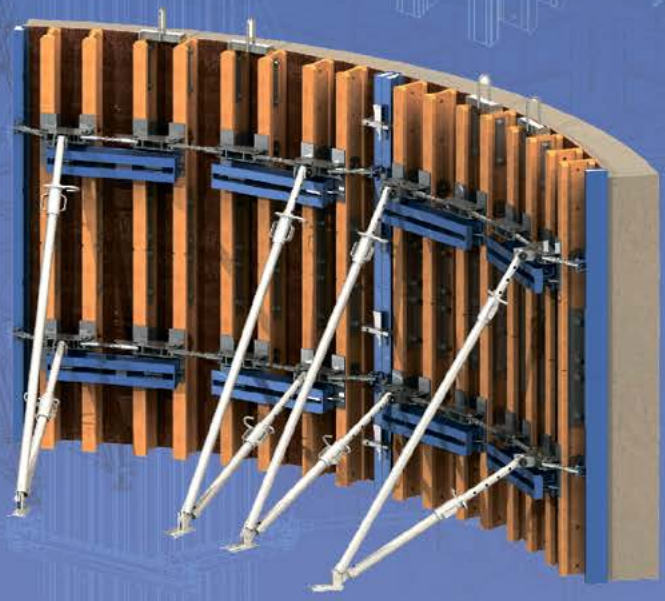
RINGFORM
Circular formwork

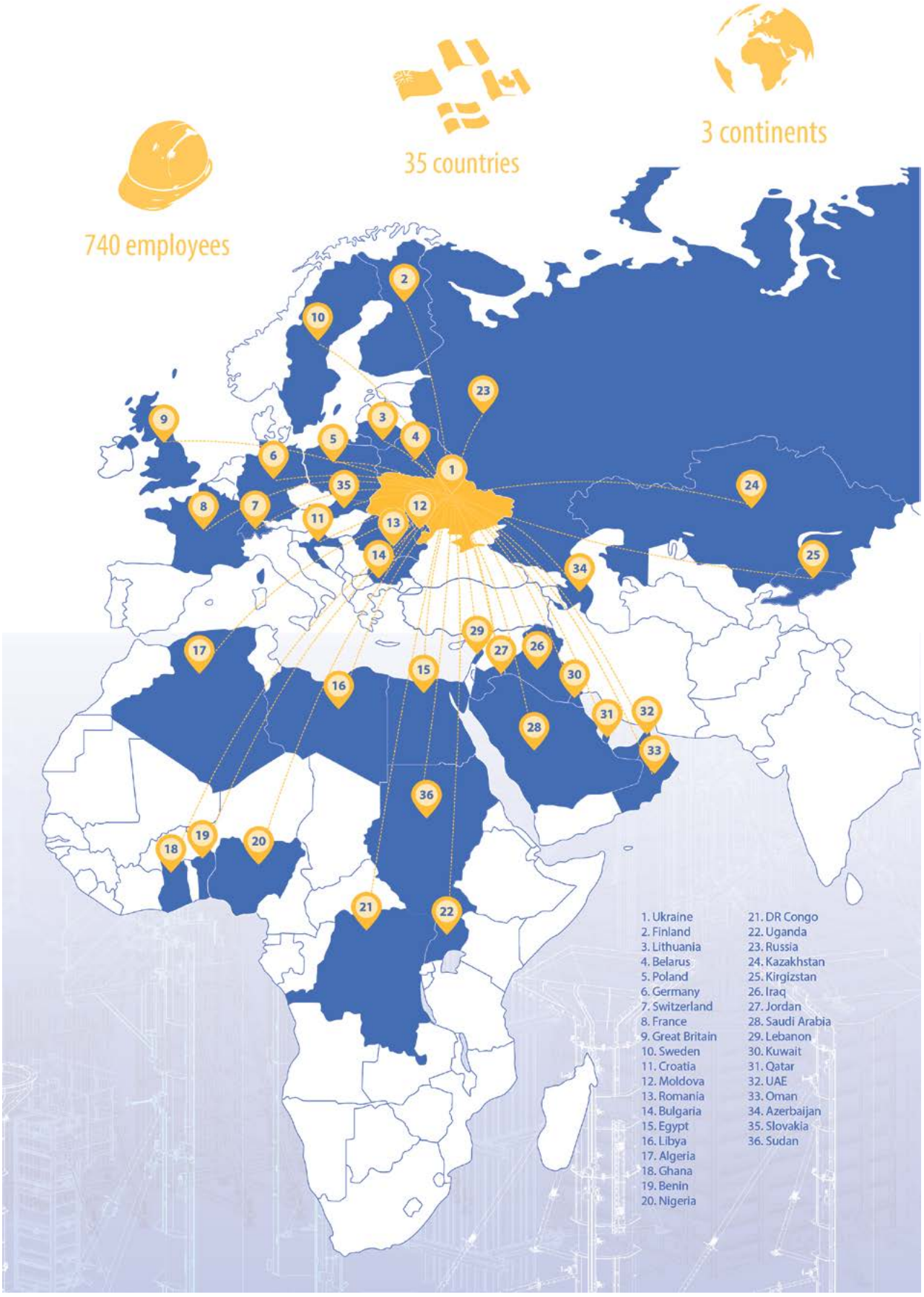


VARIANT

USER MANUAL

www.variant-factory.eu

ISO 9001
BUREAU VERITAS
Certification
N° 00000


740 employees
35 countries
3 continents
1. Ukraine
2. Finland
3. Lithuania
4. Belarus
5. Poland
6. Germany
7. Switzerland
8. France
9. Great Britain
10. Sweden
11. Croatia
12. Moldova
13. Romania
14. Bulgaria
15. Egypt
16. Libya
17. Algeria
18. Ghana
19. Benin
20. Nigeria
21. DR Congo
22. Uganda
23. Russia
24. Kazakhstan
25. Kirgizstan
26. Iraq
27. Jordan
28. Saudi Arabia
29. Lebanon
30. Kuwait
31. Qatar
32. UAE
33. Oman
34. Azerbaijan
35. Slovakia
36. Sudan

Contents

GENERAL INSTRUCTIONS

This user manual (method statement) is aimed at everyone who will be working with the «VARIANT» product or system it describes. It contains information on how to set up this system, and proper use it.

All persons working with the product described herein must be familiar with the contents of this manual and with all the safety instructions it contains.

The customer is to ensure that the information materials provided by «VARIANT» are available to all users, and that they have been made aware of them and have easy access to them at the usage location.

Persons who are incapable of reading and understanding this booklet, or who can do so only with difficulty, must be instructed and trained by the customer.

Always observe all construction safety regulations and other safety rules applying to the application and using of our products in the country and/or region in which you are operating.

In the relevant technical documentation and formwork usage plans, «VARIANT» shows the workplace safety precautions that are necessary in order to use the «VARIANT» products safely in the usage situations shown. In all cases, users are obliged to ensure compliance with national laws, Standards and rules throughout the entire project and to take appropriate additional or alternative workplace safety precautions where necessary.

The customer is responsible for drawing up, documenting, implementing and continually updating a hazard assessment on every construction site. This document serves as the basis for the site-specific hazard assessment, and for the instructions given to users on how to prepare and use the system. It does not substitute for these, however.

This manual can also be used as a generic method statement or incorporated with a site-specific method statement.

The equipment/system must be inspected by the customer before use, to ensure that it is in suitable condition. Steps must be taken to rule out the use of any components that are damaged, deformed, or weakened due to wear, corrosion or rot.

