as in Wavin plumbing fittings.

The fittings are equipped with a fixed stainless steel press sleeve. The sleeve gives the connection additional strength and reliability. It has an observation window, through which the insert depth of the pipe can be reliably checked before pressing. The seal is with an O-ring.

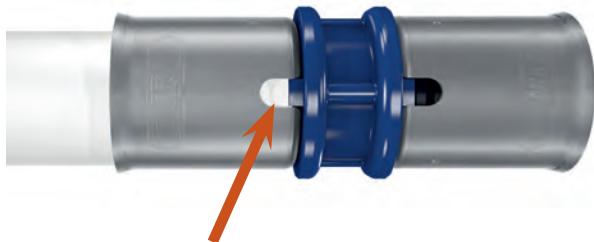


Figure 2: The observation window in the stainless steel press sleeve can be used to check that the pipe is inserted to the stop.

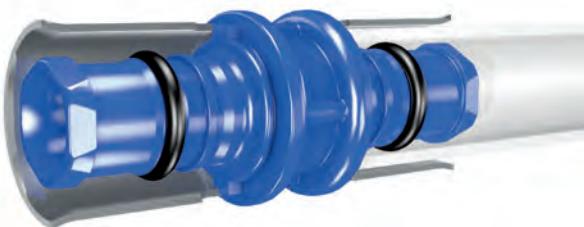


Figure 3: The new generation of PPSU press fittings with hexagonal head cross-section.

Wavin has more than 140 different K1 press fittings in its range, including threaded transition fittings. In the case of externally threaded fittings, you have the choice between pure PPSU fittings and fittings in dezincification resistant brass. Internally threaded fittings have an insert in dezincification resistant brass. In order to avoid stress cracking corrosion, all brass components undergo a special follow-up treatment.

The new generation of PPSU press fittings guarantees that an accidentally unpressed connection is unsealed and reliably exposed by leaking during the pressure test. Furthermore, the new hexagonal head cross-section reduces the force required to insert the pipe, which makes the work of the installer easier. The new fitting design is patented.

2.2. Range of applications

Wavin Tigris K1 meets the requirements for tap water installation and radiator heating systems. The pipe system is suitable for all tap water qualities and is physiologically harmless.

Wavin Tigris K1 is therefore suitable for hot and cold water installations and for radiator heating in residential construction as well as in public and commercial buildings. Thanks to an extensive range of fittings, the system is optimally suited not only to new construction but also to renovations of old buildings.

Figure 4: Safety through clever technology: the Defined Leak Function in the pressure test reveals unpressed fitting connections.



Advantages in practice:

- ⌚ Can be combined with Tigris M1 and smartFiX
- ⌚ Dimensions from 16 mm to 63 mm
- ⌚ Low insertion forces due to the patented Wavin hexagonal head shape
- ⌚ Intended leak function (unpressed = unsealed)
- ⌚ Quick and safe assembly
- ⌚ Physiologically harmless
- ⌚ Suitable for any water quality

2.3. Approvals and Certificates

Wavin Tigris K1 is subject to constant internal quality controls and continuous external monitoring.

Wavin Tigris K1 is approved by DVGW.



and certified to EN-ISO 21003

2.4. Technical specifications

Wavin Tigris K1

Pipe material (for multi-layer composite pipes see pages 7 and 8)	Internal layer in electron-beam cross-linked polyethylene (PE-Xc), external layer in PE, with an aluminium layer between, connected by special bonding agents
Fitting material	Polyphenylsulfone (PPSU), press sleeve in stainless steel
Pipe colour	White
Fitting colour	Wavin Tigris K1: blue
Max. constant operating temperature*	85°C
Max. short-term load**	100°C
Max. constant operating pressure	10 bar (where Tmax. = 70°C)
Coefficient of thermal expansion	0.025 – 0.030 mm/m K
Thermal conductivity	0.4 W/m·K
Pipe roughness	0.007 mm

* At a max. operating pressure of 6 bar.

** At max. 100 hours in 50 years.

3. Wavin Tigris M1 Press Fitting System

3.1. Wavin Tigris M1 metal press fitting with defined leak function

The Tigris M1 system is an addition to the range from Wavin. Based on the patented Tigris K1 design with the hexagonal head cross-section, Wavin now offers a system for installers who prefer to use metal fittings.

The Wavin Tigris M1 metal press fitting is resistant to high temperatures, corrosion and encrustation.

The fittings are equipped with a fixed stainless steel press sleeve. The sleeve gives the connection additional strength and reliability. It has an observation window, through which the insert depth of the pipe can be reliably checked before pressing. The seal is with two O-rings.

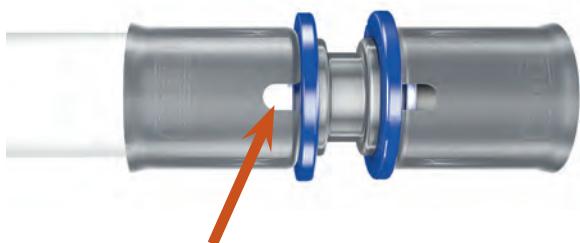


Figure 5: The observation window in the stainless steel press sleeve can be used to check that the pipe is inserted to the stop



Figure 6: The new generation of metal press fittings with hexagonal head cross-section.

Available in diameters 16 to 63 mm. The new generation of metal press fittings guarantees that an accidentally unpressed connection is unsealed and reliably exposed in the pressure test. Furthermore, the new hexagonal head cross-section has a positive impact on reducing the insertion forces with reduces the force required to insert the pipe. The new fitting design is patented.

3.2. Range of applications

Wavin Tigris M1 meets the requirements for tap water installation and radiator heating systems. The pipe system is suitable for all tap water qualities and is physiologically harmless.

Wavin Tigris M1 is therefore suitable for cold and hot water installations and for radiator heating in residential construction as well as in public and commercial buildings. Thanks to an extensive range of fittings, the system is optimally suited not only to new construction but also to renovations of old buildings.

Figure 7: Safety through clever technology: the leak function in the pressure test reveals unpressed fitting connections.



Advantages in practice:

- ⌚ Can be combined with Tigris K1 and smartFiX
- ⌚ Dimensions from 16 mm to 63 mm
- ⌚ Low insertion forces due to the patented Wavin hexagonal head shape
- ⌚ Defined leak function (unpressed = unsealed)
- ⌚ Quick and safe assembly
- ⌚ Physiologically harmless
- ⌚ Suitable for any water quality

3.3. Approvals and Certificates

Wavin Tigris M1 is subject to constant internal quality controls and continuous external monitoring.

Wavin Tigris M1 is approved by DVGW.



and certified to EN-ISO 21003.

3.4. Technical specifications

Wavin Tigris M1

Pipe material (for multi-layer composite pipes see pages 7 and 8)	Internal pipe in electron-beam cross-linked polyethylene (PE-Xc), external pipe in PE, with an aluminium layer between, connected by special bonding agents
Fitting material	Tinned brass, press sleeve in stainless steel
Colour	Pipes in white
Fitting colour	Wavin Tigris M1: base body silver and blue fix ring
Max. constant operating temperature*	85°C
Max. short-term load**	100°C
Max. constant operating pressure	10 bar (where Tmax. = 70°C)
Coefficient of thermal expansion	0.025 – 0.030 mm/m·K
Thermal conductivity	0.4 W/m·K
Pipe roughness	0.007 mm

* At a max. operating pressure of 6 bar.

** At max. 100 hours in 50 years.

4. Wavin smartFiX Push-Fit Fitting System

4.1. The push-fit fitting installation system Wavin smartFiX

As a push-fit fitting system, Wavin smartFiX stands out for its quick, tool-free processing.

4.2. System description

4.2.1. Multi-layer composite pipe system with PPSU Wavin smartFiX push-fit fitting

Like Wavin Tigris K1 and Wavin Tigris M1, Wavin smartFiX is also designed for universal use in plumbing and heating installations. All three systems are fully compatible with each other. Wavin smartFiX is available in sizes from 16 to 25 mm.

4.3.2. PPSU push-fit fitting

The base body of the push-fit fitting and the fixing ring are made of the high technical performance plastic polyphenylsulfone (PPSU), which is resistant to high temperatures (heat shape resistance > 200°C, processing temperature 360°C), corrosion and encrustation. The caps are produced in glass fibre reinforced polyamide.

