Technical Data Sheet

HelCor® and HelCor PA®

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HELCOR® & HELCOR PA®

This technical data sheet is valid for the ViaCon İnşaat A.Ş. production plant in Hendek, Turkey only.
CE Certificate of Factory Production Control No. 1023-CPR-0681 F.

Steel structures and aluminium structures according to EN 1090-1. Issued by notified body no. 1023

DESCRIPTION

Flexible, cold formed, helically corrugated steel HelCor® pipes and HelCor PA® pipe arches with couplings, used mainly in civil engineering as a steel-soil composite structures for rail and road traffic loads.

INTENDED USE

- road and railway culverts
- underpasses
- ecological crossings
- relining of deteriorated structures
- hydrotechnical structures
- detention systems

PRODUCT FEATURES

- high structural strength
- wide range of shapes and sizes
- relatively low weight
- high corrosion protection
- short installation time

DESIGN LIVE LOADS

HelCor® and HelCor PA® pipes are used for every common class of road and rail loads (according to the European Standard EN 1991-2 or others).

TECHNICAL PROPERTIES

STEEL

The steel used for production of HelCor® pipes, HelCor PA® pipe arches and all types of coupling bands conform to the European Standard: EN 10346 "Continuously hot-dip coated strip and sheet of structural steels - Technical delivery conditions"

Table1

HELCOR® AND HELCOR PA® PIPES STEEL MECHANICAL PROPERTIES

Steel grade	Standard	Yield point R_e [MPa]	Tensile strength R_m [MPa]	Elongation A_{80min} [%]
DX51D*	PN-EN 10346	–	270–500	22
S250GD	PN-EN 10346	250	330	19

* the steels DX51D and S250GD are used alternately..

The steel is delivered with the certificate 3.1 acc. to EN 10204

CORRUGATION

HelCor® & HelCor PA® pipes are produced in two types of corrugation depending on the dimensions of the profile:

- D1+ 71 x 16 mm
- D3 125 x 26 mm

HELCOR D1

Plate thickness t [mm]	Yield stress [MPa]	Area [mm²/mm]	Moment of inertia [mm⁴/mm]	Section modulus [mm³/mm]	Plastic section modulus [mm³/mm]
1,5	250	1,62	31,5	4,4	6,7
2,0	250	2,16	40,9	5,6	8,9
2,5	250	2,70	52,0	6,8	11,2
3,0	250	3,24	64,0	8,0	13,4

HELCOR D3

Plate thickness t [mm]	Yield stress [MPa]	Area [mm²/mm]	Moment of inertia [mm⁴/mm]	Section modulus [mm³/mm]	Plastic section modulus [mm³/mm]
1,5	250	1,660	143,1	10,411	13,880
2,0	250	2,213	191,8	13,697	18,557
2,5	250	2,768	241,0	16,909	23,263
3,0	250	3,322	290,8	20,057	28,000
3,5	250	3,877	341,4	23,149	32,772

SHAPES & SIZES

HelCor® pipes are produced with diameters Ø300mm to Ø3600mm.
The standard lengths of HelCor® pipe segments are 6, 7 and 8 meters. The manufacturer can produce and deliver longer segments, but the length must be accepted by the production department at the order preparation stage.
All standard HelCor® pipes diameters are presented in TDS Appendix no.1.

COUPLING BANDS

The designed length of the whole culvert is obtained by joining several segments using the coupling bands, which are made from flat or corrugated steel. Different types and widths of coupling bands are used to join the segments of pipes of different dimensions and purposes. All coupling bands meet the following conditions::

300 ≤ W ≤ 0,4 D **W – width of the coupling band,**
D – nominal pipe diameter in [mm]

All details of coupling bands (Type 2 is in use in Turkey) are presented in the "Catalogue of Production Standard Solutions and Details". Steel thickness and corrosion protection of coupling bands plate and pipe plate may differ.

FLANGE CONNECTIONS

Each HelCor®/HelCor® PA section can also be also connected to an adjacent section with a flange connection.
The standard solution is a 100x10mm flange, connected by M20 bolts and nuts.
This solution is also used for connecting additional elements, such as inlets, connectors, and manholes.
All details of flange connections are presented in the "Catalogue of Production Standard Solutions and Details".