The customer must ensure that this product is erected and dismantled, reset and generally used for its intended purpose under the direction and supervision of suitably skilled persons with the authority to issue instructions. These persons' mental and physical capacity must not in any way be impaired by alcohol, medicines or drugs.

The equipment/system must be assembled and erected in accordance with the applicable laws, Standards and rules by suitably skilled personnel of the customer's, having regard to any and all required safety inspections.

Many of the illustrations in this user manual show the situation during formwork assembly and are therefore not always complete from the safety point of view.

Combining our formwork systems with those of other manufacturers could be, but needs to be checked by customer compatibility «VARIANT» product/system with other independently under its responsibility.

It is not permitted to modify«VARIANT» products because of a safety risk.

Only original «VARIANT» components may be used as spare parts. Repairs may only be carried out by the manufacturer or authorized facilities.

We reserve the right to make alterations in the interests of technical progress.

WARNING NOTES

«VARIANT» products and systems must be set up in such a way that all loads acting upon them are safely transferred.

Do not exceed the permitted fresh-concrete pressures. Excessively high pouring rates lead to formwork overload, cause greater deflection and risk causing breakage.

The stability of all components and units must be ensured during all phases of the construction work.

All connections must be checked regularly to ensure that they still fit properly and are functioning correctly. It is very important to check all screw-type connections and wedge-clamped joins whenever the construction operations require (particularly after exceptional events such as storms), and to tighten them if necessary.

Remove any loose parts or fix them in place so that they cannot be dislodged or fall free.

It is strictly forbidden to weld «VARIANT» products – in particular anchoring/tying components, suspension components, con-nector components and castings etc. – or otherwise subject them to heating. Welding causes serious change in the microstructure of the materials from which these components are made. This leads to a dramatic drop in the failure load, representing a very great risk to safety. The only articles which are allowed to be welded are those for which the «VARIANT» literature expressly points out that welding is permitted.

If a person or object falls against, or into, the side-guard component and/or any of its accessories, the component affected may only continue in use after it has been inspected and passed by an expert.