The extremely high notched impact strength and lack of sensitivity to stress cracks make the fitting robust and insensitive to impacts. The performance of PPSU has already been proved over many years in aircraft engineering, medical sterilisation technology, chemical plants and automotive engineering as well as in Wavin plumbing fittings.

The smartFiX fittings have an observation window, through which the insert depth of the pipe can be checked. The seal is with a dry-coated O-ring, which contributes to minimising the insertion forces. This helps make the fitting tolerant to site conditions, for example dust and debris.

Wavin has more than 55 different smartFiX push-fit fittings in its range, including threaded transition fittings. In the case of externally threaded fittings, you have the choice between pure PPSU fittings and fittings in dezincification resistant brass.

Internally threaded fittings have an insert made from dezincification resistant brass. In order to avoid stress cracking corrosion, all brass components undergo a special follow-up treatment.



Figure 8: The observation window in the PPSU cap can be used to check that the pipe is inserted to the stop.

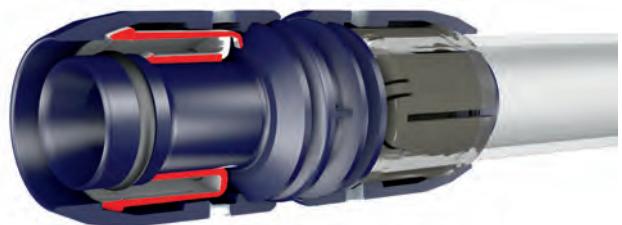


Figure 9: The smartFiX push-fit fitting.

4.3. Range of applications

Wavin smartFiX meets the requirements for tap water installation and radiator heating systems. The pipe system is suitable for all tap water qualities and physiologically harmless.

Wavin smartFiX is therefore suitable for cold and hot water installations and for radiator heating in residential construction as well as in public and commercial buildings.

Wavin smartFiX is a complete installation pipe system. It lends itself particularly where quick and safe installation is required at the same time as minimisation of expenses for installation tools.

Advantages in practice:

- ⦿ Compatible with Tigris K1 and Tigris M1
- ⦿ Dimensions from 16 mm to 25 mm
- ⦿ Uncomplicated, quick push-fit connection technology
- ⦿ Low insertion forces required
- ⦿ Minimum tooling quick and safe assembly
- ⦿ Physiologically harmless
- ⦿ Suitable for any water quality

4.4. Approvals and Certificates

Wavin smartFiX is subject to constant internal quality controls and continuous external monitoring.

Wavin smartFiX is approved by DVGW.



and certified to EN-ISO 21003.

4.5. Technical specifications
Wavin smartFiX

Pipe material (for multi-layer composite pipes see pages 7 and 8)	Internal pipe in electron-beam cross-linked polyethylene (PE-Xc), external pipe in PE, with an aluminium layer between, connected by special bonding agents
Fitting material	Polyphenylsulfone (PPSU) for the fitting base body and fixing ring. Caps in glass fibre reinforced polyamide
Pipe Colour	White
Fitting colour	Blue
Max. constant operating temperature*	85°C
Max. short-term load**	100°C
Max. constant operating pressure	10 bar (where Tmax. = 70°C)
Coefficient of thermal expansion	0.025 – 0.030 mm/m K
Thermal conductivity	0.4 W/m·K
Pipe roughness	0.007 mm

* At a max. operating pressure of 6 bar.

** At max. 100 hours in 50 years.

5. Installation and Assembly Information

5.1. Storage and handling

The Wavin system components are well protected in the original packaging. Nonetheless, all components (fittings and pipes) should be protected from mechanical and environmental damage.

5.2. Impairment due to ultraviolet radiation

Wavin multi-layer composite pipes must be protected from direct, intense sunlight and ultraviolet (UV) radiation. This applies both for the storage of the pipes and for finished installation. Storage must therefore not take place in the open air. Suitable measures must be taken to protect finished systems and system components from the effects of UV rays.

5.3. Observe press and push-fit fitting assembly instructions

- ⦿ Always cut the pipe to length at right angles
- ⦿ Calibrate and chamfer the pipe end all round
- ⦿ Push the pipe into the fitting to the sto
- ⦿ Check the press or push-fit fitting observation window
- ⦿ Press in the case of the press fittings
- ⦿ See pages 16 et seq. for detailed installation and assembly information

5.4. Potential equalisation

Building and electrical regulations such as VDI 0190 parts 410 and 540 demand potential equalisation between earth wires and “conductive” water, wastewater and heating pipes. As Wavin Hot and Cold Water Systems do not represent conductive pipe systems, they cannot be used for potential equalisation and are accordingly not to be earthed. An approved electrician must check that the installation of Wavin Tigris K1/M1 and Wavin smartFIX does not impair the existing electrical protective and earthing measures.

5.5. Installation temperature

The installation temperature for Wavin pipe systems should not fall below -10°C.

The operating temperatures of the new pressing machines with the Li-ion batteries from the Wavin range must be above -15°C nor above 40°C. The optimum processing range for Wavin Tigris K1/M1 and Wavin smartFIX system components lies roughly between 5°C and 25°C.

5.6. Frost protection

When using Wavin Hot and Cold Water Systems with pipe networks that require protection from frost (e.g. cold water networks, brine pipes), we recommend the use of ethylene glycol (to protect from risk of freezing). Ethylene glycol can be used up to a maximum concentration of 35%. This concentration roughly corresponds to frostproofing of -22°C. Before using alternative frost protection additives, confirm the suitability/approval with the manufacturer or with Wavin.

5.7. Sealing

The assembly of a threaded connection must be in accordance with DIN 30 660. We strongly recommend the use of PTFE / Teflon Tape to seal the connection. Alternatively hemp may be used but only in conjunction with an approved plastic sealing compound such as Fermit. Restrict the amount of hemp as too great a quantity can result in damage to the internal threads and cross-threading. When using hemp make sure that the thread tips remain visible.

5.8. Contact with substances containing solvents

Avoid direct contact of Wavin Hot and Cold Water Systems with solvents or construction materials containing solvents (such as paints, sprays, expanding foams, adhesives).

Note:

Specifically chemical sealants (e.g. Loctite) and adhesives (e.g. 2-part adhesives) must not be used. Expanding foams produced on the basis of methacrylate, isocyanate and acrylate must not be used.

Under unfavourable circumstances, aggressive chemicals that are present may cause damage to the plastic material.

The Wavin systems do not require the use of any chemical substance or additional lubrication during installation.

5.9. Pipe preparation and assembly

Tigris K1, Tigris M1, smartFIX



Tigris K1



Tigris M1



smartFIX





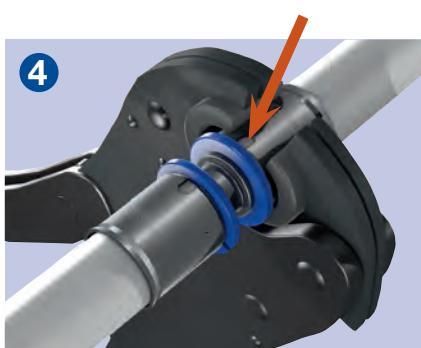
- ➊ Combination cutters (with pipe holder) for the dimension 16 – 25 mm
- ➋ Pipe cutter for the dimension 32 – 63 mm



- ➌ Dimensions 16 – 25 mm: all-round chamfer of depth min. 1 mm
- ➍ Dimensions 32 – 63 mm: all-round chamfer of depth min. 2 mm
- ➎ Max. battery or drilling machine rotation speed should be 500 rpm
- ➏ Remove accumulated shavings from the battery calibrating pin
- ➐ smartFIX: If one end of the pipe is already connected to the fitting, the opposite end should not be calibrated without resistance, to avoid the pipe rotating in the fitting