BOLTS, NUTS, ANCHOR BOLTS

Depending on the application, the following standard fasteners are used in the production of the pipes. .

BOLTS, NUTS, ANCHOR BOLTS

Type	Dimension	Length	Standard
Bolts	M8 (CLASS 8.8)	Different lengths depending on the project / order	EN ISO 4070
	M12 (CLASS 8.8)		EN ISO 4070
	M16 (CLASS 8.8)		EN ISO 4070
	M20 (CLASS 8.8)	50mm, 70mm	EN ISO 898-1
Nuts	M8, M12, M16 (CLASS 8.8)	-	EN ISO 4032
	M20 (CLASS 8.8)	-	EN ISO 898-2
Anchor bolts	M20	135mm, 225mm	EN ISO 10025-2

TOLERANCES OF PIPE'S GEOMETRY

The values of the geometric parameters of the pipe after the assembly should not differ from the designed values more than:

HelCor® pipe:

- **span ± 1.5%**
- **rise ± 1.5%**
- **length + 0.5%**

The vertical displacement of the pipe's crown point during the backfilling process should not exceed 2% of its span measured before backfilling.

CORROSION PROTECTION

The steel is delivered with ready-made corrosion protection:

- **600g/m2 of zinc coating on both sides, which corresponds to 42 µm on one side (Z600)**
- **1000g/m2 of zinc coating on both sides, which corresponds to 70 µm on one side (Z1000)**
- **600g/m2 of galvanised zinc coating on both sides, which corresponds to 42 µm on one side with an extra 300 µm-thick layer of polymer film (such as TrenchcoatTM , W-Protect®, Isofilm or similar) on one or both sides (1TC, 2TC).**

Table 3

		Non-aggresive environment	Aggresive environment
Air aggressiveness category according to EN ISO 12944-2*		■ C1 ■ C2	■ C3 ■ C4 ■ C5-I, C5-M
Water parameters		■ pH from 6.5 to 8.0 ■ hardness of water ≥ 20 mg Ca/l ■ speed of water ≤1.5 m/s	■ pH from 3.0 to 6.5 & from 8.0 to 12.0 ■ hardness of water < 20 mg Ca/l ■ speed of water >1.5 m/s
Soil parameters		■ pH from 6.5 to 8.0 ■ soil permeability k10 ≥ 8.0 m /24h ■ no organic parts ■ ununiformity Cu ≥ 5 ■ humidity ≤ 17%	■ pH from 3.0 to 6.0 & from 8.0 to 12.0 ■ soil permeabilty K<8.0 m.24h ■ contains oranic parts ■ ununiformaty index C_u <5 ■ Humidity >17%
Anti corrosive protection endurance	Zinc coating 42µm (600 g/m2)	min. 40 years	Not recommended
	Zinc coating 70µm (1000 g/m2)	50–70 years	20–50 years
	Zinc coating 42µm (600 g/m2) + polumer coating 300µm	over 100 years	80–100 years

ABRASION

The pipes, during their service, can be subjected to an abrasion process. In accordance with the recommendations of the Local Board of Roads, the abrasion resistance of HC/HCPA pipes due to the applied anti-corrosion layer, can be classified as shown in the table below.

Table 4

	Low abrasion	Medium – High abrasion	
Water speed	≤ 1.5 m/s	≤ 3.5 m/s	> 3.5 m/s
Aggregate	Sand & gravel	Sand & gravel	Fine Sand
Zinc coating 42–70	Suitable	Not suitable	
µm Zinc coating + polymer coating	Suitable	Suitable	

TRANSPORT AND STORAGE

The pipes are delivered to the jobsite by trucks. The unloading and placing of the pipes should be performed using light mechanical crane devices using textile belts. The pipes must not be dropped from the truck. The pipes can be stored in stacks using wooden spacers.

Any damages to the anti-corrosion protection of the pipe caused during transport, unloading or assembly must be repaired in accordance to the manufacturer instruction.

OTHER INFORMATION

Each application of HelCor® pipes requires a technical design, including estimated loads, hydrological conditions and other limiting outlines. Appropriate rise and span of the cross section has to be chosen. Also lifetime analysis should specify an anti-corrosion system to be applied. The design should follow the guidelines issued by ViaCon as well as respective country-specific requirements.

