Steel Sheet Piling

HZ Steel Wall System

EDITION 2007

Steel solutions for a better world

arcelor

Our mill producing the HZ king pile elements needs to be revamped in order to offer in the coming months a brand new system providing a wider range of technical possibilities and allowing the design of more cost-effective solutions. During this transition period our current HZ production will be limited to the HZ 775 and HZ 975 series.

This revised "May 2007" edition shows all the solutions available during this transition period, and includes the new wide intermediate AZ steel sheet piles AZ13-770 and AZ18-700.

For further information, feel free to contact our sales or technical department in Luxembourg, or our worldwide sales network. Updated information will also be posted on our website **www.arcelor.com/sheetpiling**.

Arcelor Mittal reserves the right to replace without prior notice the existing HZ/AZ combined wall system by an equivalent system.

Contents

cover photo: Mose project (2005), Chioggia Lock, Venice, Italy

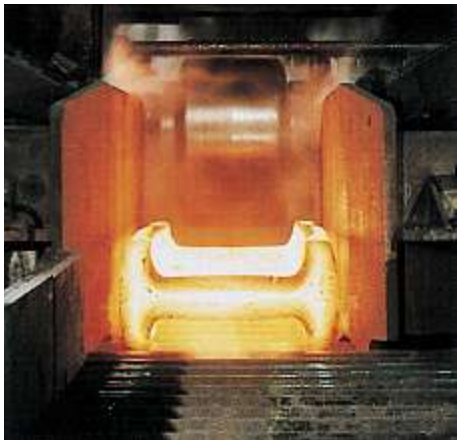
HZ Steel Wall System

The HZ wall is a combined system incorporating :

- HZ king piles as structural supports,
- AZ sheet piles as intermediate infill elements.

A full range of standard series sections interlinked by special connectors.

Systemwise assembly of these basic elements yields a multitude of possible combinations.



All combinations are based on the same principle : structural supports comprising one or more HZ king pile sections alternating with intermediate double AZ sheet pile sections.

Structurally, the HZ king piles fulfil two different functions :

- as retaining members, they resist horizontal loads resulting from earth and hydrostatic pressures,
- as bearing piles, they resist vertical superimposed loads.

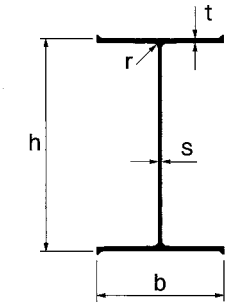
The intermediate sheet piles have only an earth-retaining and load transfer function and they may be shorter than the HZ king piles.

Depending on the structural combination and grade of steel adopted, bending moments up to 9000 kNm/m can be safely resisted by HZ walling.

Meaning the practical range of sectional combinations is characterised by loadings unsuitable for conventional sheet piling. Concurrently, an excellent section modulus to weight ratio ensures economical design.

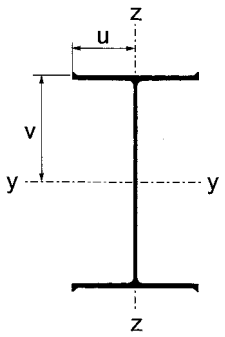
The outstanding feature of the new combination is the extensive range of possible combinations using the entire AZ sheet pile offer, if necessary, including all up and down rolled variants.

HZ - King Piles



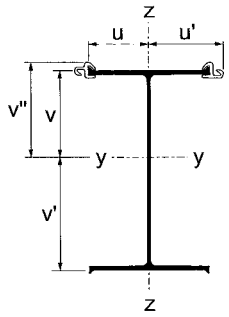
	Dimensions						
	h	b	t	s	r		
Section	mm	mm	mm	mm	mm	**Suitable connector**	
HZ 775 A	775.0	460.0	17.0	12.5	20	RZDU 16	RH 16
HZ 775 B	779.0	460.0	19.0	12.5	20	RZDU 16	RH 16
HZ 775 C	783.0	461.5	21.0	14.0	20	RZDU 18	RH 20
HZ 775 D	787.0	461.5	23.0	14.0	20	RZDU 18	RH 20
HZ 975 A	975.0	460.0	17.0	14.0	20	RZDU 16	RH 16
HZ 975 B	979.0	460.0	19.0	14.0	20	RZDU 16	RH 16
HZ 975 C	983.0	462.0	21.0	16.0	20	RZDU 18	RH 20
HZ 975 D	987.0	462.0	23.0	16.0	20	RZDU 18	RH 20

Solution 10

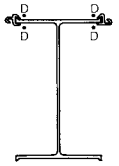


	Properties per solution											
	Dimensions		Sectional area	**Mass**	Moment of inertia		**Elastic section modulus**		Radius of gyration		**Coating area** Water-	Land-
	v	u			y-y	z-z	**y-y**	z-z	y-y	z-z	side	side
Section	mm	mm	cm^2	**kg/m**	cm^4	cm^4	**cm^3**	cm^3	cm	cm	m^2/m	m^2/m
HZ 775 A	387.5	230.0	257.9	**202.4**	280070	29550	**7230**	1285	32.96	10.70	0.470	2.919
HZ 775 B	389.5	230.0	276.3	**216.9**	307930	32800	**7905**	1425	33.38	10.90	0.470	2.927
HZ 775 C	391.5	230.8	306.8	**240.8**	342680	36580	**8755**	1585	33.42	10.92	0.471	2.937
HZ 775 D	393.5	230.8	325.3	**255.3**	371220	39850	**9435**	1725	33.78	11.07	0.471	2.945
HZ 975 A	487.5	230.0	297.0	**233.1**	476680	29560	**9780**	1285	40.06	9.98	0.470	3.316
HZ 975 B	489.5	230.0	315.4	**247.6**	520700	32810	**10635**	1425	40.63	10.20	0.470	3.324
HZ 975 C	491.5	231.0	353.9	**277.8**	582170	36770	**11845**	1590	40.56	10.19	0.472	3.335
HZ 975 D	493.5	231.0	372.4	**292.3**	627120	40060	**12710**	1735	41.04	10.37	0.472	3.343

Solution 12



Delivery Form

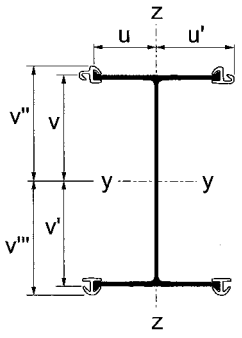


Properties per solution

Section	Dimensions v mm	v' mm	v'' mm	u mm	u' mm	Sectional area cm²	**Mass kg/m**	Moment of inertia y-y cm⁴	z-z cm⁴	*Elastic section modulus y-y cm³	z-z cm³	**Elastic section modulus y-y cm³**	Radius of gyration y-y cm	z-z cm	**Coating area** Water-side m²/m	Land-side m²/m
HZ 775 A	334.5	440.5	367.0	230.0	283.8	299.0	**234.7**	332820	53750	9070	1895	**7555**	33.36	13.41	0.631	2.970
HZ 775 B	339.5	439.5	370.8	230.0	283.8	317.4	**249.2**	361420	56990	9745	2010	**8225**	33.74	13.40	0.631	2.978
HZ 775 C	341.5	441.5	373.1	230.8	284.5	352.7	**276.9**	401790	63220	10770	2220	**9100**	33.75	13.39	0.646	2.983
HZ 775 D	345.9	441.1	376.1	230.8	284.5	371.2	**291.4**	430930	66490	11460	2335	**9770**	34.07	13.38	0.646	2.991
HZ 975 A	428.5	546.5	460.4	230.0	283.8	338.1	**265.4**	561650	53760	12200	1895	**10280**	40.76	12.61	0.631	3.367
HZ 975 B	433.4	545.6	464.7	230.0	283.8	356.5	**279.9**	606800	57000	13060	2010	**11120**	41.26	12.64	0.631	3.375
HZ 975 C	435.9	547.1	467.5	231.0	284.8	399.8	**313.8**	677600	63460	14495	2230	**12385**	41.17	12.60	0.646	3.381
HZ 975 D	440.3	546.7	470.9	231.0	284.8	418.3	**328.4**	723490	66750	15365	2345	**13235**	41.59	12.63	0.646	3.389

* Referring outside of connector (v'' resp. u'),
** Referring outside of HZ-flange (highest value of v; v')

Solution 14



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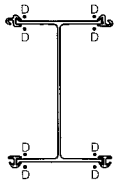
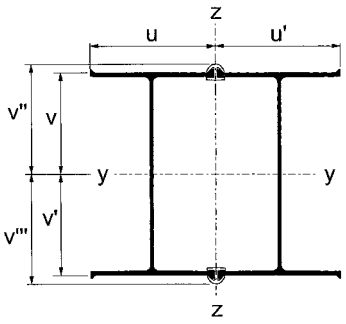


Properties per solution

Section	Dimensions v mm	v' mm	v'' mm	v''' mm	u mm	u' mm	Sectional area cm²	**Mass kg/m**	Moment of inertia y-y cm⁴	z-z cm⁴	*Elastic section modulus y-y cm³	z-z cm³	**Elastic section modulus y-y cm³**	Radius of gyration y-y cm	z-z cm	**Coating area** Water-side m²/m	Land-side m²/m
HZ 775 A	387.3	387.7	419.8	419.9	230.0	283.8	339.8	**266.7**	402550	76850	9585	2710	**10385**	34.42	15.04	0.631	3.214
HZ 775 B	389.4	389.6	420.7	420.9	230.0	283.8	358.2	**281.2**	431010	80100	10240	2825	**11060**	34.69	14.95	0.631	3.222
HZ 775 C	396.6	386.4	428.2	417.9	230.8	284.5	403.7	**316.9**	486900	92690	11370	3260	**12275**	34.73	15.15	0.646	3.250
HZ 775 D	398.4	388.6	428.5	418.7	230.8	284.5	422.1	**331.4**	515850	95860	12035	3370	**12950**	34.96	15.07	0.646	3.258
HZ 975 A	487.3	487.7	519.1	519.6	230.0	283.8	378.9	**297.4**	670210	76860	12900	2710	**13740**	42.06	14.24	0.631	3.610
HZ 975 B	489.3	489.7	520.6	521.0	230.0	283.8	397.3	**311.9**	715400	80110	13730	2825	**14610**	42.44	14.20	0.631	3.618
HZ 975 C	497.2	485.8	528.6	517.4	231.0	284.8	450.8	**353.9**	810700	92750	15335	3255	**16305**	42.41	14.34	0.646	3.648
HZ 975 D	499.0	488.0	529.4	518.6	231.0	284.8	469.3	**368.4**	856600	96040	16180	3375	**17165**	42.72	14.31	0.646	3.656

* Referring outside of connector (highest value of v''; v''' resp. u'),
** Referring outside of HZ-flange (highest value of v; v')
D = discontinuous weld, a = 6 mm, 10 % of length over the whole pile length (100 mm/m) + 500 mm top and toe

Solution 22



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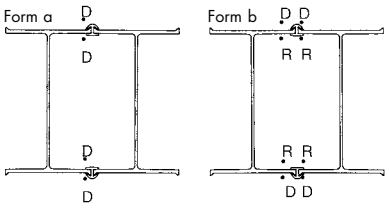
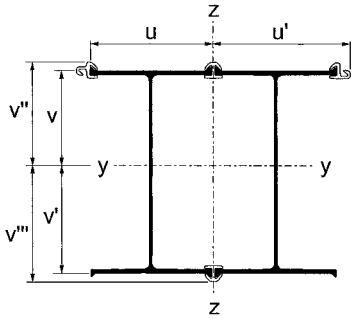


Properties per solution

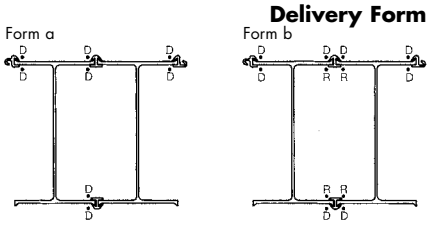
Section	Dimensions v = v' mm	Dimensions v'' = v''' mm	Dimensions u mm	Dimensions u' mm	Sectional area cm²	**Mass kg/m**	Moment of inertia y-y cm⁴	Moment of inertia z-z cm⁴	* Elastic section modulus y-y cm³	* Elastic section modulus z-z cm³	**Elastic section modulus y-y cm³**	Radius of gyration y-y cm	Radius of gyration z-z cm	**Coating area** Water-side m²/m	**Coating area** Land-side m²/m
HZ 775 A	387.5	419.8	468.8	468.8	556.5	**436.9**	621460	353340	14805	7535	**16040**	33.42	25.20	1.004	3.454
HZ 775 B	389.5	420.8	468.8	468.8	593.3	**465.8**	677500	380810	16100	8125	**17395**	33.79	25.33	1.004	3.462
HZ 775 C	391.5	423.1	470.7	470.7	664.6	**521.7**	761770	426630	18005	9065	**19460**	33.86	25.34	1.011	3.477
HZ 775 D	393.5	423.6	470.7	470.7	701.5	**550.7**	819060	454440	19335	9655	**20815**	34.17	25.45	1.011	3.485
HZ 975 A	487.5	519.3	468.8	468.8	634.7	**498.2**	1050160	397930	20220	8490	**21540**	40.68	25.04	1.003	3.850
HZ 975 B	489.5	520.8	468.8	468.8	671.5	**527.1**	1138790	425400	21865	9075	**23265**	41.18	25.17	1.003	3.858
HZ 975 C	491.5	523.1	471.2	471.2	758.8	**595.7**	1285240	482130	24570	10230	**26150**	41.16	25.21	1.012	3.875
HZ 975 D	493.5	524.1	471.2	471.2	795.8	**624.7**	1375640	510030	26250	10825	**27875**	41.58	25.32	1.012	3.883