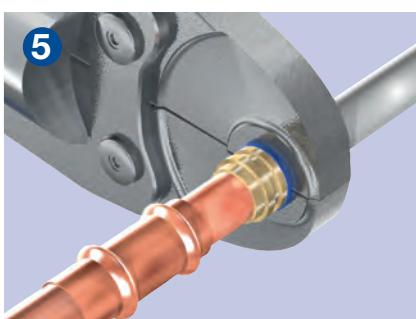
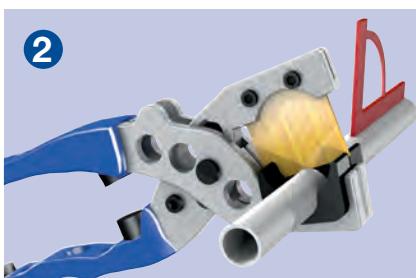
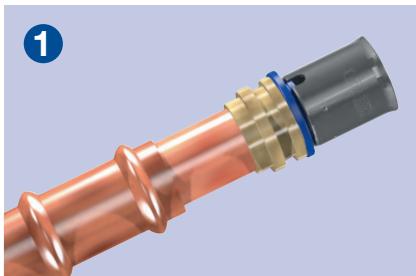
- ➑ Push the pipe into the fitting to the stop



Tigris K1 and Tigris M1 only

- ➒ The pressing jaws must be positioned on the inner stop of the press sleeve
- ➓ The pressing process may be executed only once per connection

5.10. Assembly instructions



5.10.1. Assembly instructions for K1 press transition to copper

- ① Slide the press connection into the copper fitting and press according to the specifications of the copper fitting manufacturer. A minimum space of 5 mm must be observed between the soldered joint and outer edge of the copper fitting
- ② Cut multi-layer composite pipes of dimensions 16 – 25 mm to length at right angles with the combination scissors
- ③ After deburring, an all-round chamfer of at least 1 mm (Da 16 – 25) must be visible
- ④ The maximum rotation speed when using the calibrator on the battery or drilling machine is 500 rpm. After use, remove accumulated shavings from the battery calibrating pin
- ⑤ Push the pipe into the fitting to the stop
- ⑥ The pressing jaws must be positioned on the inner stop of the press sleeve
- ⑦ The pressing process must be executed only once per connection.

Attention: Do not solder, otherwise the sealing rings on the press transition to copper may be damaged

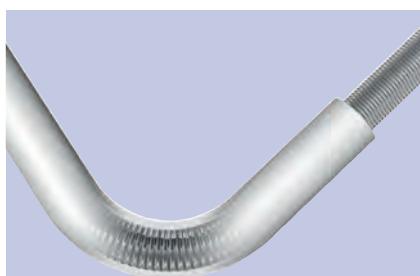


5.10.2. Assembly instructions for smartFIX push-fit transition to copper

- ➊ Cut the copper pipe to length at right angles
- ➋ Carefully deburr the copper pipe inside and outside
Soft copper pipe must be calibrated



- ➌ Check the transition coupling for cleanliness and correct sitting of the sealing elements. Push the transition coupling onto the copper pipe as far as it will go. Do not use oil or any lubrication here



5.11. Bending Wavin multi-layer composite pipes

The pipe is easy to bend: by hand, with the aid of the bending spring or using the Wavin bending pliers.

Measurement Da x s mm	Bending radius By hand mm	Bending radius Bending spring mm
16 x 2,0	5 x ø ≈ 80	4 x ø ≈ 64
20 x 2,25	5 x ø ≈ 100	4 x ø ≈ 80
25 x 2,5	5 x ø ≈ 125	4 x ø ≈ 100
32 x 3,0	-	-
40 x 4,0	-	-
50 x 4,5	-	-
63 x 6,0	-	-

* Smaller bending radii using our bending pliers.

Table1: Minimum bending radii with and without aids*.

5.12. Installation and Assembly Information

The respective current codes of practice must be observed in the installation of Wavin Tigris K1, Tigris M1 and smartFiX Hot and Cold Water Systems. These systems are to be assembled only by trained and qualified professionals.

5.12.1. Installation and fixing

5.12.1.1. Basics

Wavin Tigris K1, Tigris M1 and smartFiX Hot and Cold Water Systems are constructed in accordance with the relevant codes of practice. The mountings used must be adequate for fixing the composite pipe in the respective nominal diameter. Fixing systems with a sound insulation insert are recommended.

The expected length expansion based on maximum temperature feed and line length must be taken into account. A distinction is generally drawn between fixed points and floating points as fixing methods. Fixed points divide the pipeline element into separate sections. In the case of straight pipe routes, a fixed point is to be applied at the mid-point. No fixed points should be applied directly at fittings that are used for a change of direction.

Sufficient stability of the fixed points is required in order to effectively absorb the expansion forces occurring. A short distance to the ceiling must be observed.

Vertical lines, e.g. such as risers, can generally be installed only with fixed point clips. Here, fixing should be in front of or behind each storey branch. By contrast, floating point fixings guarantee expansion and movement of the pipeline concerned. For more information about this, please refer to the next chapter.

5.12.1.2. Consideration of thermally induced length expansion

All pipe materials expand on heating and contract on cooling. In the case of the piping for tap water systems (particularly with heated tap water) and heating pipes, the temperature-based length expansion of the materials must always be taken into account.

The temperature difference and pipe length constructed determine the length change. On assembly, the movement possibilities for each direction change must be taken into account.

Irrespective of the pipe size, the coefficient of expansion of Wavin multi-layer composite pipes is $0.025 - 0.030 \text{ mm/m}\cdot\text{K}$.

The length changes of Wavin multi-layer composite pipes as expected in operation with different pipe lengths and temperature differences can be determined from the following diagram.

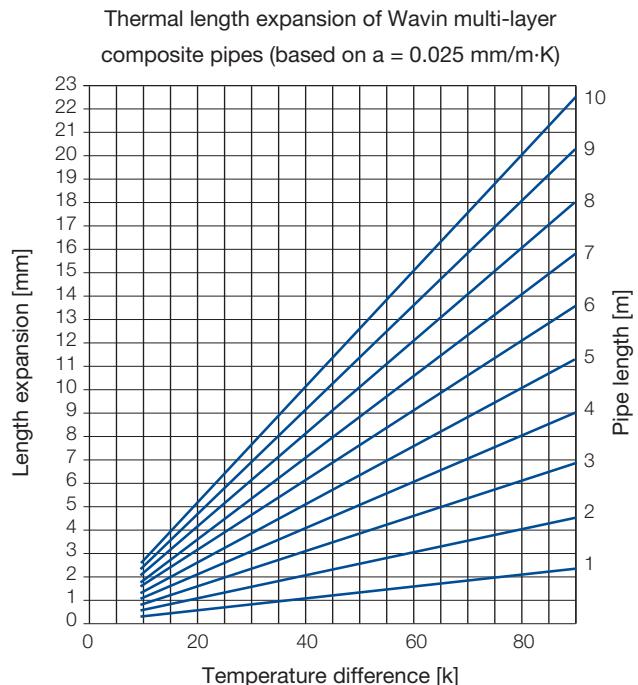


Figure 10: Length changes of Wavin multi-layer composite pipes.

The length changes can likewise be calculated using the following formula:

	$\Delta l = a \times l \times \Delta q$ Δl = Length expansion (mm) a = Coefficient of length expansion (mm/m.K) l = Pipeline length (m) Δq = Temperature difference (K)
Sample calculation: Given:	Wavin Tigris K1 hot water pipe Pipe length (l) 12 m Lowest ambient temperature 10 °C Medium temperature 60 °C
Sought:	Maximum length expansion under operating conditions $\Delta l = a \times l \times \Delta q$ $60 \text{ k} - 10 \text{ k} = 50 \text{ k}$ $0,025 \text{ mm/m.K} \times 12 \text{ m} \times 50 \text{ K} = 15 \text{ mm}$
Result:	Maximum length expansion under operating conditions = 15 mm

5.12.1.3. Absorption of length changes by bending joints

In the case of a change of direction, the thermal length expansion of a pipeline can often be offset within the pipe layout by bending joints and expansion U-bends.