Pipes can also be produced and delivered with additional elements, upon request. A wide range of such standard elements is available in the catalog: "HelCor & HelCor PA - Catalogue of Production Standard Solutions and Details. If the customer has their own solution for a given project, they should consult with ViaCon at the inquiry or ordering stage.

More details about this product can be found in product catalogues like: "HelCor & HelCor PA - Catalogue of Production Standard Solutions and Details", "HC & MP & SC - Catalogue of Design Details". With other questions, contact the manufacturer directly.

LIST OF STANDARDS:

EN ISO 1090-1 – Execution of steel structures and aluminum structures. Requirements for conformity assessment of structural components

EN ISO 1991-2 – Eurocode – Traffic loads on bridges

EN ISO 10204 – Metallic Products: Types of Inspection Documents

EN ISO 10346 – "Continuously hot-dip coated steel flat products – Technical - delivery conditions"

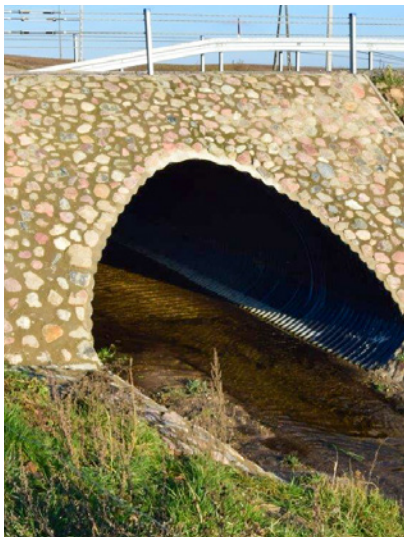
EN ISO 12944-2 – Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Classification of environments

APPENDIX

VIACON HELCOR PIPES - STANDARD DIAMETERS

Name	Diameter - inner [m]	Area [m²]	Corrugation type	Plate thickness for D1 corrugation [mm]	Plate thickness for D3 corrugation [mm]
300	0,30	0,07	D1	1,5	-
400	0,40	0,13	D1	1,5	-
500	0,50	0,20	D1	1,5	-
600	0,60	0,28	D1	1,5/2,0	-
700	0,70	0,38	D1	1,5/2,0	-
800	0,80	0,50	D1	1,5/2,0	-
900	0,90	0,64	D1	1,5/2,0	-
1000	1,00	0,79	D1, D3	1,5/2,0/2,5	1,5/2,0/2,5
1100	1,10	0,95	D1, D3	2,0/2,5	2,0/2,5
1200	1,20	1,13	D1, D3	2,0/2,5	2,0/2,5
1300	1,30	1,33	D1, D3	2,0/2,5	2,0/2,5
1400	1,40	1,54	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
1500	1,50	1,77	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
1600	1,60	2,01	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
1700	1,70	2,27	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
1800	1,80	2,54	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
1900	1,90	2,84	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
2000	2,00	3,14	D1, D3	2,0/2,5/3,0	2,0/2,5/3,0
2100	2,10	3,46	D3	-	2,0/2,5/3,0
2200	2,20	3,80	D3	-	2,0/2,5/3,0
2300	2,30	4,15	D3	-	2,0/2,5/3,0
2400	2,40	4,52	D3	-	2,0/2,5/3,0
2500	2,50	4,91	D3	-	3,0/3,5
2600	2,60	5,31	D3	-	3,0/3,5
2700	2,70	5,73	D3	-	3,0/3,5
2800	2,80	6,16	D3	-	3,0/3,5
2900	2,90	6,61	D3	-	3,0/3,5
3000	3,00	7,07	D3	-	3,0/3,5
3100	3,10	7,55	D3	-	3,5
3200	3,20	8,04	D3	-	3,5
3300	3,30	8,55	D3	-	3,5
3400	3,40	9,08	D3	-	3,5
3500	3,50	9,62	D3	-	3,5
3600	3,60	10,18	D3	-	3,5

(Turkish Production Unit)



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ViaCon is a leader in infrastructure construction solutions. Built on strong Nordic roots, ViaCon embodies a practical, human perspective that brings together technology and verifiable sustainability. The long-term view defines our vision, and by driving smart, future-friendly construction solutions for bridges and culverts, geotechnical and stormwater solutions, we will continue to shape and lead our industry.

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