* Referring outside of connector,
** Referring outside of HZ-flange

Solution 24



Delivery Form

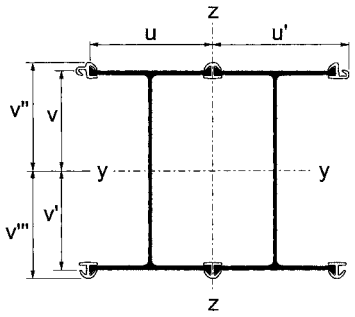


Properties per solution

Section	Dimensions v mm	Dimensions v' mm	Dimensions v'' mm	Dimensions v''' mm	Dimensions u mm	Dimensions u' mm	Sectional area cm²	**Mass kg/m**	Moment of inertia y-y cm⁴	Moment of inertia z-z cm⁴	*Elastic section modulus y-y cm³	*Elastic section modulus z-z cm³	**Elastic section modulus y-y cm³**	Radius of gyration y-y cm	Radius of gyration z-z cm	**Coating area** Water side m²/m	**Coating area** Land-side m²/m
HZ 775 A	361.0	414.0	393.3	446.3	468.8	523.8	597.7	**469.2**	678380	448850	15200	8570	**16385**	33.69	27.40	1.165	3.504
HZ 775 B	364.5	414.5	395.7	445.8	468.8	523.8	634.5	**498.1**	734960	476320	16485	9095	**17730**	34.04	27.40	1.165	3.512
HZ 775 C	366.7	416.3	398.2	447.9	470.7	525.3	710.5	**557.7**	825310	532820	18425	10145	**19825**	34.08	27.39	1.186	3.523
HZ 775 D	369.9	417.1	400.0	447.2	470.7	525.3	747.4	**586.7**	883000	560620	19745	10675	**21170**	34.37	27.39	1.186	3.531
HZ 975 A	458.0	517.0	489.8	548.8	468.8	523.8	675.8	**530.5**	1141010	493440	20790	9420	**22070**	41.09	27.02	1.165	3.901
HZ 975 B	461.4	517.6	492.7	548.8	468.8	523.8	712.6	**559.4**	1230490	520910	22420	9945	**23775**	41.55	27.04	1.165	3.909
HZ 975 C	463.9	519.1	495.4	550.7	471.2	525.8	804.7	**631.7**	1386880	588530	25185	11195	**26715**	41.51	27.04	1.187	3.922
HZ 975 D	467.0	520.0	497.6	550.5	471.2	525.8	841.7	**660.7**	1477970	616420	26845	11725	**28425**	41.90	27.06	1.187	3.930

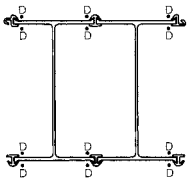
* Referring outside of connector (highest value of v''; v''' resp. u'),
** Referring outside of HZ-flange (highest value of v; v')
D = discontinuous weld, a = 6 mm, 10 % of length over the whole pile length (100 mm/m) + 500 mm continuous weld at top and toe
R = continuous weld, a = 6 mm, length 500 mm at top and toe only

Solution 26

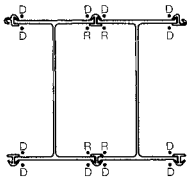


Delivery Form

Form a



Form b



Properties per solution

Section	Dimensions v mm	v' mm	v'' mm	v''' mm	u mm	u' mm	Sectional area cm²	**Mass** **kg/m**	Moment of inertia y-y cm⁴	z-z cm⁴	*Elastic section modulus y-y cm³	z-z cm³	****Elastic section modulus** **y-y cm³**	Radius of gyration y-y cm	z-z cm	**Coating area** Water side m²/m	Land-side m²/m
HZ 775 A	387.4	387.6	419.7	419.9	468.8	523.8	638.4	**501.2**	743910	541430	17720	10340	**19195**	34.14	29.12	1.165	3.748
HZ 775 B	389.4	389.6	420.7	420.9	468.8	523.8	675.2	**530.1**	800580	568900	19025	10860	**20550**	34.43	29.03	1.165	3.756
HZ 775 C	394.2	388.8	425.8	420.3	470.7	525.3	761.4	**597.7**	906040	650240	21280	12380	**22985**	34.50	29.22	1.186	3.790
HZ 775 D	396.1	390.9	426.2	421.0	470.7	525.3	798.3	**626.7**	963740	677850	22615	12905	**24330**	34.74	29.14	1.186	3.798
HZ 975 A	487.4	487.6	519.2	519.4	468.8	523.8	716.6	**562.5**	1243700	586020	23945	11190	**25505**	41.66	28.60	1.165	4.144
HZ 975 B	489.4	489.6	520.6	520.9	468.8	523.8	753.4	**591.4**	1333490	613490	25600	11715	**27235**	42.07	28.54	1.165	4.152
HZ 975 C	494.5	488.5	525.9	520.0	471.2	525.8	855.7	**671.7**	1513840	705700	28785	13425	**30615**	42.06	28.72	1.187	4.189
HZ 975 D	496.4	490.6	526.9	521.2	471.2	525.8	892.6	**700.7**	1605180	733600	30465	13955	**32340**	42.41	28.67	1.187	4.197

* Referring outside of connector (highest value of v''; v''' resp. u'),

** Referring outside of HZ-flange (highest value of v; v')

D = discontinuous weld, a = 6 mm, 10 % of length over the whole pile length (100 mm/m) + 500 mm continuous weld at top and toe

R = continuous weld, a = 6 mm, length 500 mm at top and toe only

Determination of the Section Modulus

For more transparency this catalogue gives two different values for the section modulus of solutions and combinations instead of the approximate single value of the previous editions.

In the tables of the characteristics of the solutions and combinations there are generally two values for the section modulus:

– one is referring to the outside fibre of the connector

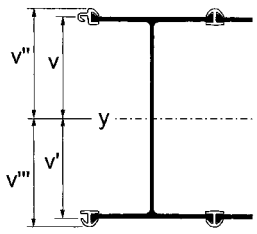
$$\text{Section modulus } * = \frac{\text{Moment of inertia}}{\max (v'', v''')}$$

where max (v'',v''') represents the highest value of v'' or v'''

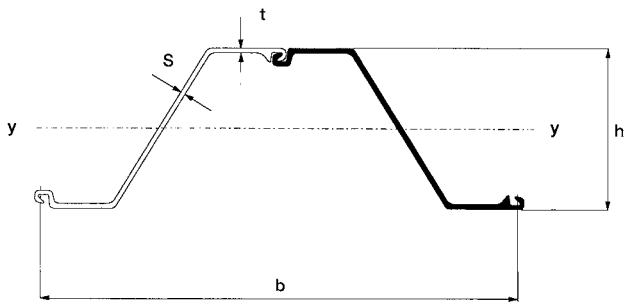
– one is referring to the outside fibre of the king pile flange

$$\text{Section modulus } ** = \frac{\text{Moment of inertia}}{\max (v, v')}$$

where max (v,v') represents the highest value of v or v'



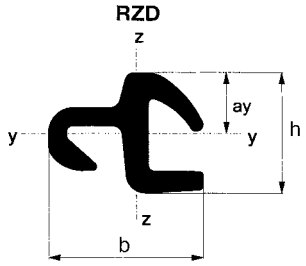
AZ - Intermediary Piles

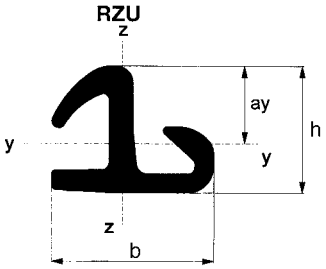


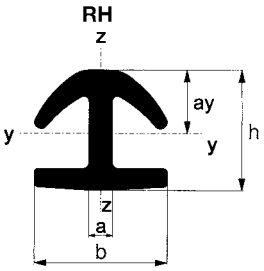
	Dimensions				Properties Double Pile					
	h	b	t	s	Sectional area	**Mass**	Moment of inertia y-y	**Elastic section modulus y-y**	Radius of gyration y-y	**Coating area***
Section	mm	mm	mm	mm	cm^2	**kg/m**	cm^4	**cm^3**	cm	m^2/m
AZ 13	303	1340	9.5	9.5	183.4	**144.0**	26400	**1740**	11.99	1.65
AZ 13 10/10	304	1340	10.0	10.0	191.6	**150.4**	27440	**1810**	11.97	1.65
AZ 18	380	1260	9.5	9.5	189.6	**148.8**	43080	**2270**	15.07	1.71
AZ 18 10/10	381	1260	10.0	10.0	198.1	**155.5**	44790	**2355**	15.04	1.71
AZ 26	427	1260	13.0	12.2	249.2	**195.6**	69940	**3280**	16.75	1.78
AZ 13-770	344	1540	9.0	9.0	193.8	**152.1**	34440	**2000**	13.33	1.85
AZ 18-700	420	1400	9.0	9.0	194.9	**153.0**	52920	**2520**	16.50	1.86

– AZ-intermediary piles are normally supplied as double piles
– For specific use all the AZ-sections are possible as intermediary piles
* One side, excluding inside of interlocks

Connectors



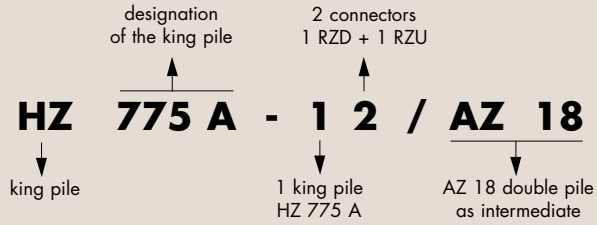




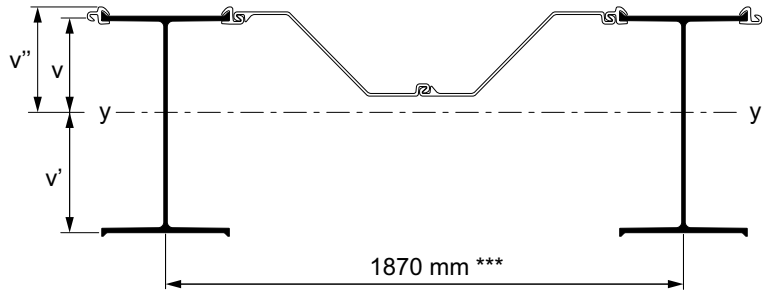
	h	b	a	ay	Suitable king pile	Sectional area	**Mass**	Moment of inertia		**Elastic section modulus**		**Coating area**	
								y-y	z-z	**y-y**	z-z	Water-side	Land-side
Section	mm	mm	mm	mm		cm^2	**kg/m**	cm^4	cm^4	**cm^3**	cm^3	m^2/m	m^2/m
RZD 16	62.0	81.0	-	31.5	HZ 775 A - B / HZ 975 A - B	20.7	**16.2**	57	96	**18**	22	0.12	0.06
RZU 16	62.0	81.0	-	38.2	HZ 775 A - B / HZ 975 A - B	20.5	**16.1**	68	96	**18**	22	0.09	0.10
RZD 18	67.0	85.0	-	35.8	HZ 775 C - D / HZ 975 C - D	23.1	**18.1**	78	112	**22**	25	0.13	0.07
RZU 18	67.0	85.0	-	41.9	HZ 775 C - D / HZ 975 C - D	22.8	**17.9**	92	112	**22**	25	0.09	0.10
RH 16	62.0	68.0	12.2	32.4	HZ 775 A - B / HZ 975 A - B	20.4	**16.0**	83	56	**26**	17	0.11	0.09
RH 20	67.0	79.0	14.2	36.4	HZ 775 C - D / HZ 975 C - D	25.5	**20.0**	123	91	**34**	23	0.12	0.10

Without other specification all the connectors are in grade S 430 GP.

Description of the combinations



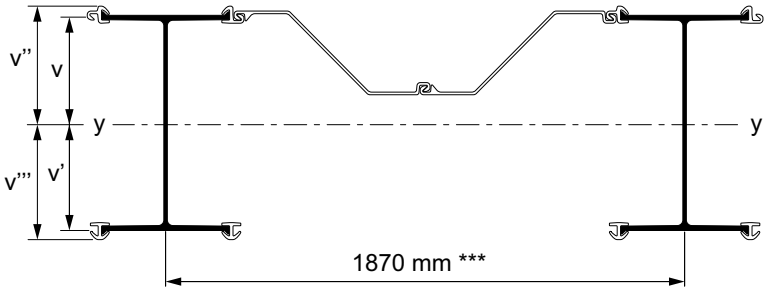
Combination HZ ..... -12/AZ 13



Section	Dimensions v mm	v' mm	v'' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 13 / AZ = 60 % / HZ kg/m²	**** AZ 13 / AZ = 80 % / HZ kg/m²	**** AZ 13 / AZ = / HZ kg/m²	Coating area Water-side m²/m	Land-side m²/m
HZ 775 A	334.5	440.5	367.0	258.0	192100	5235	**4360**	165	184	203	2.271	4.610
HZ 775 B	339.5	439.5	370.8	267.8	207390	5595	**4720**	173	191	210	2.271	4.618
HZ 775 C	341.5	441.5	373.1	286.7	228980	6135	**5185**	187	206	225	2.286	4.623
HZ 775 D	345.9	441.1	376.1	296.6	244560	6505	**5545**	194	214	233	2.286	4.631
HZ 975 A	428.5	546.5	460.4	278.9	314470	6830	**5755**	181	200	219	2.271	5.007
HZ 975 B	433.4	545.6	464.7	288.7	338610	7285	**6205**	189	208	227	2.271	5.015
HZ 975 C	435.9	547.1	467.5	311.9	376470	8055	**6880**	206	226	245	2.286	5.021
HZ 975 D	440.3	546.7	470.9	321.8	401010	8515	**7335**	214	233	253	2.286	5.029