Provide safe workplaces for those using the formwork (e.g. for when it is being erected/dismantled, modified or repositioned etc.). It must be possible to get to and from these workplaces via safe access routes.

Fire-sources are not permitted anywhere near the formwork. Heating appliances are only allowed if properly and expertly used, and set up a safe distance away from the formwork.

The work must take account of the weather conditions (e.g. risk of slippage). In extreme weather, steps must be taken in good time to safeguard the equipment, and the immediate vicinity of the equipment, and to protect employees.

Do not strike the formwork until the concrete has reached sufficient strength and the person in charge has given the order for the formwork to be struck.

When striking the formwork, never use the crane to break concrete cohesion. Use suitable tools such as timber wedges, special pry-bars or system features such as «VARIANT» stripping corners.

When striking the formwork, do not endanger the stability of any part of the structure, or of any scaffolding, platforms or formwork that is still in place.

Observe all regulations applying to the handling of formwork and scaffolding.

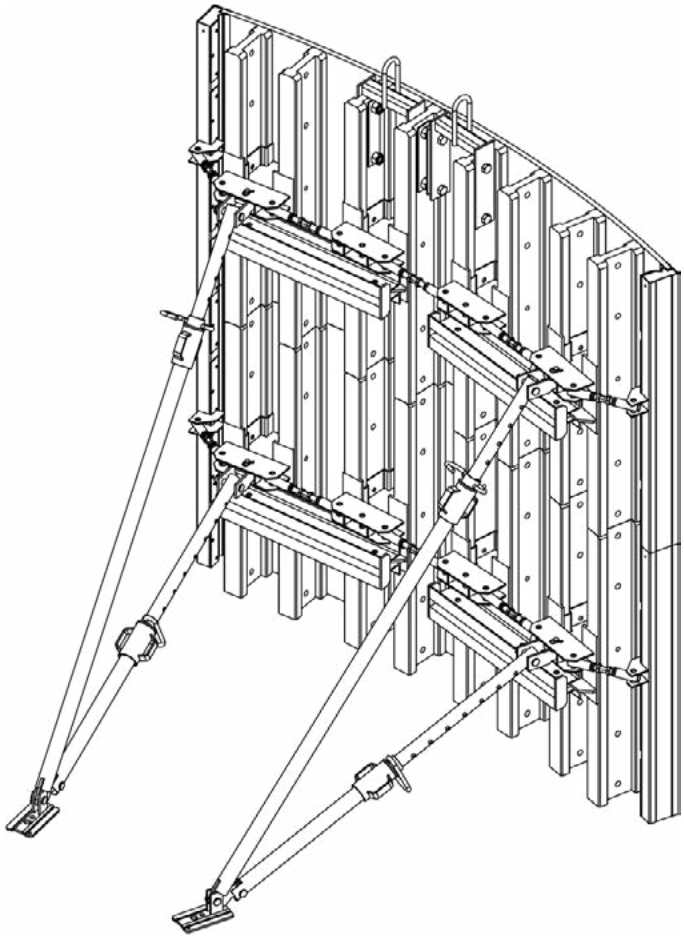
SYSTEM OVERVIEW

The «VARIANT» Adjustable Circular formwork – the circular formwork for smooth round walls with an infinitely variable radius from 3.5 m.

Just 2 elements with the widths of 2.4 m for the inner radius and of 2.5 m for the outer radius ensure simple and safe use for any objects. It's a perfect choice for construction of round reservoirs, treatment facilities, silos, entrance ramps of multi-storeyed parkings and any round structures, requiring different radiuses.

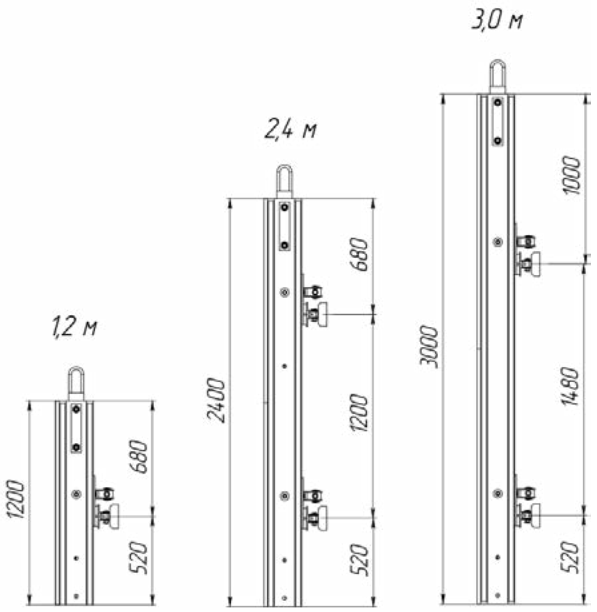
The «VARIANT» Adjustable Circular formwork system benefits:
- There is no need for different assemblies for different circular walls.
- The edge profiles are compatible with our panel formwork system Varimax.
- They are no need for any extra holes in the plywood. The same anchor holes is used throughout the project.
- For shorter assembly time with this system you only need a few clamps to connect each panel together.