The length of the bending joint can be determined by calculation or taken from the diagram below.

$$L_B = C \sqrt{d \cdot \Delta L}$$

Key:

L_B = Length of the bending joint	[mm]
d = External pipe diameter	[mm]
ΔL = Length change	[mm]
C = Material-dependent constant for Wavin multi-layer composite pipe	(= 30)

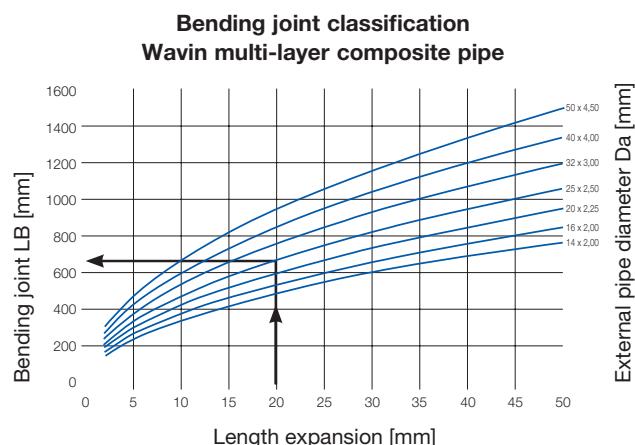
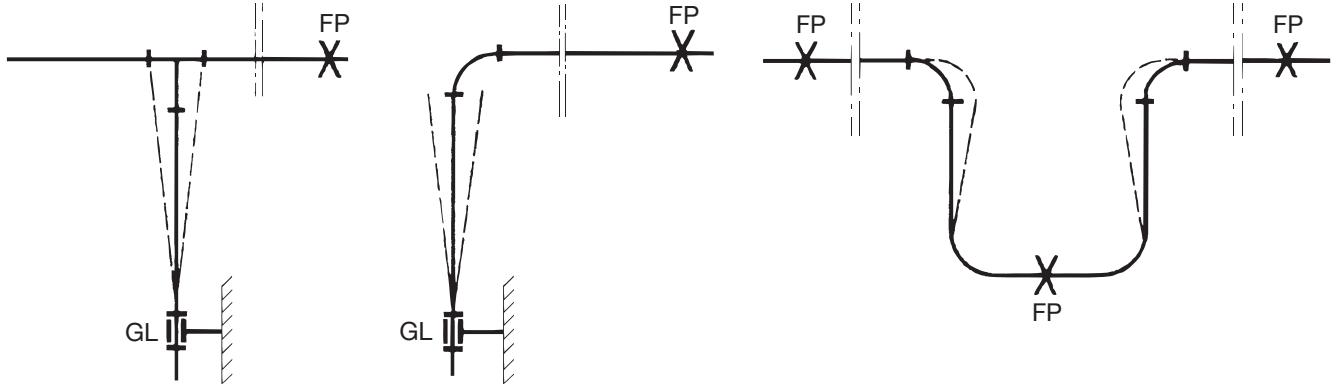


Figure 11: Bending joint classification of Wavin multi-layer composite pipes.

Sample calculation:

Given:	Length change = 20 mm Pipe diameter $d = 25 \times 2.5 \text{ mm}$ Constant c for Tigris K1/M1/smartFiX = 30
Sought:	Length of the bending joints LB
Result	650 mm, from diagram above



FP = Fixed point

GL = Floating point

Figure 12: Floating and fixed point mountings.

5.12.1.4. Fixing intervals

Pipelines on a supporting base must be fixed in accordance with DIN 18560 part 2, section 4.1.

The number of fixing components is essentially dependent on the piping in the respective construction project. As the calculation basis with straight piping, a fixing component can be attached at approx. 1 m pipe length. In the areas of diversions, at least two fixing components are to be affixed (before and after the diversion curve).

Because of their dimensional stability, Wavin multi-layer composite pipes installed in exposed locations require no supporting aids e.g. such as a supporting shell or support tube. They can be fixed at the intervals specified in the following table.

Dimension mm	Fixing interval m
16 x 2,0	1,00
20 x 2,25	1,20
25 x 2,5	1,50
32 x 3,0	1,50
40 x 4,0	1,80
50 x 4,5	1,80

Table 2: Pipe clamp intervals for Wavin multi-layer composite pipes installed in exposed locations.

The type and intervals of the attachments/fixings are dependent on pressure, temperature, medium and installation situation. The pipe attachments/fixings must be properly designed according to the total mass (pipe weight + weight of the water + weight of the insulation), in accordance with the recognised codes of practice.

Dimension mm	Pipe mass kg/m	Pipe mass + water kg/m	Pipe mass + water + Iso 9 mm kg/m	Pipe mass + water + Iso 13 mm kg/m
16 x 2,00	0,095	0,202	0,232	0,250
20 x 2,25	0,138	0,330	0,364	0,384
25 x 2,50	0,220	0,558	0,596	0,620
32 x 3,00	0,340	0,942	0,988	1,012
40 x 4,00	0,605	1,605	-	-
50 x 4,50	0,840	2,480	-	-

Table 3: Pipe masses.

5.12.1.5. Pipes in screed or concrete

Due to the relatively low expansion forces, no compensation measures are required in the case of direct embedding of the pipes. Because of the slight plastic malleability of Wavin multi-layer composite pipes, the length changes are absorbed by the pipe wall. Moreover, the respective requirements for heat protection (see the energy saving regulation section in this handbook) and impact noise insulation must be observed.

5.12.1.6. Pipes in the floor construction

As multi-layer composite pipes can move axially within the insulation with little resistance, the expected length changes must be absorbed. Right angle diversions in the insulating layer must be arranged such that length changes that occur in the respective sections are absorbed by the insulation thickness in the curve area.

Wavin Hot and Cold Water Systems already laid in the ground are exposed to many potential impacts on site during the construction phase, from scaffolding, ladders or other objects. Damage to the pipe/fitting or even the insulation must be avoided. Before installing further floor construction, a check should therefore be conducted for damage. Any damage to the pipe insulation should be repaired in all cases in order to avoid the risk of the formation of impact noise bridges or reduced sound insulation (see also the section on sound insulation in this handbook).

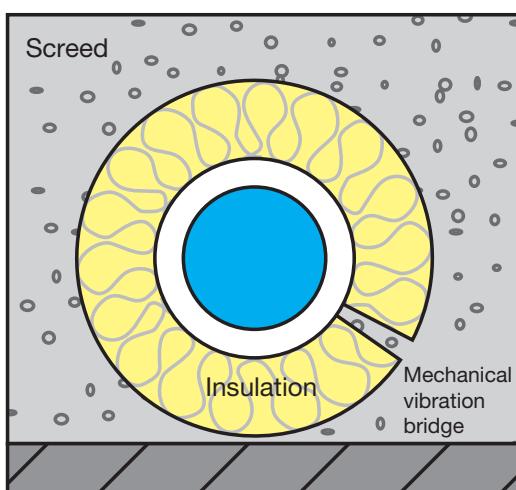


Figure 13: Mechanical vibration transmission through defective pipe insulation.

Causes of damage in floating screeds are often due to several pipe strings installed under the screed plate.

The following principles should be observed when installing pipe strings in the floor construction:

- Use heat and sound insulated pipelines
- Use sound insulated pipe fixing.
- Avoid pipe crossings as much as possible
- Pipeline installation parallel to walls
- Perpendicular junctions of pipelines into neighbouring walls
- Maximum width of the pipe string 120 mm
- Minimum distance between pipelines and walls:
200 mm in corridors, 500 mm in the living area
- Piping through screed expansion joints with corrugated tube or alternatively with 6 mm pipe insulation

5.12.1.7. Pipelines installed under plaster

Depending on the wall construction and masonry strength, there is a risk that the expansion forces from a multi-layer composite pipe that is plastered in directly will cause damage to the wall.

Multi-layer composite pipes under plaster should therefore be installed with insulation. This pipe insulation must be able to absorb expected length changes due to heat. In the case of pipelines under plaster for which there is no need for heat insulation, we recommend the use of the Wavin multi-layer composite pipe in black protective tube (see product range).

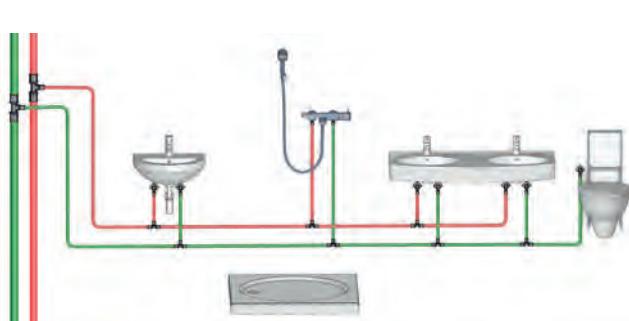
All pipes and fittings installed under plaster must be protected from direct contact with all building materials (such as masonry, plaster, cement, screed, tile adhesive) as detailed above.