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connector = Length of AZ

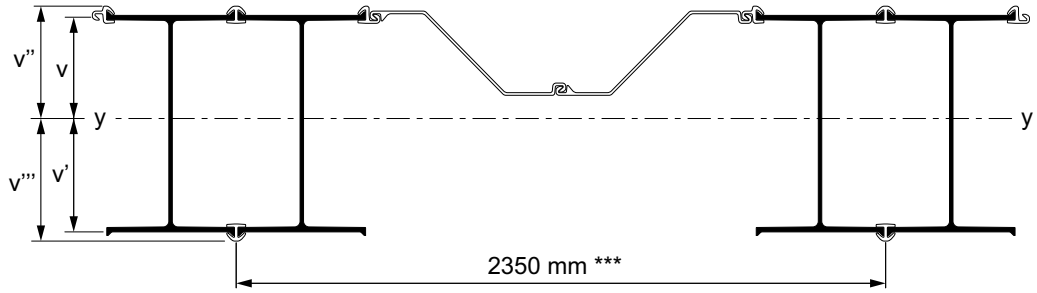
Combination HZ ..... -14/AZ 13



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 13 / AZ = 60 % / HZ kg/m²	**** AZ 13 / AZ = 80 % / HZ kg/m²	**** AZ 13 / AZ = / HZ kg/m²	Coating area Water-side m²/m	Land-side m²/m
HZ 775 A	387.3	387.7	419.8	419.9	279.8	229390	5465	**5915**	175	197	220	2.271	4.853
HZ 775 B	389.4	389.6	420.7	420.9	289.6	244600	5810	**6280**	183	205	227	2.271	4.861
HZ 775 C	396.6	386.4	428.2	417.9	313.9	274490	6410	**6920**	199	223	246	2.286	4.890
HZ 775 D	398.4	388.6	428.5	418.7	323.8	289970	6765	**7280**	207	231	254	2.286	4.898
HZ 975 A	487.3	487.7	519.1	519.6	300.7	372520	7170	**7640**	191	214	236	2.271	5.250
HZ 975 B	489.3	489.7	520.6	521.0	310.5	396680	7615	**8100**	199	221	244	2.271	5.258
HZ 975 C	497.2	485.8	528.6	517.4	339.1	447650	8470	**9005**	219	243	266	2.286	5.288
HZ 975 D	499.0	488.0	529.4	518.6	349.0	472190	8920	**9465**	227	250	274	2.286	5.296

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connector = Length of AZ

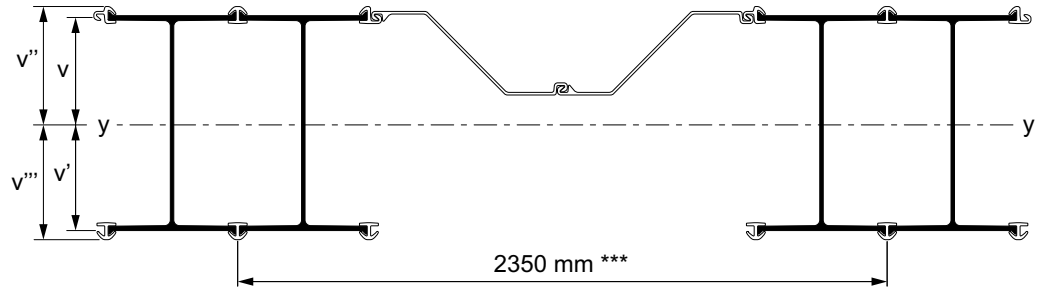
Combination HZ ..... -24/AZ 13



Section	Dimensions v	v'	v''	v'''	Properties per meter of wall: Sectional area	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	Mass of combination with intermediary section: **** AZ 13 / AZ = 60 % / HZ	/ AZ = 80 % / HZ	/ AZ = / HZ	Coating area: Water-side	Land-side
	mm	mm	mm	mm	cm^2/m	cm^4/m	cm^3/m	**cm^3/m**	kg/m^2	kg/m^2	kg/m^2	m^2/m	m^2/m
HZ 775 A	361.0	414.0	393.3	446.3	332.4	299910	6720	**7245**	231	246	261	2.805	5.144
HZ 775 B	364.5	414.5	395.7	445.8	348.0	323980	7265	**7815**	243	258	273	2.805	5.152
HZ 775 C	366.7	416.3	398.2	447.9	380.4	362430	8090	**8705**	268	283	299	2.825	5.163
HZ 775 D	369.9	417.1	400.0	447.2	396.1	386980	8655	**9275**	280	296	311	2.825	5.171
HZ 975 A	458.0	517.0	489.8	548.8	365.6	496770	9050	**9610**	257	272	287	2.805	5.541
HZ 975 B	461.4	517.6	492.7	548.8	381.3	534850	9745	**10335**	269	284	299	2.805	5.549
HZ 975 C	463.9	519.1	495.4	550.7	420.5	601400	10920	**11585**	299	315	330	2.827	5.562
HZ 975 D	467.0	520.0	497.6	550.5	436.2	640160	11630	**12310**	312	327	342	2.827	5.570

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connectors RZ = Length of AZ, Length of connectors RH = Length of HZ

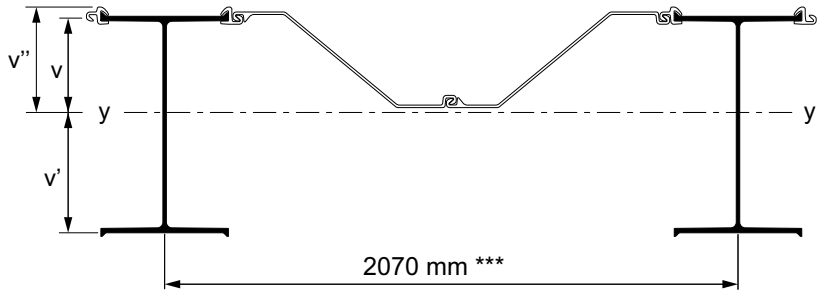
Combination HZ ..... -26/AZ 13



Section	Dimensions v	v'	v''	v'''	Properties per meter of wall: Sectional area	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	Mass of combination with intermediary section: **** AZ 13 / AZ = 60 % / HZ	/ AZ = 80 % / HZ	/ AZ = / HZ	Coating area: Water-side	Land-side
	mm	mm	mm	mm	cm^2/m	cm^4/m	cm^3/m	**cm^3/m**	kg/m^2	kg/m^2	kg/m^2	m^2/m	m^2/m
HZ 775 A	387.4	387.6	419.7	419.9	349.7	327790	7805	**8455**	239	257	275	2.805	5.388
HZ 775 B	389.4	389.6	420.7	420.9	365.4	351910	8360	**9035**	251	269	287	2.805	5.396
HZ 775 C	394.2	388.8	425.8	420.3	402.1	396780	9320	**10065**	278	297	316	2.825	5.430
HZ 775 D	396.1	390.9	426.2	421.0	417.8	421340	9885	**10635**	291	309	328	2.825	5.438
HZ 975 A	487.4	487.6	519.2	519.4	383.0	540470	10405	**11085**	265	283	301	2.805	5.784
HZ 975 B	489.4	489.6	520.6	520.9	398.6	578680	11110	**11820**	277	295	313	2.805	5.792
HZ 975 C	494.5	488.5	525.9	520.0	442.2	655420	12460	**13255**	310	328	347	2.827	5.829
HZ 975 D	496.4	490.6	526.9	521.2	457.9	694290	13175	**13985**	322	341	359	2.827	5.837

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connectors RZ = Length of outside of flange RH = Length of AZ, Length of box-pile interlocking RH = Length of HZ

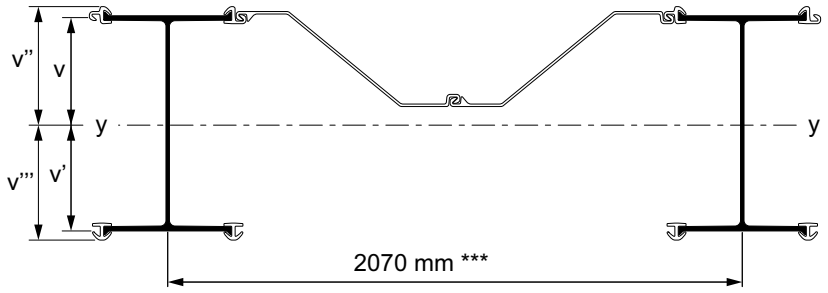
Combination HZ ..... -12/AZ 13-770



Section	Dimensions v	v'	v''	Properties per meter of wall: Sectional area	Moment of inertia	* Elastic section modulus	** Elastic section modulus	Mass of combination with intermediary section: **** AZ 13-770 / AZ = 60 % / HZ	/ AZ = 80 % / HZ	/ AZ = / HZ	Coating area: Water-side	Land-side
	mm	mm	mm	cm^2/m	cm^4/m	cm^3/m	**cm^3/m**	kg/m^2	kg/m^2	kg/m^2	m^2/m	m^2/m
HZ 775 A	334.5	440.5	367.0	238.1	177420	4835	**4030**	151	169	187	2.468	4.807
HZ 775 B	339.5	439.5	370.8	247.0	191240	5155	**4350**	158	176	194	2.468	4.815
HZ 775 C	341.5	441.5	373.1	264.0	210740	5650	**4775**	171	189	207	2.482	4.820
HZ 775 D	345.9	441.1	376.1	272.9	224820	5980	**5095**	178	196	214	2.482	4.828
HZ 975 A	428.5	546.5	460.4	257.0	287970	6255	**5270**	166	184	202	2.468	5.204
HZ 975 B	433.4	545.6	464.7	265.9	309780	6665	**5680**	173	191	209	2.468	5.212
HZ 975 C	435.9	547.1	467.5	286.8	343980	7360	**6285**	189	207	225	2.483	5.218
HZ 975 D	440.3	546.7	470.9	295.7	366150	7775	**6695**	196	214	232	2.483	5.226

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connector = Length of AZ

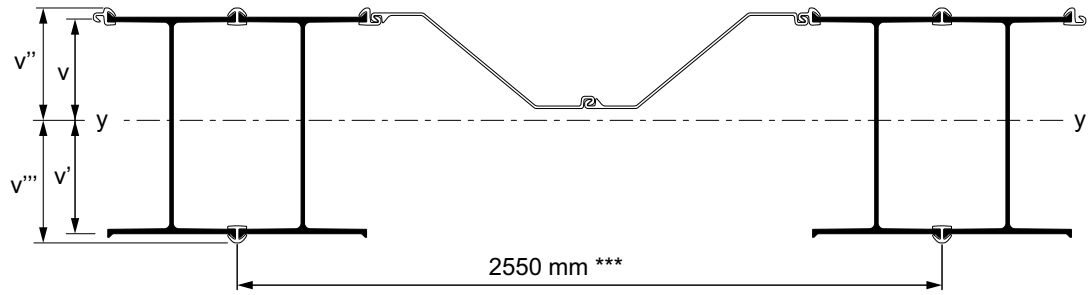
Combination HZ ..... -14/AZ 13-770



Section	Dimensions v	v'	v''	v'''	Properties per meter of wall: Sectional area	Moment of inertia	* Elastic section modulus	** Elastic section modulus	Mass of combination with intermediary section: **** AZ 13-770 / AZ = 60 % / HZ	/ AZ = 80 % / HZ	/ AZ = / HZ	Coating area: Water-side	Land-side
	mm	mm	mm	mm	cm^2/m	cm^4/m	cm^3/m	**cm^3/m**	kg/m^2	kg/m^2	kg/m^2	m^2/m	m^2/m
HZ 775 A	387.3	387.7	419.8	419.9	257.8	211110	5025	**5445**	161	181	202	2.468	5.050
HZ 775 B	389.4	389.6	420.7	420.9	266.7	224860	5340	**5770**	168	188	209	2.468	5.058
HZ 775 C	396.6	386.4	428.2	417.9	288.6	251860	5880	**6350**	182	205	227	2.482	5.087
HZ 775 D	398.4	388.6	428.5	418.7	297.6	265840	6205	**6675**	189	212	234	2.482	5.095
HZ 975 A	487.3	487.7	519.1	519.6	276.7	340410	6550	**6980**	175	196	217	2.468	5.447
HZ 975 B	489.3	489.7	520.6	521.0	285.6	362240	6955	**7395**	182	203	224	2.468	5.455
HZ 975 C	497.2	485.8	528.6	517.4	311.4	408280	7725	**8210**	200	222	244	2.483	5.485
HZ 975 D	499.0	488.0	529.4	518.6	320.3	430450	8130	**8625**	207	229	251	2.483	5.493

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connector = Length of AZ

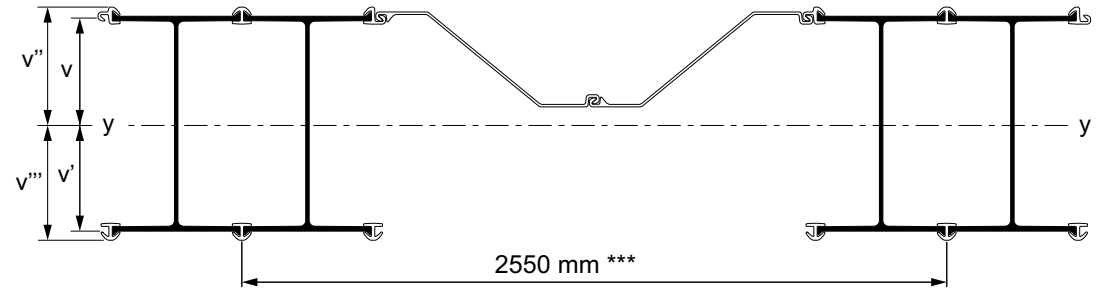
Combination HZ ..... -24/AZ 13-770



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section **** AZ 13-770: / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	361.0	414.0	393.3	446.3	310.4	279540	6265	**6750**	215	229	244	3.002	5.341
HZ 775 B	364.5	414.5	395.7	445.8	324.8	301730	6770	**7280**	226	241	255	3.002	5.349
HZ 775 C	366.7	416.3	398.2	447.9	354.6	337160	7530	**8100**	249	264	278	3.022	5.360
HZ 775 D	369.9	417.1	400.0	447.2	369.1	359780	8045	**8625**	260	275	290	3.022	5.368
HZ 975 A	458.0	517.0	489.8	548.8	341.0	460960	8400	**8915**	239	253	268	3.001	5.737
HZ 975 B	461.4	517.6	492.7	548.8	355.5	496050	9040	**9585**	250	265	279	3.001	5.745
HZ 975 C	463.9	519.1	495.4	550.7	391.6	557380	10120	**10735**	278	293	307	3.024	5.758
HZ 975 D	467.0	520.0	497.6	550.5	406.1	593100	10775	**11405**	289	304	319	3.024	5.766

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connectors RZ = Length of AZ, Length of connectors RH = Length of HZ