Permitted load pressure - 50 kPa



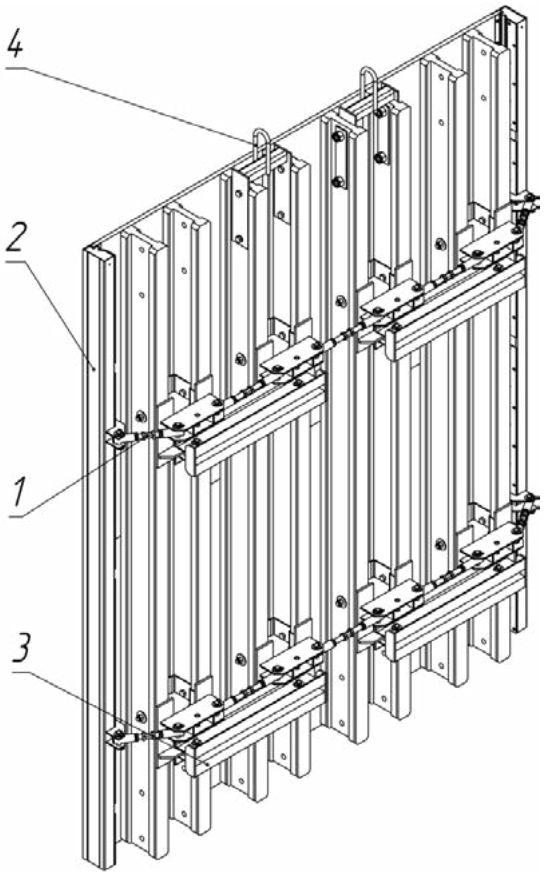
PANELS ARE EASILY ADAPTED TO DIFFERENT DIAMETERS BY MEANS OF TURNBUCKLES.

The panels of the adjustable circular formwork have 3 sizes in height 1.2 m, 2.4 m, 3.0 m which provide a good range of sizes. By stacking the panels vertically, optimal height can be met.



PANEL COMPONENTS

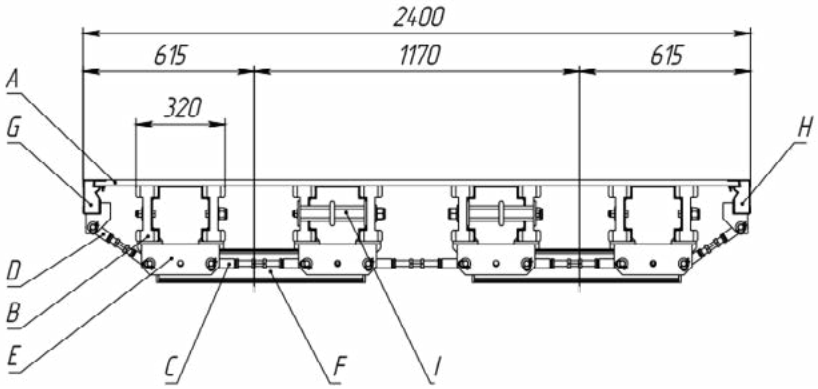
1. Turnbuckle. For setting the element-bending radius.
2. Connecting profile. Connection piece to further circular formwork elements or to Frame formwork panels Varimax.
3. Steel waling RD. For distributing the form-tie forces
4. Lifting-bracket. For lifting and resetting the element.



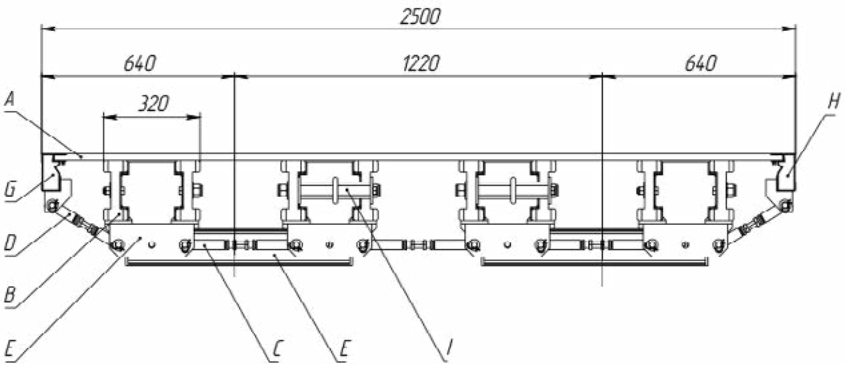
PANEL WIDTHS

The 2.40 m wide elements are used for the inside formwork, and the 2.50 m wide ones for the outside formwork. This speeds up work by making it easy to see which element belongs where.