5.12.1.8. Pipelines installed in exposed locations

Pipelines installed in exposed locations (e.g. basement pipes, risers etc) are fixed depending on the structural conditions and the recognised codes of practice. As appropriate, thermal length changes must be taken into account with the arrangement of bending joints in conjunction with fixed points and floating points (see section 5.12.2.).

5.12.1.9. Installation variants for drinking water

5.12.1.9.1. Tee installation



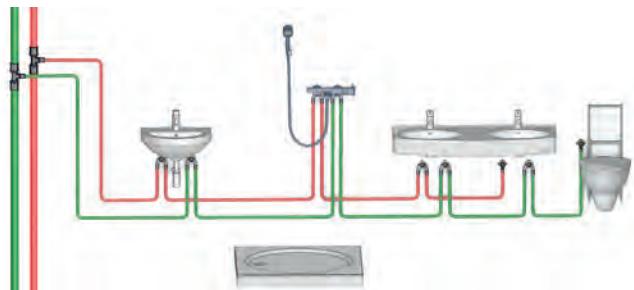
Example 1: Traditional distribution system, using individual Tee fittings to connect to each tap.

This type of installation should be used only when supplying to regularly and frequently used taps and fittings. Regularly and frequently here means "daily". Tee connections result in single supply lines in which the drinking water can stagnate if it is not used.

Advantages:

- Simple piping
- Quick to install
- Less piping used

5.12.1.9.2. In-series installation



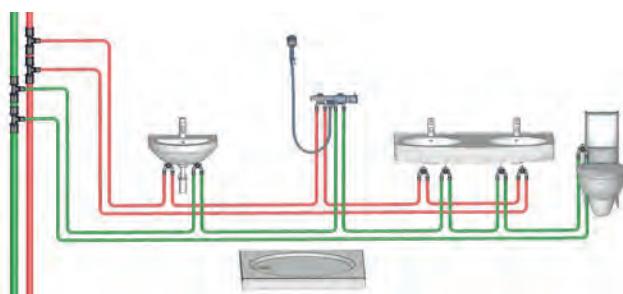
Example 2: In-series installation; loop-through up to the last fixture.

In-series installation is suited to multi-storey installation with upstream water meters. The pipe is routed from one tapping point directly to the next using double connections. The tapping points are supplied by a common pipe. It should be ensured that the most frequently used fixture appears at the end of the in-series installation. WC flushing systems that can be set with a continuous, timed flush are available. These ensure that the entire cold-water piping on each storey is flushed even when not in continuous use, for example in hotels. If required, flush valves for hot water piping are also available, with which a continuous, timed flush can be set.

Advantages:

- Simple piping
- No joints in screed
- Time-saving, quick installation
- Even pressure and heat distribution
- Low stagnation volume
- Rapid water exchange

5.12.1.9.3. Loop installation



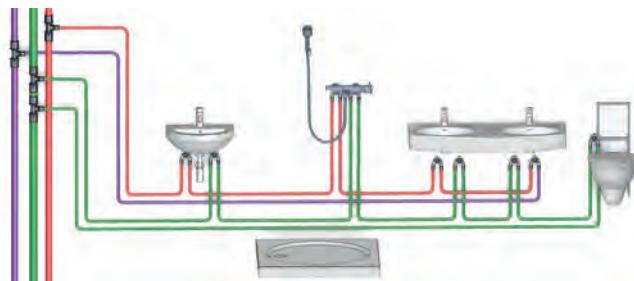
Example 3: Loop installation; loop-through up to the last fixture and then return to the storey connection point.

The loop installation illustrated here is suited to multi-storey installation with upstream water meters. The pipe is routed from one tapping point directly to the next using double connections. The piping then runs from the last consumer back to the storey connection point.

Advantages:

- ➊ Low pressure loss values (reduced by 50%)
- ➋ Significantly more tapping points can be connected with the same pipe diameter
- ➌ Greater distances for tapping are possible
- ➍ Even pressure and heat distribution
- ➎ Optimum water exchange with just one consumer's use
- ➏ Low stagnation times

5.12.1.9.4. Loop installation with circulation connection



Example 4: Loop installation with separate circulation.

This type of loop installation is suitable for multi-storey installations without upstream water meters. The pipe is guided from one tapping point directly to the next using double connections. The piping then runs from the last cold water consumer back to the storey connection point. The hot water pipe is guided from the last fixture as a circulation pipe back to the storey connection point.

Advantages:

- ➊ Lower pressure loss values for cold water section
- ➋ All hot water tapping points feature a circulation connection. Even hot water temperature distribution
- ➌ Optimum water exchange even when only one fixture is used
- ➍ Low stagnation times
- ➎ No legionella growth in the hot water tapping points
- ➏ Hydraulic alignment of the circulation piping

5.12.1.9.5. Internal circulation

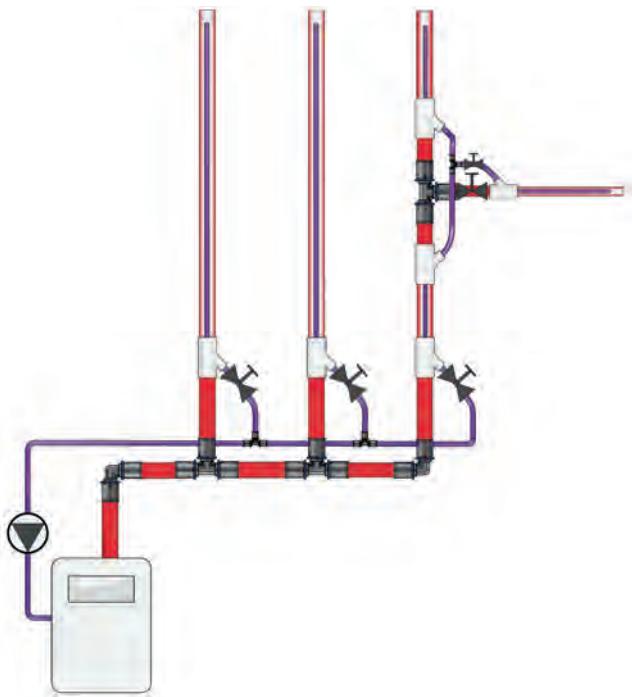


Fig. 14: The principle of internal circulation through an entire drinking water installation.

Internal circulation is an efficient installation type offering various advantages. Basically, the circulation piping feeds into the hot water piping.

Advantages:

- ⌚ Less space required in the duct
- ⌚ No separate fixings
- ⌚ No separate insulation
- ⌚ No separate fire protection. Less material required
- ⌚ No additional loss of energy through external circulation
- ⌚ Optimum hygiene
- ⌚ Can be retrofitted into existing installations (depending on standing pipe dimension)

Tip: Internal circulation: quick, energy-efficient, can be retrofitted.



Fig. 15: Fittings for feeding the internal circulation into the existing pipework and pre-assembled connection sets for distribution in the storey.

Wavin offers pre-assembled connection sets for internal circulation. The Wavin connection sets comprise:

- ⌚ Wavin internal circulation pipe PE-Xc, in 8 mm or 12 mm.
- ⌚ Wavin multi-layer composite pipe.
- ⌚ Tigris K1 and Tigris M1 pre-form parts (incl. pre-form parts with sleeve as transition to internal circulation pipe).
- ⌚ Thermostat valve with default setting for circulation piping.
- ⌚ Phase regulation and isolation valve.

Note for calculating the size:

With internal circulation, the selected existing pipe generally has to be one size bigger than the calculation. The Wavin connection set is available on request.