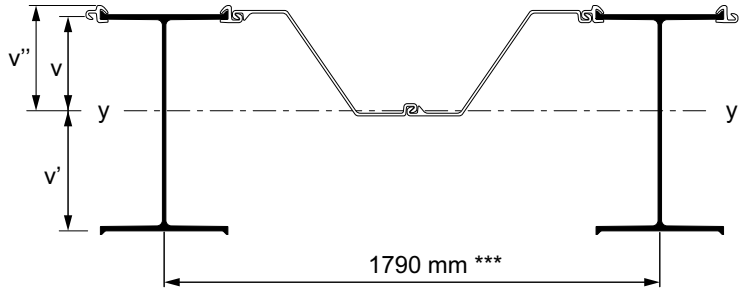
Combination HZ ..... -26/AZ 13-770



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section **** AZ 13-770: / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387.4	387.6	419.7	419.9	326.4	305240	7270	**7875**	222	239	256	3.002	5.584
HZ 775 B	389.4	389.6	420.7	420.9	340.8	327460	7780	**8405**	234	251	268	3.002	5.592
HZ 775 C	394.2	388.8	425.8	420.3	374.6	368820	8665	**9355**	258	276	294	3.022	5.627
HZ 775 D	396.1	390.9	426.2	421.0	389.1	391440	9185	**9885**	270	288	305	3.022	5.635
HZ 975 A	487.4	487.6	519.2	519.4	357.0	501230	9650	**10280**	246	263	280	3.001	5.980
HZ 975 B	489.4	489.6	520.6	520.9	371.5	536440	10300	**10955**	258	275	292	3.001	5.988
HZ 975 C	494.5	488.5	525.9	520.0	411.6	607170	11545	**12280**	287	305	323	3.024	6.025
HZ 975 D	496.4	490.6	526.9	521.2	426.1	642990	12205	**12955**	299	317	334	3.024	6.033

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connectors RZ = Length of outside of flange RH = Length of AZ, Length of box-pile interlocking RH = Length of HZ

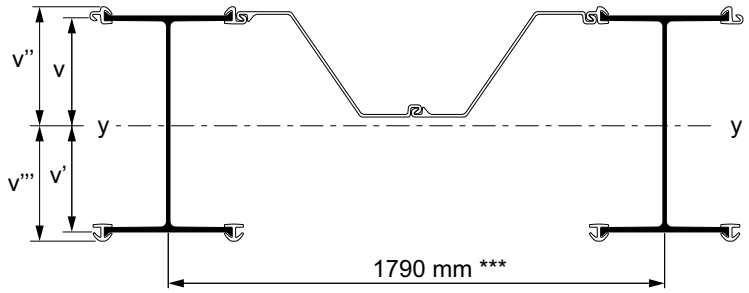
Combination HZ ..... -12/AZ 18



Section	Dimensions v mm	v' mm	v'' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 18 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	334.5	440.5	367.0	273.0	210000	5720	**4765**	174	194	214	2.332	4.671
HZ 775 B	339.5	439.5	370.8	283.3	225980	6095	**5140**	182	202	222	2.332	4.679
HZ 775 C	341.5	441.5	373.1	303.0	248530	6660	**5630**	197	217	238	2.346	4.684
HZ 775 D	345.9	441.1	376.1	313.3	264810	7040	**6005**	205	225	246	2.346	4.692
HZ 975 A	428.5	546.5	460.4	294.8	337840	7340	**6180**	191	211	231	2.332	5.068
HZ 975 B	433.4	545.6	464.7	305.1	363060	7815	**6655**	199	219	240	2.332	5.076
HZ 975 C	435.9	547.1	467.5	329.3	402610	8610	**7360**	217	238	258	2.347	5.082
HZ 975 D	440.3	546.7	470.9	339.6	428250	9095	**7835**	225	246	267	2.347	5.090

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connector = Length of AZ

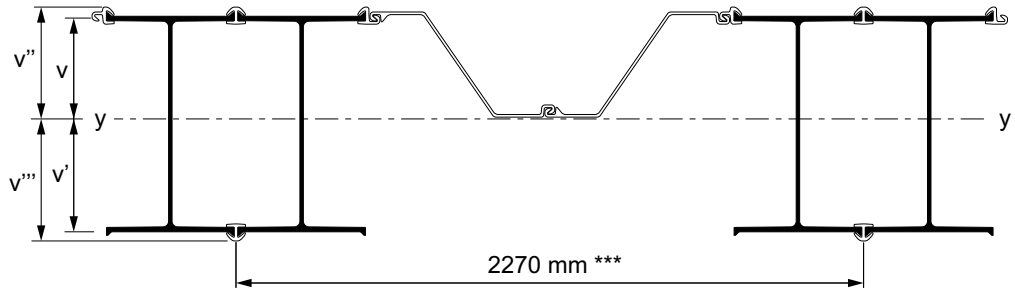
Combination HZ ..... -14/AZ 18



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 18 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387.3	387.7	419.8	419.9	295.8	248960	5930	**6420**	185	208	232	2.332	4.914
HZ 775 B	389.4	389.6	420.7	420.9	306.0	264850	6290	**6795**	193	216	240	2.332	4.922
HZ 775 C	396.6	386.4	428.2	417.9	331.4	296080	6915	**7465**	210	235	260	2.346	4.951
HZ 775 D	398.4	388.6	428.5	418.7	341.7	312250	7285	**7840**	218	243	268	2.346	4.959
HZ 975 A	487.3	487.7	519.1	519.6	317.6	398490	7670	**8170**	202	225	249	2.332	5.311
HZ 975 B	489.3	489.7	520.6	521.0	327.9	423730	8135	**8650**	210	234	257	2.332	5.319
HZ 975 C	497.2	485.8	528.6	517.4	357.8	476970	9025	**9595**	231	256	281	2.347	5.349
HZ 975 D	499.0	488.0	529.4	518.6	368.1	502610	9495	**10070**	239	264	289	2.347	5.357

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connector = Length of AZ

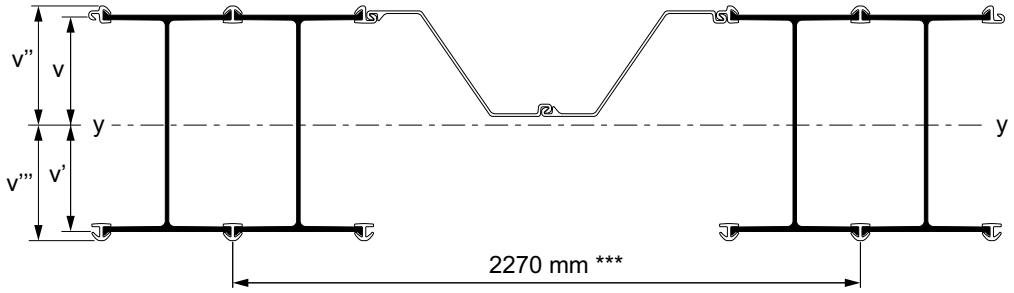
Combination HZ ..... -24/AZ 18



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 18 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	361.0	414.0	393.3	446.3	346.8	317820	7120	**7675**	240	256	272	2.866	5.205
HZ 775 B	364.5	414.5	395.7	445.8	363.0	342750	7690	**8270**	253	269	285	2.866	5.213
HZ 775 C	366.7	416.3	398.2	447.9	396.5	382550	8540	**9190**	279	295	311	2.886	5.224
HZ 775 D	369.9	417.1	400.0	447.2	412.8	407960	9120	**9780**	291	308	324	2.886	5.232
HZ 975 A	458.0	517.0	489.8	548.8	381.3	521630	9505	**10090**	267	283	299	2.865	5.601
HZ 975 B	461.4	517.6	492.7	548.8	397.5	561040	10220	**10840**	280	296	312	2.865	5.609
HZ 975 C	463.9	519.1	495.4	550.7	438.0	629940	11440	**12135**	311	328	344	2.888	5.622
HZ 975 D	467.0	520.0	497.6	550.5	454.3	670070	12170	**12885**	324	340	357	2.888	5.630

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connectors RZ = Length of AZ, Length of connectors RH = Length of HZ

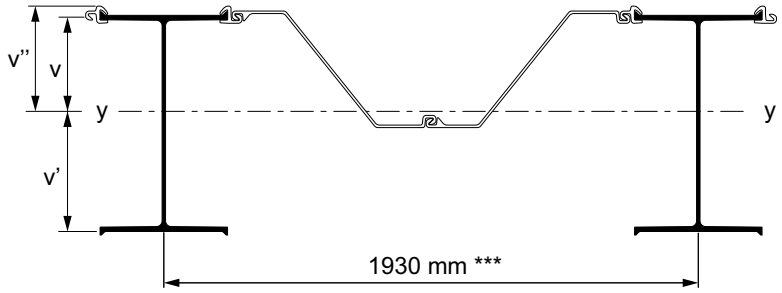
Combination HZ ..... -26/AZ 18



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 18 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387.4	387.6	419.7	419.9	364.8	346690	8255	**8945**	249	268	286	2.866	5.448
HZ 775 B	389.4	389.6	420.7	420.9	381.0	371660	8830	**9540**	262	280	299	2.866	5.456
HZ 775 C	394.2	388.8	425.8	420.3	419.0	418110	9820	**10605**	289	309	329	2.886	5.491
HZ 775 D	396.1	390.9	426.2	421.0	435.2	443530	10405	**11200**	302	322	342	2.886	5.499
HZ 975 A	487.4	487.6	519.2	519.4	399.2	566860	10915	**11625**	276	295	313	2.865	5.845
HZ 975 B	489.4	489.6	520.6	520.9	415.4	606420	11640	**12385**	289	307	326	2.865	5.853
HZ 975 C	494.5	488.5	525.9	520.0	460.5	685870	13040	**13870**	322	342	361	2.888	5.889
HZ 975 D	496.4	490.6	526.9	521.2	476.8	726110	13780	**14630**	335	354	374	2.888	5.897

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connectors RZ = Length of outside of flange RH = Length of AZ, Length of box-pile interlocking RH = Length of HZ

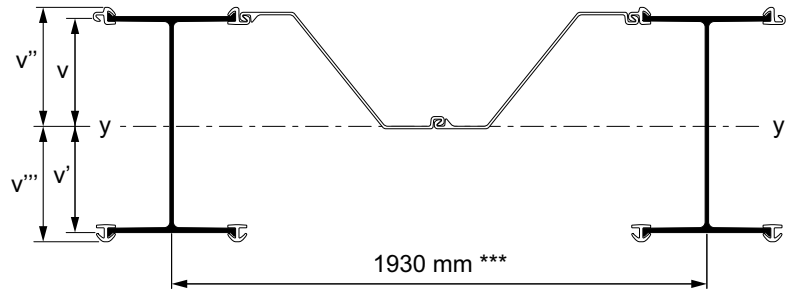
Combination HZ ..... -12/AZ 18-700



Section	Dimensions v mm	v' mm	v'' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 18-700 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	334,5	440,5	367,0	255,9	199870	5445	**4535**	162	182	201	2,479	4,818
HZ 775 B	339,5	439,5	370,8	265,5	214680	5790	**4885**	170	189	208	2,479	4,826
HZ 775 C	341,5	441,5	373,1	283,7	235600	6315	**5335**	184	203	223	2,493	4,831
HZ 775 D	345,9	441,1	376,1	293,3	250700	6665	**5685**	191	211	230	2,493	4,839
HZ 975 A	428,5	546,5	460,4	276,2	318430	6915	**5825**	178	198	217	2,478	5,215
HZ 975 B	433,4	545,6	464,7	285,7	341820	7355	**6265**	186	205	224	2,478	5,223
HZ 975 C	435,9	547,1	467,5	308,2	378510	8095	**6920**	203	222	242	2,494	5,228
HZ 975 D	440,3	546,7	470,9	317,7	402280	8545	**7360**	210	230	249	2,494	5,236

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connector = Length of AZ

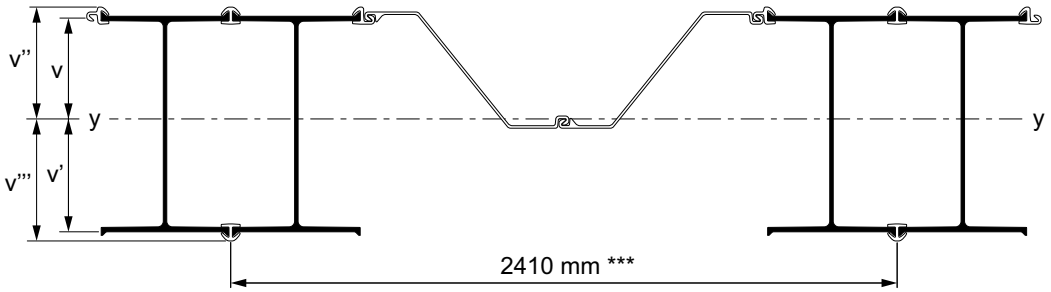
Combination HZ ..... -14/AZ 18-700



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 18-700 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387,3	387,7	419,8	419,9	277,0	235990	5620	**6090**	172	195	217	2,479	5,061
HZ 775 B	389,4	389,6	420,7	420,9	286,6	250740	5955	**6435**	180	202	225	2,479	5,069
HZ 775 C	396,6	386,4	428,2	417,9	310,1	279700	6530	**7050**	196	220	243	2,493	5,098
HZ 775 D	398,4	388,6	428,5	418,7	319,7	294700	6875	**7395**	204	227	251	2,493	5,106
HZ 975 A	487,3	487,7	519,1	519,6	297,3	374680	7210	**7680**	188	211	233	2,478	5,458
HZ 975 B	489,3	489,7	520,6	521,0	306,8	398090	7640	**8130**	196	218	241	2,478	5,466
HZ 975 C	497,2	485,8	528,6	517,4	334,6	447470	8465	**9000**	215	239	263	2,494	5,495
HZ 975 D	499,0	488,0	529,4	518,6	344,1	471250	8900	**9445**	223	246	270	2,494	5,503