(A) Plywood 21mm
(B) Timber beam H20
(C) Turnbuckle C
(D) Turnbuckle D
(E) Timber-beam seat 24 cm
(F) Steel waling RD 0.75 m
(G) Connecting profile (left)
(H) Connecting profile (right)
(I) Lifting-bracket

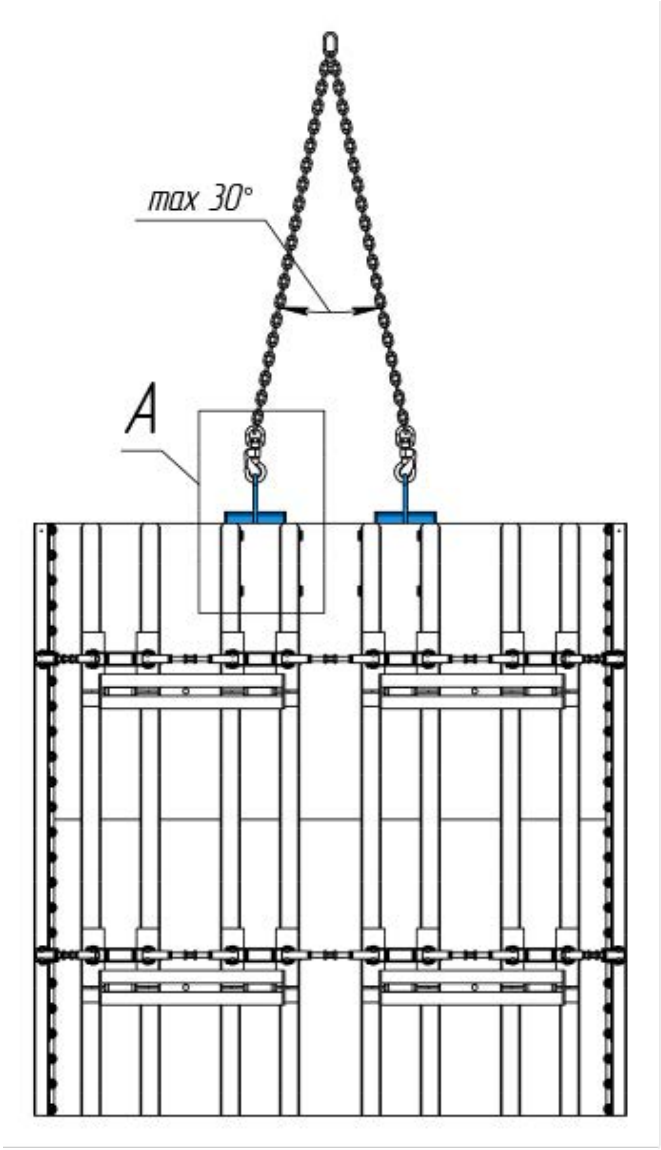


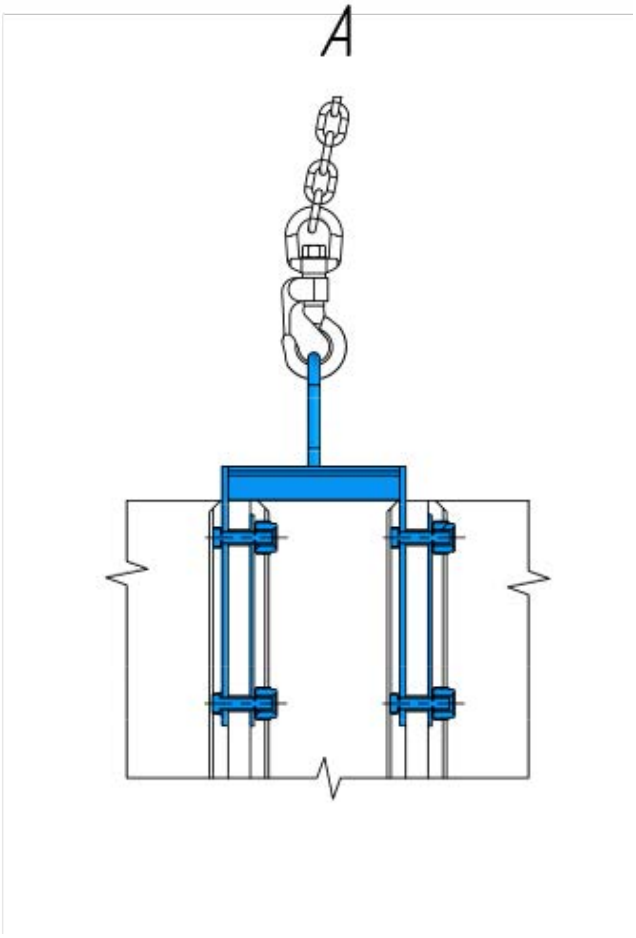
(A) Plywood 21 mm
(B) Timber beam H20
(C) Turnbuckle A
(D) Turnbuckle C
(E) Timber-beam seat 24 cm
(F) Steel waling RD 0.75 m
(G) Connecting profile (left)
(H) Connecting profile (right)
(I) Lifting-bracket



SHIFTING BY CRANE

The slinging chains are hooked into the ready-mounted lifting-brackets of the Circular formwork element.