Tigris Inliner connection sets	Cat. code
40 x 32 mm	03171473
50 x 32 mm	03171474

Individual parts	Cat. code
Tigris Inliner pipe PE-Xc 8 mm	03171472
Tigris Inliner pipe PE-Xc 12 mm	03171471
Tigris M1 Inliner fitting 1" x ¾" 8 mm	03171469
Tigris M1 Inliner fitting 1 ½" x ¾" 12 mm	03171470

5.12.1.10. Heating installation variants

1. Double pipe heating

The “standard variant” – recognised, tried and tested

Economically sensible terms and conditions of service

Because of the total length of the pipe network resulting in pressure loss, a pressure loss of 100 to 200 Pa/m can be calculated in consideration of additional individual resistances (e.g. valves).

The advantages:

- ⌚ Even temperature of all radiators (= source of well being)
- ⌚ Recognised system for recording heating costs
- ⌚ Typical for old building renovation
- ⌚ Suitable for skirting boards

2. Double pipe heating with central manifold

The “spaghetti system” – optimal assembly and comfort

Economically sensible terms and conditions of service

Because of the short connection pipes from the manifold to the individual radiators, a pressure loss of 240 to 400 Pa/m can be calculated in consideration of additional individual resistances (e.g. valves).

The advantages:

- ⌚ Only one pipe dimension from the manifold
- ⌚ No connecting points in the floor area
- ⌚ Each radiator feed line can be operated autonomously.
- ⌚ No circulation in the pipe system in case of radiator stoppage (energy saving)

3. Single pipe heating

The “saving variant” – quick and inexpensive

Economically sensible terms and conditions of service

Because of the total length of the main line resulting in pressure loss in the case of single pipe heating, a pressure loss of 100 to 200 Pa/m should be expected in consideration of additional individual resistances (sub-pipes branching off of the main line or z values of 4-way valves).

With the use of 4-way valves:

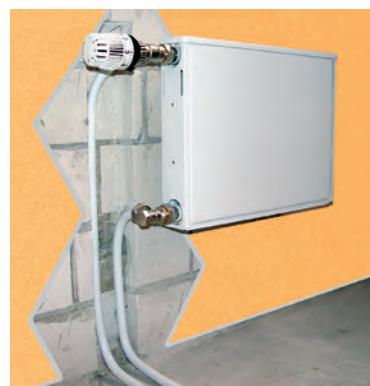
- ⌚ No connecting points in the floor area
- ⌚ Extremely quick installation
- ⌚ Only one pipe dimension from the line connection

5.13. Radiator connection: installation variants

The Wavin Tigris K1/M1 and smartFIX systems offer many options for the connection of standard compact and valve radiators in the single pipe and double pipe system. The following diagrams show the most popular connection variants. In all cases, the insulation must be taken into account in accordance with the energy saving regulation.

5.13.1. Compact radiators

1. Pipe connection from the wall by means of IT “Eurocone” screw connections.



Tigris K1 IT screw connections
“Eurocone”
16 x $\frac{3}{4}$ "
20 x $\frac{3}{4}$ "

5.13.2. Valve radiators

1. Pipe connection from the wall by means of radiator connecting block and IT "Eurocone" screw connections and the use of a junction fitting.



2. Pipe connection from the floor by means of Tigris K1 angle connecting pipes.



**Tigris K1
IT screw connections**
"Eurocone"
 $16 \times \frac{3}{4}''$
 $20 \times \frac{3}{4}''$



**Radiator connecting
blocks**



**Vario radiator
connecting block**



**Tigris K1 "Eurocone"
junction fitting**
 $16 \times 16 \times 16$
 $16 \times 16 \times 20$
 $20 \times 16 \times 16$
 $20 \times 16 \times 20$
 $20 \times 16 \times 16$
 $20 \times 20 \times 16$



**Tigris K1
T connecting
pipes**



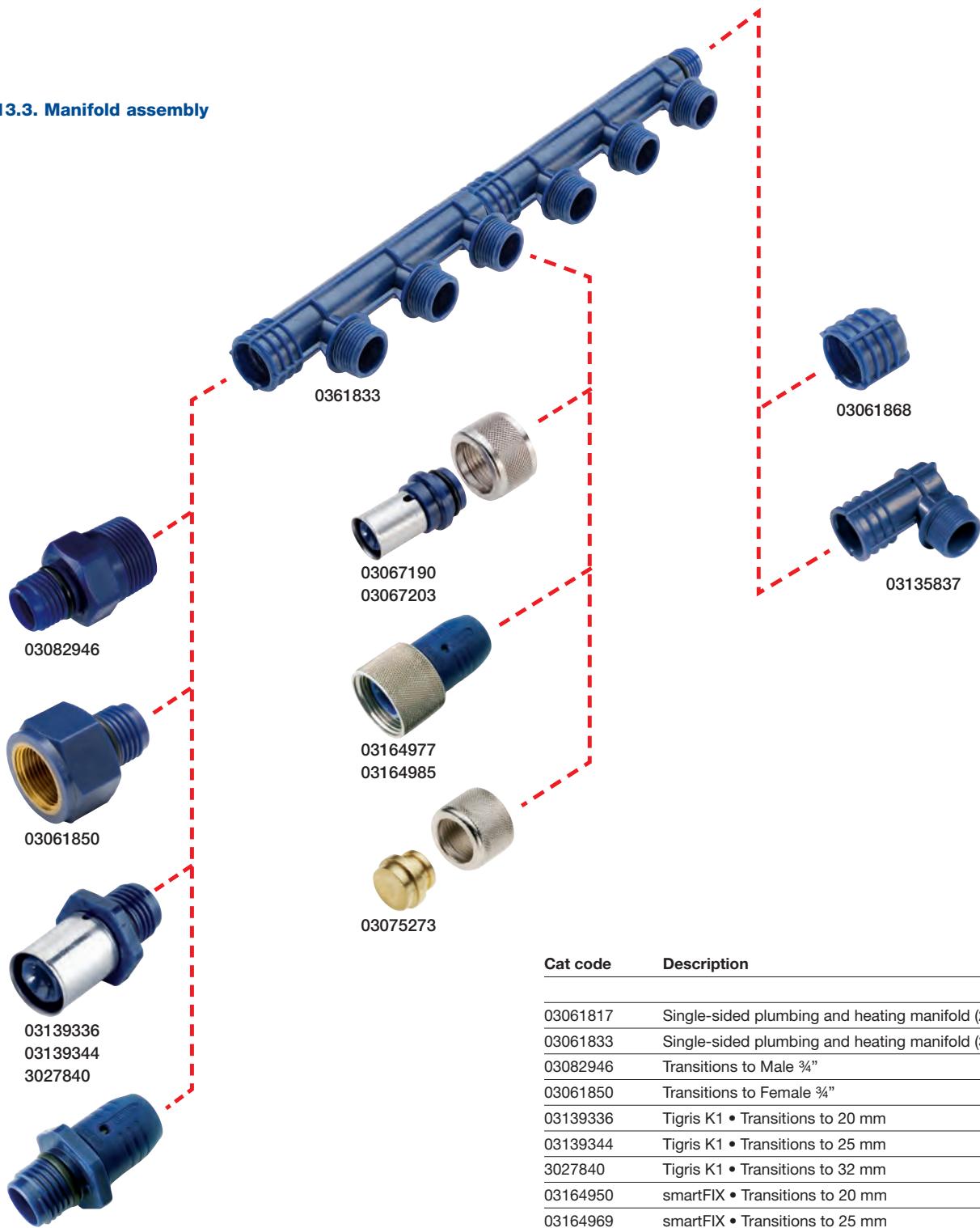
**Tigris K1
Angle connecting pipes**



**Tigris K1
Radiator assembly
fittings for the wall**



**Tigris K1
Radiator assembly
fittings for the floor**

5.13.3. Manifold assembly


Cat code	Description
03061817	Single-sided plumbing and heating manifold (2-way)
03061833	Single-sided plumbing and heating manifold (3-way)
03082946	Transitions to Male ¾"
03061850	Transitions to Female ¾"
03139336	Tigris K1 • Transitions to 20 mm
03139344	Tigris K1 • Transitions to 25 mm
3027840	Tigris K1 • Transitions to 32 mm
03164950	smartFIX • Transitions to 20 mm
03164969	smartFIX • Transitions to 25 mm
03067190	Tigris K1 • Connection adapter to 16 mm
03067203	Tigris K1 • Connection adapter to 20 mm
03164977	smartFIX • Connection adapter to 16 mm
03164985	smartFIX • Connection adapter to 20 mm
03061868	Manifold caps
03075273	Manifold stoppers
03135837	Tigris K1 • 90° manifold connecting elbow

5.14. Cordless and electric press tools

Wavin press-tools are supplied to the highest quality and manufacturing standards. Under correct operation and when all the necessary device inspections are carried out at regular intervals, the press tool warranty runs for 24 months from the despatch date or for 10,000 pressing operations whichever is sooner. Please refer to the respective press tool operating instructions for further details on operation and maintenance. The warranty is activated from the day of despatch from Wavin. The warranty does not cover any damage caused by improper handling or failure to observe the operating instructions or use with pipes or fittings not supplied by Wavin. Warranty services may be provided by the manufacturer only. Claims shall only be accepted if the device is supplied to the manufacturer fully intact, fully documented and with no interventions.