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connector = Length of AZ

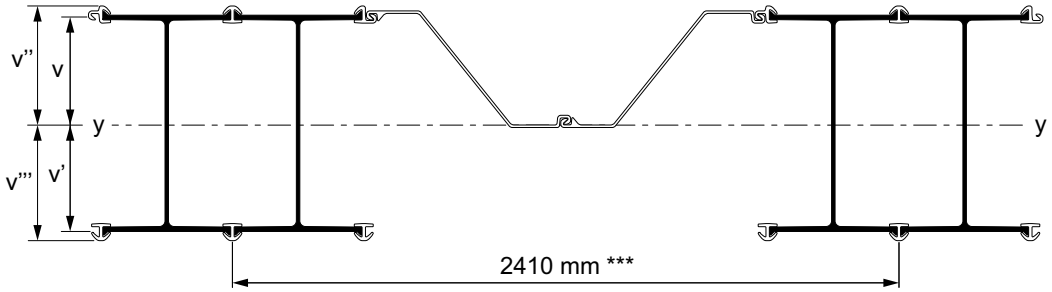
Combination HZ ..... -24/AZ 18-700



	Dimensions				Properties per meter of wall				Mass of combination with intermediary section				
	v	v'	v''	v'''	Sectional area	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	**** AZ 18-700 / AZ = 60 % / HZ kg/m²	**** AZ 18-700 / AZ = 80 % / HZ kg/m²	**** AZ 18-700 / AZ = / HZ kg/m²	**Coating area** Water-side m²/m	**Coating area** Land-side m²/m
Section	mm	mm	mm	mm	cm²/m	cm⁴/m	cm³/m	**cm³/m**					
HZ 775 A	361,0	414,0	393,3	446,3	328,9	303440	6800	**7330**	227	243	258	3,013	5,352
HZ 775 B	364,5	414,5	395,7	445,8	344,1	326920	7335	**7885**	239	255	270	3,013	5,360
HZ 775 C	366,7	416,3	398,2	447,9	375,7	364410	8135	**8755**	264	279	295	3,033	5,371
HZ 775 D	369,9	417,1	400,0	447,2	391,0	388350	8685	**9310**	276	291	307	3,033	5,379
HZ 975 A	458,0	517,0	489,8	548,8	361,3	495410	9025	**9580**	253	268	284	3,012	5,748
HZ 975 B	461,4	517,6	492,7	548,8	376,6	532540	9705	**10290**	265	280	296	3,012	5,756
HZ 975 C	463,9	519,1	495,4	550,7	414,8	597430	10850	**11510**	294	310	326	3,035	5,769
HZ 975 D	467,0	520,0	497,6	550,5	430,1	635220	11540	**12215**	306	322	338	3,035	5,777

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connectors RZ = Length of AZ, Length of connectors RH = Length of HZ

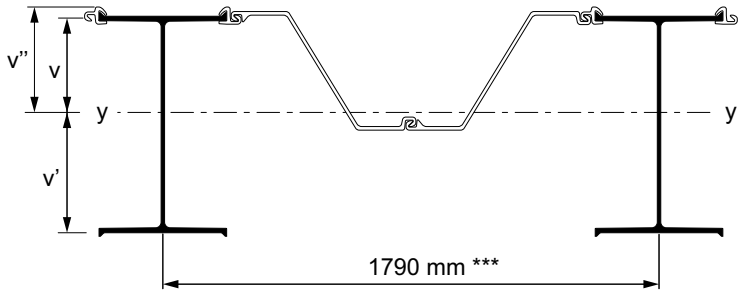
Combination HZ ..... -26/AZ 18-700



	Dimensions				Properties per meter of wall				Mass of combination with intermediary section				
	v	v'	v''	v'''	Sectional area	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	**** AZ 18-700 / AZ = 60 % / HZ kg/m²	**** AZ 18-700 / AZ = 80 % / HZ kg/m²	**** AZ 18-700 / AZ = / HZ kg/m²	**Coating area** Water-side m²/m	**Coating area** Land-side m²/m
Section	mm	mm	mm	mm	cm²/m	cm⁴/m	cm³/m	**cm³/m**					
HZ 775 A	387,4	387,6	419,7	419,9	345,8	330630	7875	**8530**	235	253	271	3,013	5,595
HZ 775 B	389,4	389,6	420,7	420,9	361,1	354150	8415	**9090**	247	265	283	3,013	5,603
HZ 775 C	394,2	388,8	425,8	420,3	396,8	397910	9345	**10095**	273	292	312	3,033	5,638
HZ 775 D	396,1	390,9	426,2	421,0	412,1	421850	9900	**10650**	286	305	324	3,033	5,646
HZ 975 A	487,4	487,6	519,2	519,4	378,2	538020	10360	**11035**	261	279	297	3,012	5,991
HZ 975 B	489,4	489,6	520,6	520,9	393,5	575270	11045	**11750**	273	291	309	3,012	5,999
HZ 975 C	494,5	488,5	525,9	520,0	435,9	650110	12360	**13145**	304	323	342	3,035	6,036
HZ 975 D	496,4	490,6	526,9	521,2	451,3	688010	13055	**13860**	316	335	354	3,035	6,044

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connectors RZ = Length of outside of flange RH = Length of AZ, Length of box-pile interlocking RH = Length of HZ

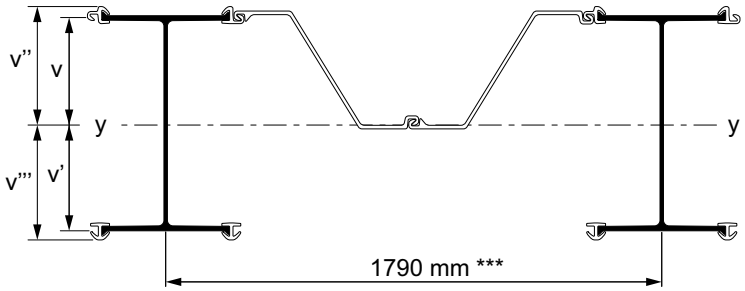
Combination HZ ..... -12/AZ 26



Section	Dimensions v mm	v' mm	v'' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 26 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	334.5	440.5	367.0	306.3	225010	6130	**5110**	189	215	240	2.406	4.744
HZ 775 B	339.5	439.5	370.8	316.6	240980	6500	**5485**	198	223	248	2.406	4.752
HZ 775 C	341.5	441.5	373.1	336.3	263540	7065	**5970**	212	238	264	2.420	4.758
HZ 775 D	345.9	441.1	376.1	346.6	279820	7440	**6345**	220	246	272	2.420	4.766
HZ 975 A	428.5	546.5	460.4	328.1	352840	7665	**6455**	207	232	258	2.405	5.141
HZ 975 B	433.4	545.6	464.7	338.4	378070	8135	**6930**	215	240	266	2.405	5.149
HZ 975 C	435.9	547.1	467.5	362.6	417620	8935	**7635**	233	259	285	2.421	5.155
HZ 975 D	440.3	546.7	470.9	372.9	443260	9415	**8110**	241	267	293	2.421	5.163

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connector = Length of AZ

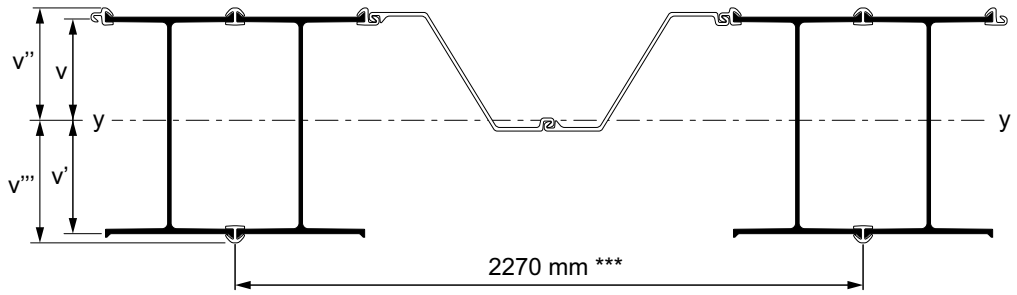
Combination HZ ..... -14/AZ 26



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** Elastic section modulus cm³/m	Mass of combination with intermediary section: **** AZ 26 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387.3	387.7	419.8	419.9	329.1	263960	6285	**6810**	200	229	258	2.406	4.988
HZ 775 B	389.4	389.6	420.7	420.9	339.3	279860	6650	**7185**	208	237	266	2.406	4.996
HZ 775 C	396.6	386.4	428.2	417.9	364.7	311080	7265	**7845**	226	256	286	2.420	5.024
HZ 775 D	398.4	388.6	428.5	418.7	375.0	327260	7635	**8215**	234	264	294	2.420	5.032
HZ 975 A	487.3	487.7	519.1	519.6	350.9	413490	7960	**8480**	217	246	275	2.405	5.384
HZ 975 B	489.3	489.7	520.6	521.0	361.2	438740	8420	**8960**	225	254	284	2.405	5.392
HZ 975 C	497.2	485.8	528.6	517.4	391.1	491980	9305	**9895**	246	277	307	2.421	5.422
HZ 975 D	499.0	488.0	529.4	518.6	401.4	517620	9775	**10375**	254	285	315	2.421	5.430

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connector = Length of AZ

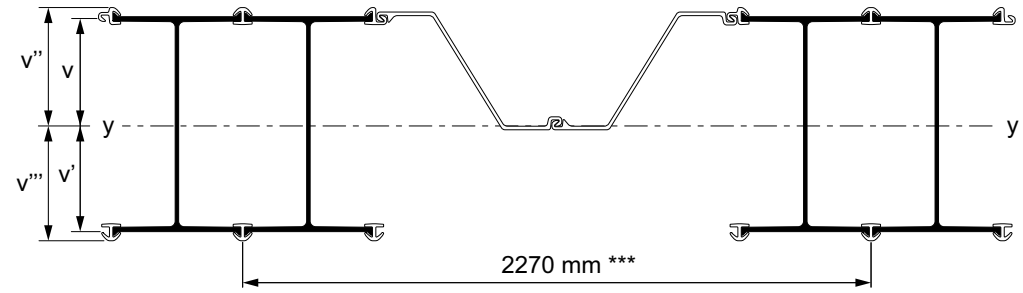
Combination HZ ..... -24/AZ 26



Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 26 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	361.0	414.0	393.3	446.3	373.1	329660	7385	**7965**	253	273	293	2.940	5.278
HZ 775 B	364.5	414.5	395.7	445.8	389.3	354580	7955	**8555**	265	286	306	2.940	5.286
HZ 775 C	366.7	416.3	398.2	447.9	422.8	394380	8805	**9475**	291	311	332	2.960	5.298
HZ 775 D	369.9	417.1	400.0	447.2	439.0	419800	9385	**10065**	304	324	345	2.960	5.306
HZ 975 A	458.0	517.0	489.8	548.8	407.5	533460	9720	**10320**	280	300	320	2.939	5.675
HZ 975 B	461.4	517.6	492.7	548.8	423.7	572880	10440	**11070**	292	313	333	2.939	5.683
HZ 975 C	463.9	519.1	495.4	550.7	464.3	641770	11655	**12365**	324	344	364	2.961	5.696
HZ 975 D	467.0	520.0	497.6	550.5	480.6	681900	12385	**13115**	336	357	377	2.961	5.704

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v'),
*** Rounded value,
**** Length of connectors RZ = Length of AZ, Length of connectors RH = Length of HZ

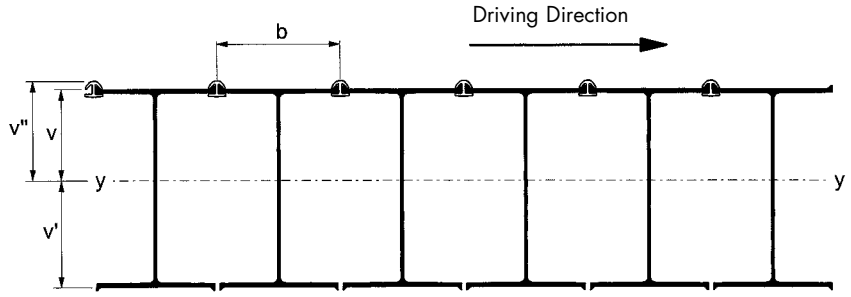
Combination HZ ..... -26/AZ 26



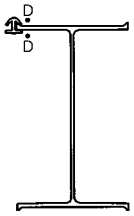
Section	Dimensions v mm	v' mm	v'' mm	v''' mm	Properties per meter of wall: Sectional area cm²/m	Moment of inertia cm⁴/m	* Elastic section modulus cm³/m	** **Elastic section modulus** **cm³/m**	Mass of combination with intermediary section: **** AZ 26 / AZ = 60 % / HZ kg/m²	/ AZ = 80 % / HZ kg/m²	/ AZ = / HZ kg/m²	Coating area: Water-side m²/m	Land-side m²/m
HZ 775 A	387.4	387.6	419.7	419.9	391.0	358520	8540	**9250**	261	284	307	2.940	5.522
HZ 775 B	389.4	389.6	420.7	420.9	407.2	383490	9110	**9845**	274	297	320	2.940	5.530
HZ 775 C	394.2	388.8	425.8	420.3	445.2	429950	10100	**10905**	302	326	349	2.960	5.564
HZ 775 D	396.1	390.9	426.2	421.0	461.5	455370	10685	**11495**	314	338	362	2.960	5.572
HZ 975 A	487.4	487.6	519.2	519.4	425.5	578700	11140	**11870**	288	311	334	2.939	5.918
HZ 975 B	489.4	489.6	520.6	520.9	441.7	618250	11870	**12625**	301	324	347	2.939	5.926
HZ 975 C	494.5	488.5	525.9	520.0	486.7	697700	13265	**14110**	334	358	382	2.961	5.963
HZ 975 D	496.4	490.6	526.9	521.2	503.0	737940	14005	**14865**	347	371	395	2.961	5.971

* Referring outside of connector (highest value of v''; v'''),
** Referring outside of HZ-flange (highest value of v; v'),
*** Rounded value,
**** Length of connectors RZ = Length of outside of flange RH = Length of AZ, Length of box-pile interlocking RH = Length of HZ