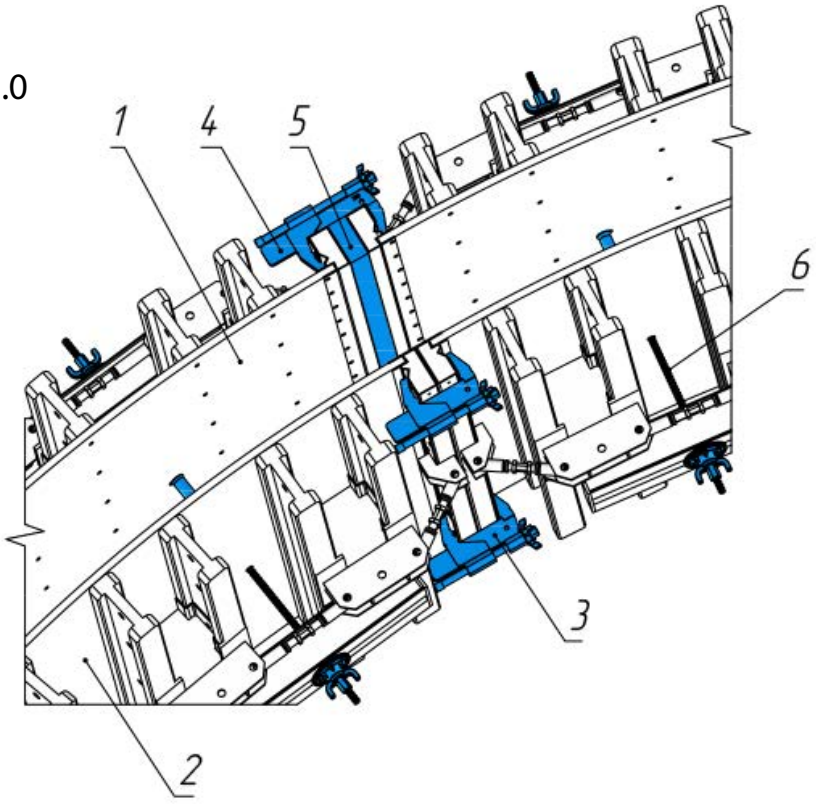
Permitted vertical force
- 1000 kg / lifting-bracket

INTER-ELEMENT CONNECTIONS

AS A RULE:

- For the outside formwork, 2.50 m wide elements are used;
- For the inside formwork, 2.40 m wide elements are used;
- The inter-element connections are made using Adjustable clamps 0-5 cm & 5-10 cm;
- Attach at least 1 clamp for every meter that the element is high;
- Do not oil or grease wedge-clamped joints;
- Place the inside and outside formworks opposite one another;
- Bridge any closure gaps between the elements using fitting-timbers;
- Tie using a Tie-rod 15.0 and a Superplate 15.0;
- Minimum length of the tie-rods: Wall thickness + 1.00 m.

1. Outside formwork
2. Inside formwork
3. Adjustable clamp 0-5
4. Adjustable clamp 5-10
5. Fitting-timber
6. Tie-rod 15.0 and Superplate 15.0



The connecting profiles of the Circular formwork elements permit Frame formwork panels Varimax to be connected directly to the elements.

Wall thickness	Number of connectors
	Adjustable clamp
up to 25 cm	0.75 pcs./m
up to 34 cm	1 pcs./m
up to 40 cm	1.2 pcs./m
up to 50 cm	1.5 pcs./m
up to 60 cm	1.8 pcs./m

BENDING INSTRUCTIONS

The site delivery condition – straight
The smallest bending radius – 3.50 m

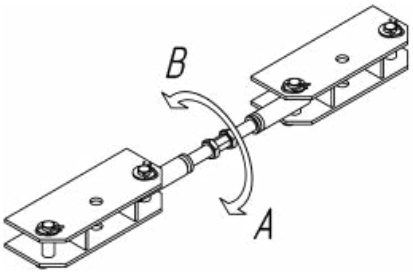
Steps:
- Put the circular formwork element and secure it so that it cannot topple over.
- Place tall formwork elements on their sides, as it shown in the illustration. This way the position of the spindle-levels is vertical only and all the spindles are easy to reach.

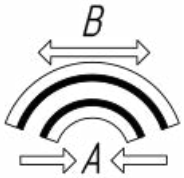
- Uniformly pre-tension all the spindles by hand.
- Prepare the template.

The formwork is easier to set up if there is an in-line connection to an existing wall.