Inspection and service

The reliable performance of the press tool is dependent on careful handling. This is an important requirement for the tool to ensure long-lasting joints. The device requires regular service and maintenance. For the fault message/check list see page 30). Only a clean and operational press tool can ensure a long-lasting sealed joint. The pressing jaws must only be used for their intended purpose of pressing Wavin Tigris fittings and should only be replaced by a qualified technician.



Caution:

Do not open the device! If any seals are damaged the warranty shall be void.

An annual inspection is required. A major service is required every 10,000 pressing operations or every three years, whichever is sooner.

5.14.1. Wavin Tigris K1-/M1 pressing jaw with alternative brand press tools

External certification in accordance with DVGW (German Technical and Scientific Association for Gas and Water) work sheet 534 is carried out exclusively on the basis of press joints created using Wavin pressing jaws and Wavin press tools. If a different press tool is used, it must meet the minimum requirements listed below (e.g. linear thrust of 30 – 34 kN, use a suitable pressing jaw fixture etc) and must be technically flawless. This means it must be serviced and maintained according to the manufacturer's specifications. For the purpose of liability and security, we recommend contacting the respective manufacturer for proof of suitability. In the event that a complaint is made and the damage can be traced back to an unsuitable press tool from a different manufacturer, Wavin shall carry no responsibility or liability.

The press tools must meet the following requirements:

- ⦿ Only Wavin pressing jaws (U-contour) may be used.
- ⦿ The press tool must be operated and serviced according to the respective manufacturer guidelines. The Wavin assembly guidelines must be complied with.
- ⦿ The “mini” press (16 – 32 mm) must provide a linear thrust of at least 15 kN.
- ⦿ The “cordless” press (16 – 63 mm) must provide a linear thrust of 30 kN to 34 kN.
- ⦿ The bolt geometry of the press tool must be suitable for the Wavin pressing jaws.

Important note:

The following press tools from Rems/Roller must not be used with the Wavin pressing jaws:

REMS Power-Press E REMS Power-Press 2000
ROLLER Uni-Press E ROLLER Uni-Press 2000

To check the compatibility of Wavin Tigris K1/M1 pressing jaws with alternative brand press tools, please see overleaf.

The table below illustrates Wavin Tigris K1/M1 pressing jaw compatibility with alternative brand press tools. This table lists only "compatible devices" with a pressing force of 32 kN (± 2 kN) and 40 mm piston stroke. The "mini" versions are not listed here since they are generally not compatible. If using press tools and pressing jaws not listed here, proof of suitability for the Wavin Tigris K1/M1 systems must be provided in accordance with the corresponding national regulations. According to technical specifications, the Wavin Tigris K1/M1 system can be used with the following device types.

Machine type/description	Features	Pressing jaw dimension
Wavin	UAP3L	16 to 63 mm
Wavin	ACO202	16 to 63 mm
Wavin	ECO202	16 to 63 mm
Uponor electric press tool	UP 50 EL	16 to 63 mm
Uponor cordless press tool	UP 75	16 to 63 mm
Uponor electric press tool	UP 75 EL	16 to 63 mm
Geberit "new" PWH-75	Blue sleeve above pressing jaw fixture	16 to 63 mm
Novopress EFP 2 (manuf. after 1996)	Swivel head	16 to 63 mm
Novopress ACO 1/ECO 1 (Pressboy)	ACO 1 = cordless ECO 1 = electric	16 to 63 mm
Novopress ACO201/ECO201 ECO201 = electric	ACO201 = cordless	16 to 63 mm
Novopress AFP201/EFP201 EFP201 = electric	AFP201 = cordless	16 to 63 mm
Novopress AFP202/EFP202	AFP202 = cordless EFP202 = electric	16 to 63 mm
Klauke ipress	UAP3L	16 to 63 mm
Milwaukee	M18 HPT	16 to 63 mm
REMS Power-Press		16 to 63 mm
REMS Power-Press ACC		16 to 63 mm
REMS Akku-Press		16 to 63 mm
REMS Akku-Press ACC		16 to 63 mm
ROLLER'S Uni-Press		16 to 63 mm
ROLLER'S Uni-Press ACC		16 to 63 mm
ROLLER'S Multi-Press		16 to 63 mm
ROLLER'S Multi-Press ACC		16 to 63 mm
Rothenberger ROMAX® 3000		16 to 63 mm
Ridgid cordless press tool	RP 340-B	16 to 63 mm
Ridgid electric press tool	RP 340-C	16 to 63 mm
Viega cordless press tool	Pressgun 5	16 to 63 mm
Viega cordless press tool	Pressgun 4B	16 to 63 mm
Viega electric press tool	Pressgun 4E	16 to 63 mm
Viega electric	Type PT3-EH/H	16 to 63 mm
Viega electric press tool	Type 2 (manuf. after 1996) Serial numbers starting with 96...; lateral leverage for bolt monitoring	16 to 63 mm

5.14.2 Inspection and service

The following check list can be used when tools require regular inspection and maintenance, or in the event of damage or a complaint.

In the event of local service solutions only the authorised offices and agents of the manufacturers can be considered and then only after prior authorisation from Wavin Overseas

Manufacturer: Novopress tools

ACO 102
ACO 202
ECO 202
and the respective jaws.

Manufacturer: Klauke Tools

UAP2
UAP3L MAP1
MAP2L UP2EL-14
UNP 2
and the respective jaws.

In the first instance all requests for technical support should be sent to your local Wavin Overseas distributor or agent from whom the tool was purchased.

Damage report/check list

Customer:

Street:

City / Postcode / Country:

Telephone / Fax:

E-mail:

Contact person:

Responsible Wavin Overseas distributor or Agent (supplier):

Please find enclosed:

- | | | | |
|-----------------------------------|--------------------------|--|-------------------------------|
| UAP2 cordless press tool | <input type="checkbox"/> | delivered with: | case <input type="checkbox"/> |
| UAP3L cordless press tool | <input type="checkbox"/> | battery <input type="checkbox"/> | |
| „Mini“ MAP 1 cordless press tool | <input type="checkbox"/> | charging unit <input type="checkbox"/> | |
| „Mini“ MAP 2L cordless press tool | <input type="checkbox"/> | | |
| UP2EL-14 electric press tool | <input type="checkbox"/> | | |
| UNP 2 electric press tool | <input type="checkbox"/> | | |
| ACO202 cordless press tool | <input type="checkbox"/> | | |
| „Mini“ ACO102 cordless press tool | <input type="checkbox"/> | | |
| ECO202 electric press tool | <input type="checkbox"/> | | |

Other tools: _____ Pressing jaw
(please indicate number and dimension) _____

Tool number: _____

The tool has been sent for: Repair Service Inspection

- In the event of repair, please specify the reason:
- Tool is losing oil
 - Faulty piston
 - Press procedure not correctly ended
 - Tool does not generate pressure
 - Housing broken
 - Faulty motor
 - Pressing jaw mount cracked
 - Faulty switch
 - Battery does not work
 - Charging unit does not work

Other complaints:

Price quotation requested? Yes No

Date, Location

Signature

5.15. Flushing Wavin Tigris K1/M1 and Wavin smartFIX tap water pipes

The flushing of tap water pipes is described in detail in DIN 1988 part 2.