Combination C 1



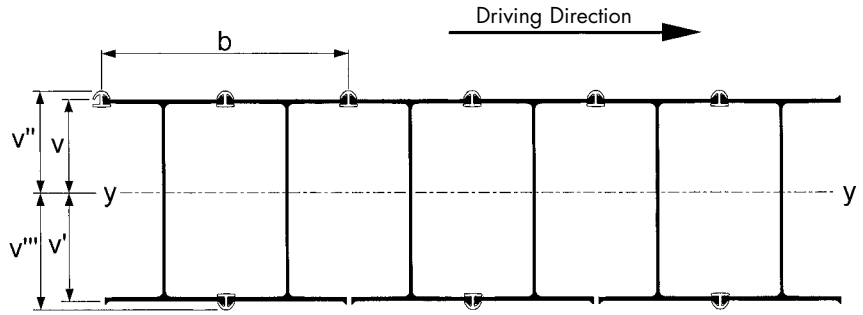
Delivery



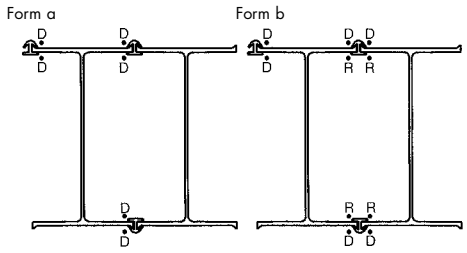
Section	Dimensions b	v	v'	v''	Properties per meter of wall: Sectional area	**Mass**	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	Coating area: Water-side	Land-side
	mm	mm	mm	mm	cm^2/m	**kg/m^2**	cm^4/m	cm^3/m	**cm^3/m**	m^2/m	m^2/m
HZ 775 A	475	359.1	415.9	391.4	585.8	**460**	649450	16595	**15615**	0.534	2.901
HZ 775 B	475	362.8	416.2	394.1	624.5	**490**	708720	17985	**17030**	0.534	2.909
HZ 775 C	479	361.9	421.1	393.4	693.7	**545**	789060	20055	**18735**	0.540	2.916
HZ 775 D	479	365.4	421.6	395.5	732.3	**575**	849160	21470	**20140**	0.540	2.924
HZ 975 A	475	456.2	518.8	488.1	668.1	**524**	1098910	22515	**21185**	0.534	3.298
HZ 975 B	475	459.9	519.2	491.1	706.8	**555**	1192510	24280	**22970**	0.534	3.306
HZ 975 C	480	458.8	524.2	490.4	790.4	**620**	1330350	27130	**25380**	0.541	3.314
HZ 975 D	480	462.3	524.7	492.8	828.9	**651**	1424880	28915	**27155**	0.541	3.322

* Referring outside of connector (v''),
** Referring outside of HZ-flange (v')

Combination C 23



Delivery Form



Section	Dimensions b	v	v'	v''	v'''	Properties per meter of wall: Sectional area	**Mass**	Moment of inertia	* Elastic section modulus	** **Elastic section modulus**	Coating area: Water-side	Land-side
	mm	mm	mm	mm	mm	cm^2/m	**kg/m^2**	cm^4/m	cm^3/m	**cm^3/m**	m^2/m	m^2/m
HZ 775 A	950	373.8	401.2	406.1	433.5	607.3	**477**	685320	15810	**17080**	1.068	3.435
HZ 775 B	950	376.6	402.4	407.9	433.7	646.0	**507**	744540	17170	**18500**	1.068	3.443
HZ 775 C	958	377.2	405.8	408.8	437.3	720.3	**565**	833570	19060	**20545**	1.080	3.456
HZ 775 D	958	379.9	407.1	410.0	437.2	758.9	**596**	893560	20440	**21950**	1.080	3.464
HZ 975 A	950	472.4	502.7	504.2	534.5	689.6	**541**	1154800	21605	**22975**	1.067	3.831
HZ 975 B	950	475.1	503.9	506.4	535.2	728.3	**572**	1248470	23330	**24775**	1.067	3.839
HZ 975 C	960	475.7	507.3	507.3	538.9	817.0	**641**	1399720	25975	**27590**	1.081	3.854
HZ 975 D	960	478.4	508.6	508.9	539.2	855.5	**672**	1494230	27715	**29380**	1.081	3.862

* Referring outside of connector (v'''),
** Referring outside of HZ-flange (v')


BOLSEN 22 - 8
BOLSEN 22 - 8
BOLSEN 23 - 8

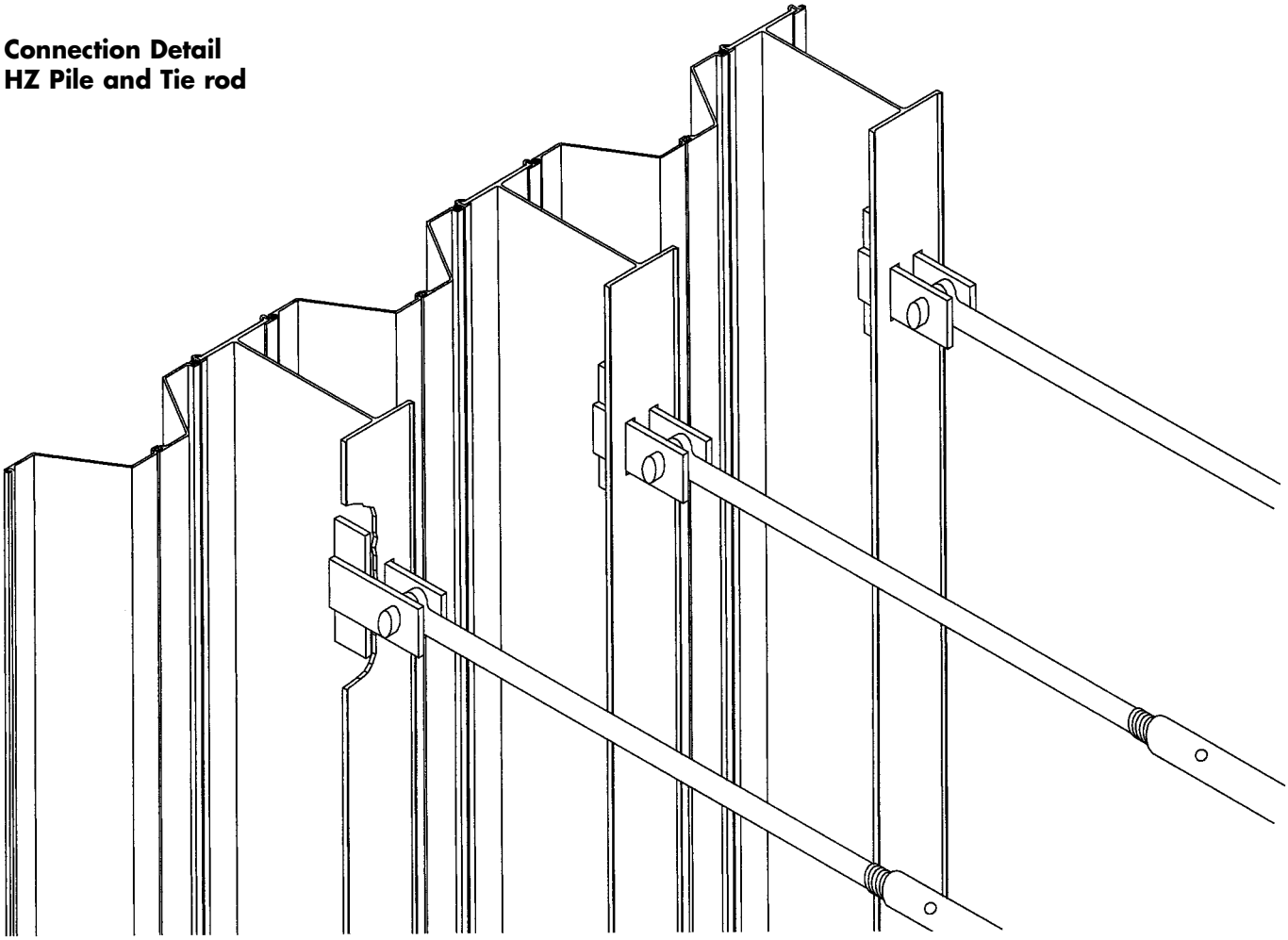
Anchorage of HZ Walls

Tie-Back System

Anchorage of HZ walling can be provided simply and effectively. A tie rod links each HZ king pile to a steel sheet pile anchor wall or to isolated sheet pile panels - a particularly economic solution.
Because each king pile is anchored, a complicated waler system is not required. The tie rod is simply linked to the relevant H-pile by two T-connectors and a pin. T-connectors are threaded through oxyacetylene-cut slots in the rear flanges of the driven H-piles. Loads are thereby applied close to the web.

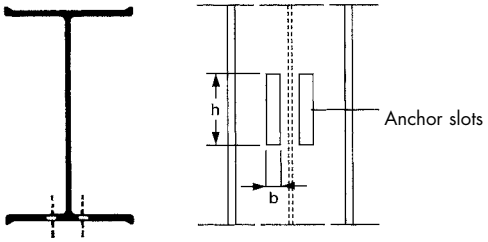
Conventional anchoring, incorporating a waler system, is also possible. HZ walling can also be anchored by batter piles or by ground or rock anchors.

Connection Detail
HZ Pile and Tie rod



Anchor Slots

To reduce anchoring work on site, HZ sections can be delivered with precut anchor slots, on request. The accompanying illustration shows tie rod slots being cut. Dimensions "h" and "b" vary with the tie rod diameter.




TRANSLUBECA

Design of the HZ Steel Wall System

The design of a cantilever or anchored wall is consistent with that of all standard sheet pile walls, but calculating the section of combined HZ walling may be undertaken somewhat differently to conventional sheet piling.
In combined walls, savings can be achieved in terms of steel grade and pile length for the intermediate sheet piles.

- In the stress analysis, the intermediate sheet pile only resists a small portion of the bending moment proportional to its own contribution to the combined moment of inertia. Stresses in the infill sheet pile are invariably less than stresses in the HZ king pile sections. The result is that a low yield point steel grade can normally be used for the AZ sheet pile sections.

Moment of inertia of one HZ/AZ system:

$I_{system} = I_{HZ} + I_{AZ}$ (cm⁴)

Moment of inertia of the system per m of wall:

$$I_{system/m} = \frac{I_{HZ} + I_{AZ}}{b_{system}} \quad (cm^4/m)$$

With b_{system} = width of one system (HZ/AZ combination)
I_{system} = moment of inertia of one system (HZ/AZ combination)
$I_{system/m}$ = moment of inertia of the wall per m of wall
I_{HZ} = moment of inertia of one HZ solution
I_{AZ} = moment of inertia of one AZ double sheet pile

It is assumed that the bending moments are distributed proportionally to the stiffness of the different elements.

Bending moment transmitted to the HZ king pile:

$$M_{HZ} = \frac{I_{HZ}}{I_{system}} M_{max} * b_{system} = \frac{I_{HZ}}{I_{HZ} + I_{AZ}} M_{max} * b_{system}$$

with M_{max} = maximum bending moment per m of wall (kNm/m)

σ_{HZ} = steel stresses in the HZ beam:

$$\sigma_{HZ} = \frac{M_{HZ}}{W_{HZ}} = \frac{\frac{I_{HZ}}{I_{HZ} + I_{AZ}} M_{max} * b_{system}}{\frac{I_{HZ}}{Max\ (v,v')}} = \frac{Max\ (v,v') * b_{system}}{I_{HZ} + I_{AZ}} M_{max}$$

$$\sigma_{HZ} = \frac{1}{W_{HZ,eq}} M_{max}$$

Where $W_{HZ,eq} = \frac{I_{HZ} + I_{AZ}}{b_{system} * Max\ (v,v')}$ (cm³/m) per m of wall

With $W_{HZ,eq}$ = "equivalent" section modulus to determine the stresses in the HZ section
v,v' = distance of the neutral axis to the outside fibre of the HZ flanges
Max(v,v') = highest value of v and v'

Note: "$W_{HZ,eq}$" is labelled in the tables simply as "elastic section modulus".

For the connectors RH / RZD / RZU, replace Max (v,v') with Max (v'',v''').

Bending moment transmitted to the intermediate AZ sheet pile:

$$M_{AZ} = \frac{I_{AZ}}{I_{system}} M_{max} * b_{system} = \frac{I_{AZ}}{I_{HZ} + I_{AZ}} M_{max} * b_{system}$$

$$\sigma_{AZ} = \frac{M_{AZ}}{W_{AZ}} = \frac{\frac{I_{AZ}}{I_{system}} M_{max} * b_{system}}{W_{AZ}}$$

Where M_{max} = maximum bending moment per m of wall (kNm/m)
W_{AZ} = section modulus of the intermediate AZ sheet pile (cm³)

- In the ground, where there is earth support and embedment, the length of the intermediate sheet piles can be considerably curtailed.

- In general, bending is less in the embedded portion than in the retaining portion of the wall, especially in the case of an anchored design, and the limited strength in bending of the intermediate sheet piles can be neglected.

- In the infill role the intermediate sheet piling is only required to resist active earth pressures down to the zero earth pressure level. As a factor of safety, its length is extended below this level (Fig. a).

- HZ king pile spacing should be so that full continuous earth resistance is safeguarded. When determining pile spacing, arching properties of the soils should be considered. If these properties are negligible (eg. in soft mud or where groundwater pressure is high), the transverse load capacity of the intermediate sheet piles needs to be checked.

If the spacing of the king piles gets too big, the development of the retaining force in front of the wall has to be checked.

Furthermore, if groundwater pressures are high, the risk of seepage beneath the toe should not be neglected when curtailing the length of the intermediate sheet piles.

The section modulus of the HZ king piles can be adapted to the resultant bending moment by adding RH sections or by welding stiffening plates to their flanges. As a result, a lighter section can be selected and simply strengthened locally where maximum bending occurs (Figs. b and c).

The new combined walling, in which the full range of AZ sections can be used as intermediate sheet piles, offers flexibility in terms of design. Heavier AZ sections can also be selected to enhance corrosion resistance or in cases involving difficult driving conditions.

The HZ king piles are capable of transferring high vertical loads to the subsoil. In such cases, stress analysis should include vertical loads and additional bending moments induced by deflection.