ADJUSTING

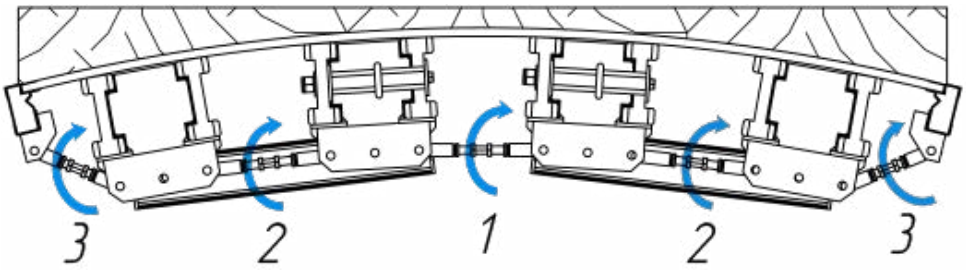
- Only adjust the element by means of the template.
- Make sure that you turn each spindle exactly as much as the ones above and below it.
- Check the radius with the template before every pour.
- Adjust the spindles using the Wrench for Circular formwork 22.





(A) Inside element pulled together
(B) Outside element pushed apart

- Repeat this procedure until the form-ply sits closely and evenly against the template. To return the elements to the «straight» position, simply repeat the spindling procedure in reverse.



N° of turns of the spindle

Operation	3	2	1	2	3
1	–	–	1 ½	–	–
2	–	1 ½	–	1 ½	–
3	½	–	–	–	½

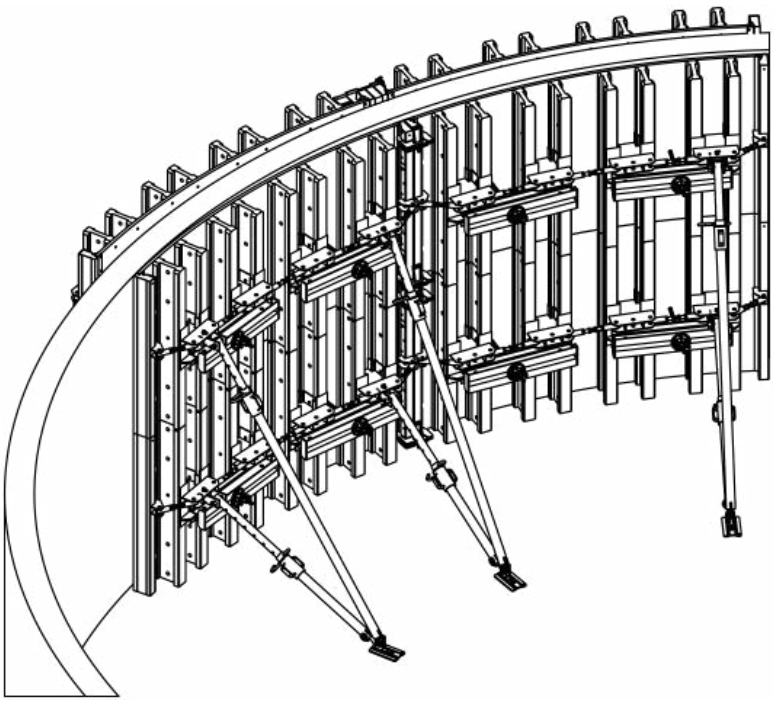
If spindling has gone badly wrong: Straighten out the element and start all over again!

- Once you have adjusted the circular formwork elements to the desired radius, set them up next to one another in the same way as straight elements, link them with Adjustable clamps, and then place the form-ties.

STORAGE

- Straighten out the elements again before storing them for any length of time.

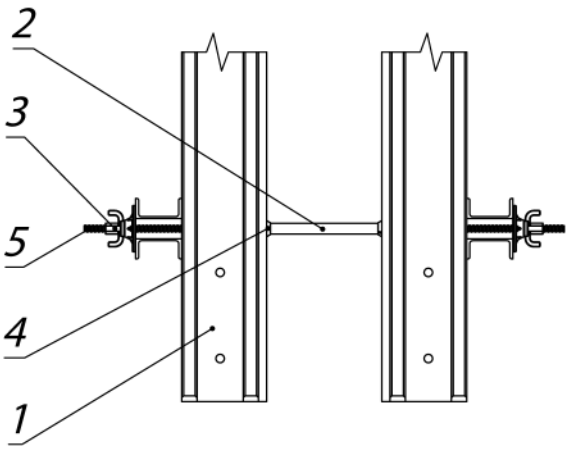
TIE-ROD SYSTEM



- Only use approved tie-rods
- Never weld or heat tie-rods

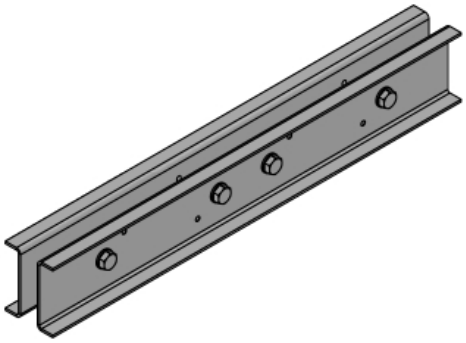
TIE-ROD SYSTEM 15.0 mm

- Permitted capacity with safety factor of 1.6: 120 kN
- Permitted capacity to DIN 18216: 90 kN