This treatment of the pipe network ensures the quality of the tap water. All pipe sections must be free of contamination and foreign bodies at the time of initial operation. Time delays between flushing and initial operation of the tap water network must be avoided, as complete drainage is not generally carried out after flushing. According to VDI 6023 – hygiene-conscious planning, execution, operation and maintenance of tap water systems – system sections that are unused for longer than 4 weeks must be flushed again.

5.16. Initial operation and handover

According to DIN 1988-2, the installer of the system must prepare relevant handover and acceptance logs. The system operator must be instructed with respect to the operation of the tap water system created. It is recommended that the instruction being completed is confirmed in writing.

Depending on the scale of the system, the presentation of written operating instructions is advised.

5.17. Checking Wavin Tigris K1 or Tigris M1 (unpressed/unsealed)

This additional test serves as an additional check for unpressed connections. When the function check is carried out with water, the leak from unpressed connections is clearly identifiable.

First a visual check on the connections (pressed/unpressed) should be carried out. A low pressure test with water should then be carried out to further check for any unpressed connections, with conditions as below. The results should be recorded and signed for.

5.17.1 Test Conditions

Test Pressure: Min 0.5 Bar, Max 3 Bar

Test duration: 15 minutes after temperature equalisation between the pipe and the test medium.

Note: In case of greater temperature differences (~10 K) between the ambient temperature and the filling water temperature, a waiting time of 30 minutes has been observed for temperature equalisation after filling of the system.

Test differential pressure: 0.0 bar.

There should be no pressure drop during this test. A further visual check should be carried out to ensure there are no leaking connections.

5.18. Main System Pressure Test (all fittings systems)

It is essential that a system pressure test is carried out in line with the relevant local regulations for plastic pipe systems used for drinking water or heating systems. Clean filtered drinking water should be used for the test.

If there are no clear local regulations available then Wavin recommends to use the testing procedures according to DIN 1998 Part 2. The main requirements of the test conditions, including records to be kept are summarised below.

5.18.1. Pressure Test to DIN 1988 Part 2 (if no local test regulation available)

Test pressure = authorised max. operating pressure x 1.1; min. 11 bar (based on the lowest point of the system)

All pipelines must undergo a pressure test. The pipes completed but not yet tested must be filled with filtered tap water (protect from frost). Connect the pressure gauge to the lowest point on the installation to be tested. Use only pressure gauges that allow reliable reading of a pressure change of 0.1 bar.

Valves or other blocking agents before and after heat producers and boilers must be closed in order to keep the test pressure away from the rest of the system. The pipeline must then be checked with test pressure and reduced to operating pressure. The test pressure is the authorised positive operating pressure for the system x 1.1. For tap water systems with an authorised positive operating pressure of e.g. 10 bar, the test pressure is 11 bar. The maximum positive operating pressure for pressure booster systems must be checked.

$\Delta \leq 10$ K Ambient temperature to fill temperature temperature difference must be max $\pm 10^\circ$ C

Test pressure: maximum positive operating pressure x 1.1 (min. 11 bar)

Test duration: 30 minutes after temperature equalisation between the pipe and the test medium.

Test differential pressure: 0.0.

Main test

Start: _____ Time _____ Test pressure: _____ bar
Date

End: _____ Time _____ Test pressure: _____ bar
Date (max. pressure drop 0.0)

Finally, all pipe connections must undergo a visual inspection.

No leaks were found in the aforementioned system during the main test.

Certification

Place, date

Contractor signature/stamp

Place, date

Client signature/stamp

5.19. Flushing heating installations

The completed heating installation must be flushed thoroughly before initial operation. This process removes metallic residues and contaminants that may have entered the pipe system during the construction activity.

Metallic contaminants in particular may result in long-term damage through corrosion on heating surfaces such as plate radiators or the heat generator.

5.20. Pressure test in accordance with DIN 18380

5.20.1. Pressure testing heating installations

Heating pipe installations must undergo a thorough visual inspection after completion, before openings are sealed and before the screed work, as unpressed or incorrectly pressed connections must be inspectable during and immediately after the leak test and pressure test.

All pipelines installed must always undergo a pressure test in accordance with DIN 18380 or equivalent local regulations. To do this, the pipes completed but not yet covered must be filled with water (caution: risk of frost; use glycol additive if necessary – see also page 31).

The proper execution of the pressure test in accordance with DIN 18380 is described in the corresponding pressure test log from this handbook. To ensure the guarantee, the pressure test for heating installations is to be conducted only in accordance with the specifications of this form.

5.20.2. Test (unpressed/unsealed)

See Section 5.17 above.

5.20.3. Pressure test for radiator installations in accordance with DIN 18380 (if no local test regulation available)

Test pressure = authorised max. operating pressure: _____ bar (based on the lowest point of the system)

System height: _____ m

Max. operating temperature parameter: _____ °C

All pipelines must undergo a pressure test in accordance with DIN 18380. The pipes completed but not yet tested must be filled with water (protect from frost). Connect the pressure gauge to the lowest point on the installation to be tested (e.g. boiler house). Use only pressure gauges that allow reliable reading of a pressure change of 0.1 bar.

Water heaters are to be tested with pressure equal to 1.3 times the total pressure at any point in the system and at least 1 bar positive pressure. As soon as possible after the cold water pressure test, check whether the system also remains sealed at maximum temperature by heating to the highest hot water temperature on the basis of the calculation.

Test pressure: 1.3 x total pressure

Test duration: 2 hours after temperature equalisation between the pipe and the test medium.

Test differential pressure \leq 0.2 bar.

Finally, all pipe connections must undergo a visual inspection.

Start: _____ Time _____ Test pressure: _____ bar
Date

End: _____ Time _____ Test pressure: _____ bar
Date (max. pressure drop 0.0)

The aforementioned system was heated to the design temperature and no leaks were found. After cooling, there were also no leaks. Suitable measures must be taken in the event of a risk of freezing.



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TEST CERTIFICATE

This Certificate is issued to Wavin Singapore Holding Pte Ltd

1 Maritime Square #12-19B,
Harbourfront Centre,
Singapore 099253

FOR

Product: Multilayer piping system for hot & cold water installation
inside buildings

Brand/Model: WAVIN / Hot & Cold Water System

Detail: DN 16, 20, 25, 32, 40, 50, 63 and 75

Tested to: BS EN ISO 21003-1, BS EN ISO 21003-2,
BS EN ISO 21003-3, BS EN ISO 21003-5,
AS/NZS 4020, BS 6920

Test Report reference: 22004761-JON, 21702098-CLC, 21601755-CLC,
8575/09-VI, 95572/11-II, MAT/LAB 744D

A sample of product submitted was tested and found to comply with the test requirements of
the above standard(s).

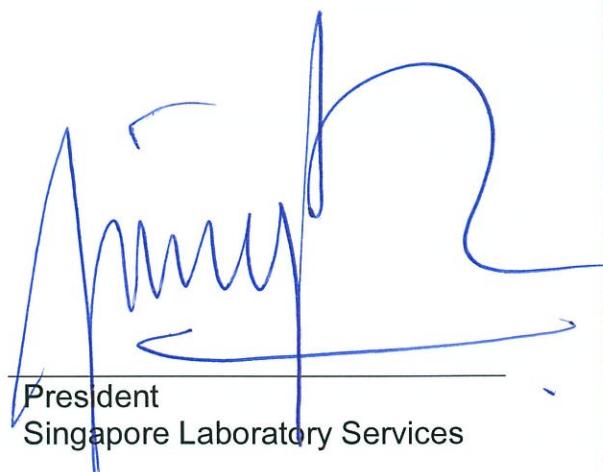
Certificate number: 140036

Date of original issue: 9 Dec 2014

Date of last renewal: 25 Jan 2020

Date of expiry: 8 Dec 2022

SLS
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President
Singapore Laboratory Services

This Certificate is part of a complete report and should be read as a whole. The use of this Certificate is
subjected to the terms and conditions of SLS. For further information, please contact SLS.

Singapore Laboratory Services Pte Ltd, 64 Tuas South Ave 2 S637525



Watercove @ Sembawang



T.O.P: June 2019

Citadines Balestier / Former Balestier Towers

T.O.P: End of 2019

Outram Community Hospital



T.O.P: Early 2019

Tekka Place @ Serangoon

T.O.P: Dec 2019

Tampines Care Centre

Completed 2018