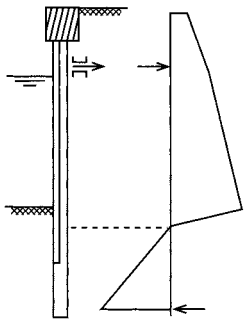


Fig. a

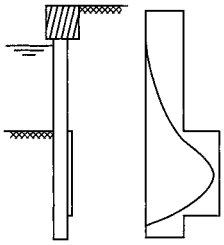


Fig. b

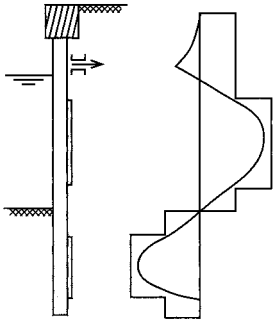


Fig. c

Installing combined HZ walls

Procedure

HZ walls can be installed on land and in water. In both cases the procedure is the same. First the king piles are driven in small or large driving steps. Then the intermediate sheet piles are pitched and driven. If geotechnical conditions are difficult, it may be necessary to carry out the whole driving operation in two stages. In this case the first stage is to drive the king piles as far as possible, or to a predetermined intermediate depth. The intermediate sheet piles are then threaded and driven, generally to the same depth as the king piles, or to a shallower depth. The second stage is to drive first the king piles and then the infill sheets down to the design depth or to refusal.

Driving equipment and driving aids

With current technology hammer or vibratory equipment can be used to drive king and intermediate sheet piles. Vibratory equipment should be preferred wherever possible (less damage to the pile). A combination of the two techniques can be used above all in driving the king piles. In this case the king piles are first driven using vibration, as described above, and then the final depth is reached using a hammer. Types of hammers used are free-fall hammers, diesel hammers and hydraulic hammers.

If using free-fall or diesel hammers, a driving cap must be used, and in the case of a hydraulic hammer, a driving plate which fits the pile head. If, however, vibration is used for driving, correct load transfer to the pile must be ensured by fitting a corresponding clamp to the pile head. Double clamps are used for box piles and for intermediate AZ sheet piles.

Intermediate sheet piles are generally driven by vibrational means.

If geotechnical conditions are difficult, driving is facilitated by means of auxiliary techniques such as:

- Low-pressure or high-pressure jetting in granular or lightly cohesive soil
- Predrilling
- Drillings combined with soil replacement
- Pre-blasting
- Thickening the cross section at the toe of the pile in cohesive soils with the aim of reducing skin friction.

These techniques apply to king piles as well as to intermediate sheet piles.

Installation methods

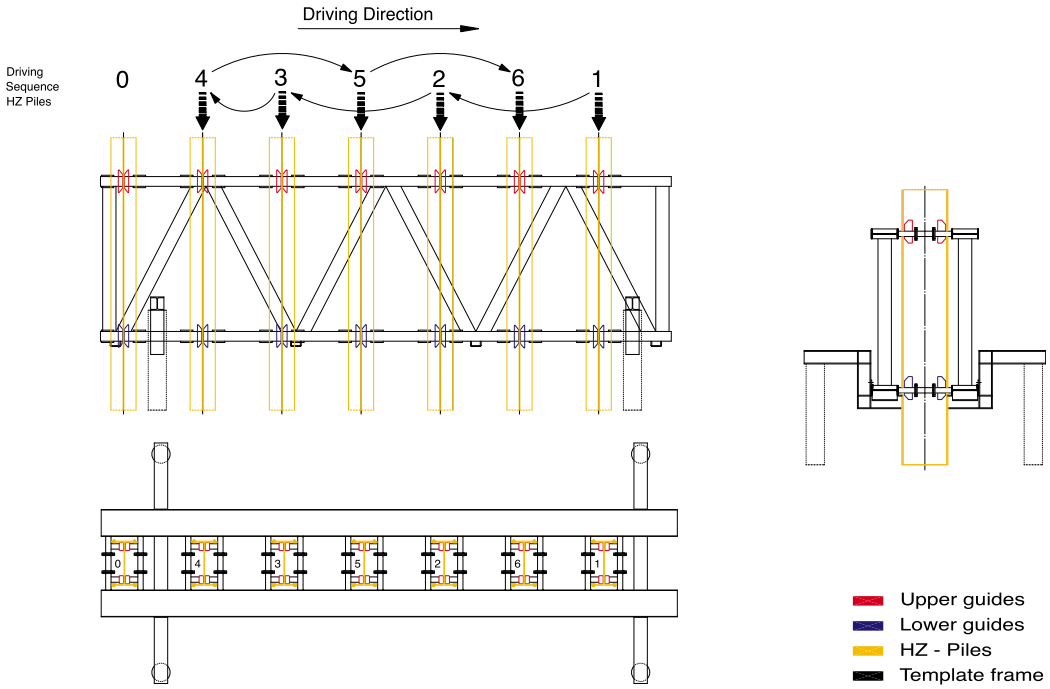
It is essential that the king piles are driving in the correct position and vertically, or at the prescribed batter. Two different methods can be used.

Method 1

Use of a template with two guide levels at which the pitching positions for the piles are set. The vertical distance between the two guide levels should not be less than 3 m. Wherever possible a greater distance should be chosen. The lower guide should be set as low as possible. When driving in water the template is mounted on auxiliary piles. On land the template can stand on the ground and should be secured firmly against any shifting. The template must of course be correctly aligned with the wall axis.

Depending on the design, such templates can have space for 5 to 9 king piles. These primary piles are driven using a free-hanging vibrator or a hammer guided by a hanging leader, the vibrator being the most commonly used equipment.
When all the piles of a template are driven, the template is repositioned.

Intermediate sheet piles can then be installed, for example, by a second driving team.



Method 2

The king piles are driven using piling equipment guided by a fixed leader. The correct driving angle, in the direction of the pile axis, must be ensured by the leader, and the correct positioning through a simple horizontal driving guide. When piling in water the latter is secured above the water level on auxiliary piles, in all other cases it is set down on the driving platform and secured.

In both methods it is important to constantly check that the position of the king piles is as close as possible to the design position. This is essential for trouble-free driving of the intermediate sheet piles. At the depth of the toe of the sheet piling, the spacing between the king piles should not deviate by more than 200 mm.

Useful hints

If the rock horizon is higher than the required penetration depth of the combined wall the bottom of the piling can be secured by dowelling the king pile to the underlying rock (toe pin). Another solution is to pitch the king piles into corresponding predrillings.

It is advisable to choose a vibrator with a sufficient power reserve. This helps guard against the danger of interlock damage through overheating.

Hammers should also be sufficiently powerful so as to avoid, for example, local deformation of the piles. Hammers with variable impact energy are preferable.

If, when installing the intermediate sheet piles, progress is impossible or can only be achieved through excessive driving energy, check the following:

- Check that there are no obstructions in the soil. This can be done, for example, by extracting the intermediate sheet pile and re-driving it outside the interlocks.

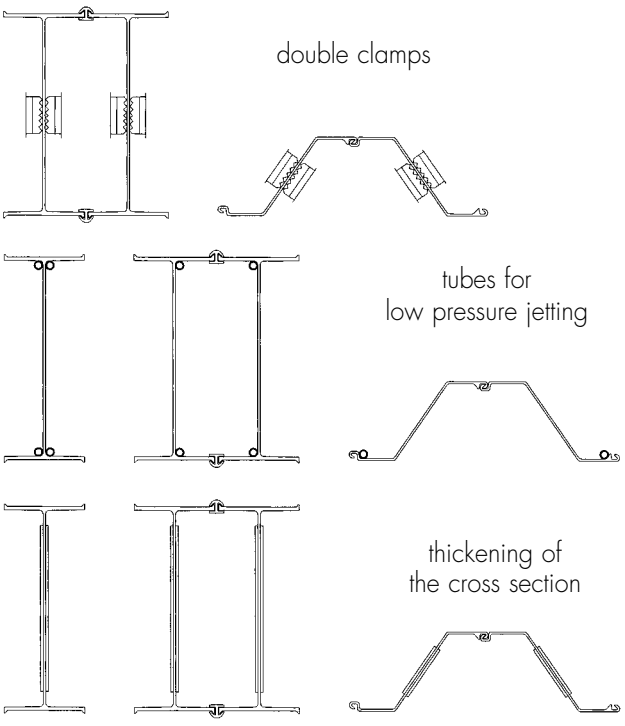
- Check that the spacing and the positioning of the king piles is correct. This can be done, for example, by means of an inclinometer. A tube of the same diameter as the inclinometer is fitted with a corresponding interlock piece and jetted in at the back of the king piles. The measurements taken by the inclinometer will give information on the actual position of the king pile at the relevant depths.

If it is established that the spacing between the king piles does not correspond to the requirements, the king piles must be extracted and redriven.

It is not recommended to force the driving of an intermediate sheet pile, as experience shows that this generally leads to damage and often to de-clutching problems.

If geotechnical conditions are problematic and if driving is expected to be difficult, it may be advisable to fit jetting tubes to the intermediate sheet piles, close to the free threading interlocks, for low-pressure jetting to facilitate driving. For high-pressure jetting it is recommended to use an appropriately equipped displacement pile. This displacement pile is driven prior to inserting the actual intermediate sheet pile, and then extracted.

Informative drawings

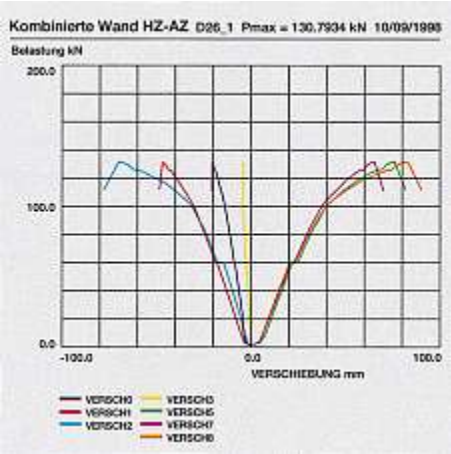


Research and Development
Limit Water Pressure

During the development of the HZ – system Arcelor Mittal in collaboration with independent research institutes carried out tests on double Z sheet piles used as intermediary elements in a combined wall.

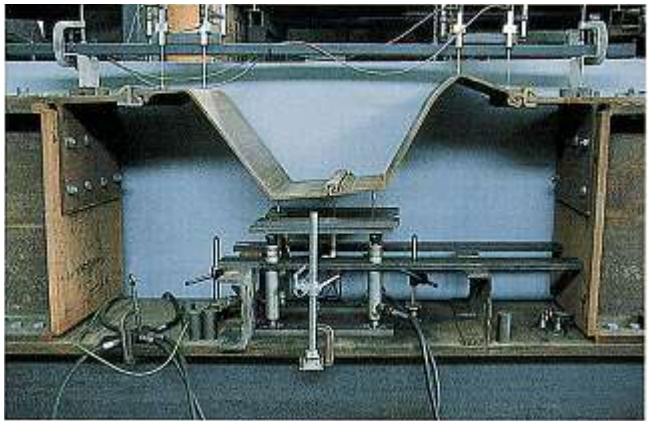
The aim of the tests was to determine the load-carrying behaviour of these elements when loaded by water pressure.

Two hydraulic jacks acting at the flange corners of the Z-piles simulated the water pressure loading.



It had been shown in the framework of a previous research project via finite element simulations that these concentrated loads may be considered an acceptable approximation for a hydrostatic pressure distribution.

From the outcome of the tests the excellent behaviour of this type of combined wall under hydrostatic loading was confirmed: differential water head up to 15 m could be borne by the system without failure. During all the tests no declutching occurred, proving the reliability of the connections.



Limit water pressure (kN/m²) **for HZ-AZ System** (p(x<X) = 95%)

Pile	Steel grade	HZ-flange e- mm					
		17	**18**	**19**	**20**	**21**	**23**
AZ 13	S 355 GP	53.6	55.1	56.5	57.8	59.2	61.7
	S 430 GP	65.0	66.8	68.5	70.1	71.8	74.9
AZ 18	S 355 GP	67.4	75.4	83.9	92.8	102.2	122.3
	S 430 GP	81.6	91.3	101.6	112.4	123.7	148.0
AZ 26	S 355 GP	110.1	113.8	117.3	120.8	124.2	130.9
	S 430 GP	133.3	137.7	142.1	146.3	150.4	158.5

These values may be considered as characteristic values

Delivery Conditions

Tolerances	HZ	AZ
Weight [1]	± 5 %	
Length	± 200 mm	
Thickness	e ≤ 12.5 mm: + 2.0 mm/- 1.0 mm	e ≤ 8.5 mm: ± 0.5 mm
	e > 12.5 mm: + 2.5 mm/- 1.5 mm	e > 8.5 mm: ± 6 %
Height	< 500 mm: ± 5.0 mm	≤ 200 mm: ± 5.0 mm
	≥ 500 mm: ± 7.0 mm	200 mm < ± 6.0 mm < 300 mm
		≥ 300 mm: ± 7.0 mm
Width single pile	± 2 %	
Width interlocked elements	± 3 %	
Straightness	0.2 % of the length	
Ends out of square [2]	2 % b	

1) of the total mass of the complete order
2) of the section width

Available maximum length of piles

HZ	33.0 m
AZ	31.0 m
RZD/RZU	24.0 m
RH	24.0 m

For greater delivery lengths than indicated, enquire in advance.

Steel Grades

Standard referred to: EN 10248				Comparable International Standards		
Grade	Min. yield point	Min. tensile strength	Min. elongation	USA	Canada	Japan
	N/mm²	N/mm²	Lo=5.65 √So %	ASTM	CSA G 4021	JIS A 5528
S 240 GP	240	340	26			
S 270 GP	270	410	24	A 328	Gr. 260 W	SY 295
S 320 GP	320	440	23		Gr. 300 W	
S 355 GP	355	480	22	A 572 Gr. 50; A 690		Gr. 350 W
S 390 GP	390	490	20	A 572 Gr. 55		SY 390
S 430 GP	430	510	19	A 572 Gr. 60	Gr. 400 W	
Mill specification:						
S 460 AP(*)	460	550	17	A 572 Gr. 65		

ASTM A690 available with $f_{yk} \geq 390$ N/mm²

(*) For more details, please contact our technical department.

The mechanical properties are shown in the table indicating comparable international standards to which sheet piles can be ordered.

The standard we normally refer to regarding steel grades for hot-rolled sheet piles is EN 10248 Part 1.

Supply to other standards is possible on request.

For the chemical analysis see corresponding standard.

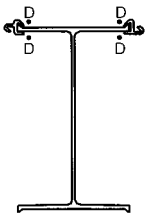
Other qualities of the type:
- steel with copper addition
- special steels
- steel with an improved corrosion resistance, on request.

A proposed galvanisation of the finished product for corrosion protection for instance, has an influence on the chemical analysis and must be specified in the purchase order.

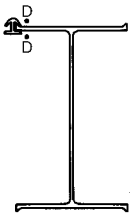
It is recommended that the manufacturer be informed by the purchaser at the time of the order, if a surface treatment on the product is foreseen after delivery.

STANDARD WELDING CONFIGURATION

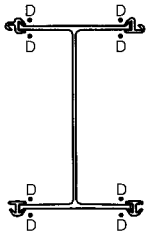
Solution 12



Solution C1

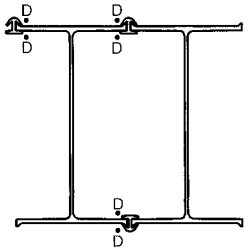


Solution 14

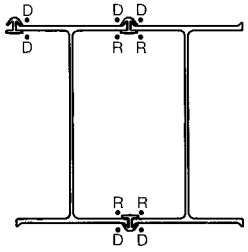


Solution C 23

Form a

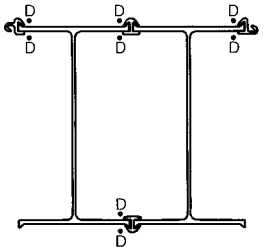


Form b

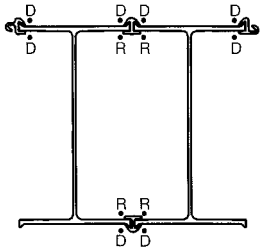


Solution 24

Form a

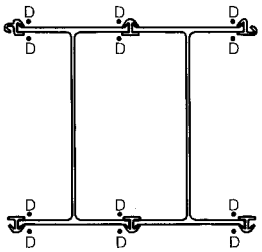


Form b

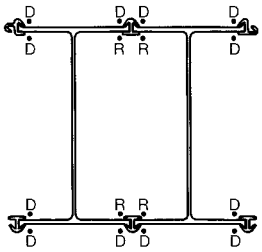


Solution 26

Form a



Form b



D = discontinuous weld, a = 6 mm, 10 % of length (100 mm/m) over the whole pile length + 500 mm continuous weld at top and toe
R = continuous weld, a = 6 mm, length 500 mm at top and toe only
The HZ box piles delivered as **Form a** can be driven separately if required.
In **Form b** both HZ king piles are welded together and the box pile has to be driven in one piece.
If hard driving conditions are expected, the length of the "D" weld at the RH connector should be increased. Please contact our technical department.

Table of Combinations according to Section Modulus

Elastic section modulus cm³/m	Mass ⎸AZ = ⎸HZ kg/m²	King Pile Section	Combination
4030	187	**HZ 775 A**	Sol.12 / AZ 13-770
4350	194	**HZ 775 B**	Sol.12 / AZ 13-770
4360	203	**HZ 775 A**	Sol.12 / AZ 13
4535	201	**HZ 775 A**	Sol.12 / AZ 18-700
4720	210	**HZ 775 B**	Sol.12 / AZ 13
4765	214	**HZ 775 A**	Sol.12 / AZ 18
4775	207	**HZ 775 C**	Sol.12 / AZ 13-770
4885	208	**HZ 775 B**	Sol.12 / AZ 18-700
5095	214	**HZ 775 D**	Sol.12 / AZ 13-770
5110	240	**HZ 775 A**	Sol.12 / AZ 26
5140	222	**HZ 775 B**	Sol.12 / AZ 18
5185	225	**HZ 775 C**	Sol.12 / AZ 13
5270	202	**HZ 975 A**	Sol.12 / AZ 13-770
5335	223	**HZ 775 C**	Sol.12 / AZ 18-700
5445	202	**HZ 775 A**	Sol.14 / AZ 13-770
5485	248	**HZ 775 B**	Sol.12 / AZ 26
5545	233	**HZ 775 D**	Sol.12 / AZ 13
5630	238	**HZ 775 C**	Sol.12 / AZ 18
5680	209	**HZ 975 B**	Sol.12 / AZ 13-770
5685	230	**HZ 775 D**	Sol.12 / AZ 18-700
5755	219	**HZ 975 A**	Sol.12 / AZ 13
5770	209	**HZ 775 B**	Sol.14 / AZ 13-770
5825	217	**HZ 975 A**	Sol.12 / AZ 18-700
5915	220	**HZ 775 A**	Sol.14 / AZ 13
5970	264	**HZ 775 C**	Sol.12 / AZ 26
6005	246	**HZ 775 D**	Sol.12 / AZ 18
6090	217	**HZ 775 A**	Sol.14 / AZ 18-700
6180	231	**HZ 975 A**	Sol.12 / AZ 18
6205	227	**HZ 975 B**	Sol.12 / AZ 13
6265	224	**HZ 975 B**	Sol.12 / AZ 18-700
6280	227	**HZ 775 B**	Sol.14 / AZ 13
6285	225	**HZ 975 C**	Sol.12 / AZ 13-770
6345	272	**HZ 775 D**	Sol.12 / AZ 26
6350	227	**HZ 775 C**	Sol.14 / AZ 13-770
6420	232	**HZ 775 A**	Sol.14 / AZ 18
6435	225	**HZ 775 B**	Sol.14 / AZ 18-700
6455	258	**HZ 975 A**	Sol.12 / AZ 26
6655	240	**HZ 975 B**	Sol.12 / AZ 18
6675	234	**HZ 775 D**	Sol.14 / AZ 13-770
6695	232	**HZ 975 D**	Sol.12 / AZ 13-770
6750	244	**HZ 775 A**	Sol.24 / AZ 13-770
6795	240	**HZ 775 B**	Sol.14 / AZ 18
6810	258	**HZ 775 A**	Sol.14 / AZ 26
6880	245	**HZ 975 C**	Sol.12 / AZ 13
6920	246	**HZ 775 C**	Sol.14 / AZ 13
6920	242	**HZ 975 C**	Sol.12 / AZ 18-700
6930	266	**HZ 975 B**	Sol.12 / AZ 26
6980	217	**HZ 975 A**	Sol.14 / AZ 13-770
7050	243	**HZ 775 C**	Sol.14 / AZ 18-700
7185	266	**HZ 775 B**	Sol.14 / AZ 26
7245	261	**HZ 775 A**	Sol.24 / AZ 13
7280	254	**HZ 775 D**	Sol.14 / AZ 13
7280	255	**HZ 775 B**	Sol.24 / AZ 13-770
7330	258	**HZ 775 A**	Sol.24 / AZ 18-700
7335	253	**HZ 975 D**	Sol.12 / AZ 13
7360	258	**HZ 975 C**	Sol.12 / AZ 18
7360	249	**HZ 975 D**	Sol.12 / AZ 18-700
7395	224	**HZ 975 B**	Sol.14 / AZ 13-770
7395	251	**HZ 775 D**	Sol.14 / AZ 18-700
7465	260	**HZ 775 C**	Sol.14 / AZ 18
7635	285	**HZ 975 C**	Sol.12 / AZ 26
7640	236	**HZ 975 A**	Sol.14 / AZ 13
7675	272	**HZ 775 A**	Sol.24 / AZ 18
7680	233	**HZ 975 A**	Sol.14 / AZ 18-700
7815	273	**HZ 775 B**	Sol.24 / AZ 13
7835	267	**HZ 975 D**	Sol.12 / AZ 18
7840	268	**HZ 775 D**	Sol.14 / AZ 18
7845	286	**HZ 775 C**	Sol.14 / AZ 26
7875	256	**HZ 775 A**	Sol.26 / AZ 13-770
7885	270	**HZ 775 B**	Sol.24 / AZ 18-700
7965	293	**HZ 775 A**	Sol.24 / AZ 26
8100	244	**HZ 975 B**	Sol.14 / AZ 13
8100	278	**HZ 775 C**	Sol.24 / AZ 13-770
8110	293	**HZ 975 D**	Sol.12 / AZ 26
8130	241	**HZ 975 B**	Sol.14 / AZ 18-700
8170	249	**HZ 975 A**	Sol.14 / AZ 18
8210	244	**HZ 975 C**	Sol.14 / AZ 13-770
8215	294	**HZ 775 D**	Sol.14 / AZ 26
8270	285	**HZ 775 B**	Sol.24 / AZ 18
8405	268	**HZ 775 B**	Sol.26 / AZ 13-770
8455	275	**HZ 775 A**	Sol.26 / AZ 13
8480	275	**HZ 975 A**	Sol.14 / AZ 26
8530	271	**HZ 775 A**	Sol.26 / AZ 18-700
8555	306	**HZ 775 B**	Sol.24 / AZ 26
8625	251	**HZ 975 D**	Sol.14 / AZ 13-770
8625	290	**HZ 775 D**	Sol.24 / AZ 13-770
8650	257	**HZ 975 B**	Sol.14 / AZ 18
8705	299	**HZ 775 C**	Sol.24 / AZ 13
8755	295	**HZ 775 C**	Sol.24 / AZ 18-700
8915	268	**HZ 975 A**	Sol.24 / AZ 13-770
8945	286	**HZ 775 A**	Sol.26 / AZ 18
8960	284	**HZ 975 B**	Sol.14 / AZ 26
9000	263	**HZ 975 C**	Sol.14 / AZ 18-700
9005	266	**HZ 975 C**	Sol.14 / AZ 13
9035	287	**HZ 775 B**	Sol.26 / AZ 13
9090	283	**HZ 775 B**	Sol.26 / AZ 18-700
9190	311	**HZ 775 C**	Sol.24 / AZ 18
9250	307	**HZ 775 A**	Sol.26 / AZ 26
9275	311	**HZ 775 D**	Sol.24 / AZ 13
9310	307	**HZ 775 D**	Sol.24 / AZ 18-700
9355	294	**HZ 775 C**	Sol.26 / AZ 13-770
9445	270	**HZ 975 D**	Sol.14 / AZ 18-700
9465	274	**HZ 975 D**	Sol.14 / AZ 13
9475	332	**HZ 775 C**	Sol.24 / AZ 26
9540	299	**HZ 775 B**	Sol.26 / AZ 18
9580	284	**HZ 975 A**	Sol.24 / AZ 18-700
9585	279	**HZ 975 B**	Sol.24 / AZ 13-770
9595	281	**HZ 975 C**	Sol.14 / AZ 18
9610	287	**HZ 975 A**	Sol.24 / AZ 13
9780	324	**HZ 775 D**	Sol.24 / AZ 18
9845	320	**HZ 775 B**	Sol.26 / AZ 26
9885	305	**HZ 775 D**	Sol.26 / AZ 13-770
9895	307	**HZ 975 C**	Sol.14 / AZ 26
10065	316	**HZ 775 C**	Sol.26 / AZ 13
10065	345	**HZ 775 D**	Sol.24 / AZ 26
10070	289	**HZ 975 D**	Sol.14 / AZ 18
10090	299	**HZ 975 A**	Sol.24 / AZ 18
10095	312	**HZ 775 C**	Sol.26 / AZ 18-700
10280	280	**HZ 975 A**	Sol.26 / AZ 13-770
10290	296	**HZ 975 B**	Sol.24 / AZ 18-700
10320	320	**HZ 975 A**	Sol.24 / AZ 26
10335	299	**HZ 975 B**	Sol.24 / AZ 13
10375	315	**HZ 975 D**	Sol.14 / AZ 26
10605	329	**HZ 775 C**	Sol.26 / AZ 18
10635	328	**HZ 775 D**	Sol.26 / AZ 13
10650	324	**HZ 775 D**	Sol.26 / AZ 18-700
10735	307	**HZ 975 C**	Sol.24 / AZ 13-770
10840	312	**HZ 975 B**	Sol.24 / AZ 18
10905	349	**HZ 775 C**	Sol.26 / AZ 26
10955	292	**HZ 975 B**	Sol.26 / AZ 13-770
11035	297	**HZ 975 A**	Sol.26 / AZ 18-700
11070	333	**HZ 975 B**	Sol.24 / AZ 26
11085	301	**HZ 975 A**	Sol.26 / AZ 13
11200	342	**HZ 775 D**	Sol.26 / AZ 18
11405	319	**HZ 975 D**	Sol.24 / AZ 13-770
11495	362	**HZ 775 D**	Sol.26 / AZ 26
11510	326	**HZ 975 C**	Sol.24 / AZ 18-700
11585	330	**HZ 975 C**	Sol.24 / AZ 13
11625	313	**HZ 975 A**	Sol.26 / AZ 18
11750	309	**HZ 975 B**	Sol.26 / AZ 18-700
11820	313	**HZ 975 B**	Sol.26 / AZ 13
11870	334	**HZ 975 A**	Sol.26 / AZ 26
12135	344	**HZ 975 C**	Sol.24 / AZ 18
12215	338	**HZ 975 D**	Sol.24 / AZ 18-700
12280	323	**HZ 975 C**	Sol.26 / AZ 13-770
12310	342	**HZ 975 D**	Sol.24 / AZ 13
12365	364	**HZ 975 C**	Sol.24 / AZ 26
12385	326	**HZ 975 B**	Sol.26 / AZ 18
12625	347	**HZ 975 B**	Sol.26 / AZ 26
12885	357	**HZ 975 D**	Sol.24 / AZ 18
12955	334	**HZ 975 D**	Sol.26 / AZ 13-770
13115	377	**HZ 975 D**	Sol.24 / AZ 26
13145	342	**HZ 975 C**	Sol.26 / AZ 18-700
13255	347	**HZ 975 C**	Sol.26 / AZ 13
13860	354	**HZ 975 D**	Sol.26 / AZ 18-700
13870	361	**HZ 975 C**	Sol.26 / AZ 18
13985	359	**HZ 975 D**	Sol.26 / AZ 13
14110	382	**HZ 975 C**	Sol.26 / AZ 26
14630	374	**HZ 975 D**	Sol.26 / AZ 18
14865	395	**HZ 975 D**	Sol.26 / AZ 26

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