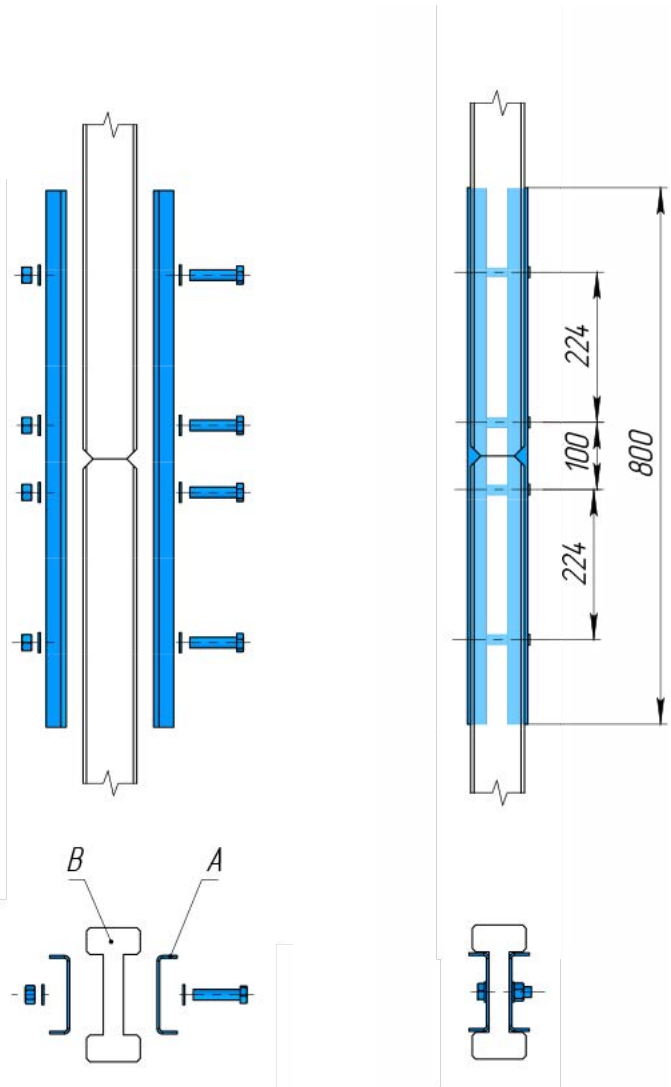
VERTICAL STACKING OF ELEMENTS

Dismount the Lifting-bracket for Circular formwork from the element joint before vertically stacking the elements.



Stacking plate for circular formwork.

- Before vertically stacking elements, always turn their spindles to make them straight again.
- Attach one stacking plate for every beam-join.



(A) Stacking plate
(B) Hexagon screw M16x70

In stacking configurations, 3.00 m high elements are only allowed to have other elements placed beneath them, never on top of them! In other words, these elements must always be on top.

STOP-END FORMWORK

Walls up to approx. 20 cm thick

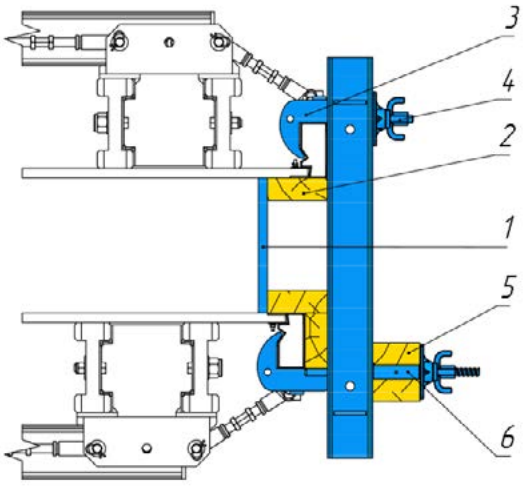
- Timber planks are simply nailed onto the panel element and a strip of plywood is inserted.

Walls thicker than approx. 20 cm

- Stop-end tie ensures that the loads are safely transferred into the waling system of the system elements

Number of connectors required

Wall thickness	Number of connectors
	Stop-end tie
up to 25 cm	0.5 pcs./m
up to 34 cm	0.68 pcs./m
up to 40 cm	0.8 pcs./m
up to 50 cm	1 pcs./m
up to 60 cm	1.2 pcs./m



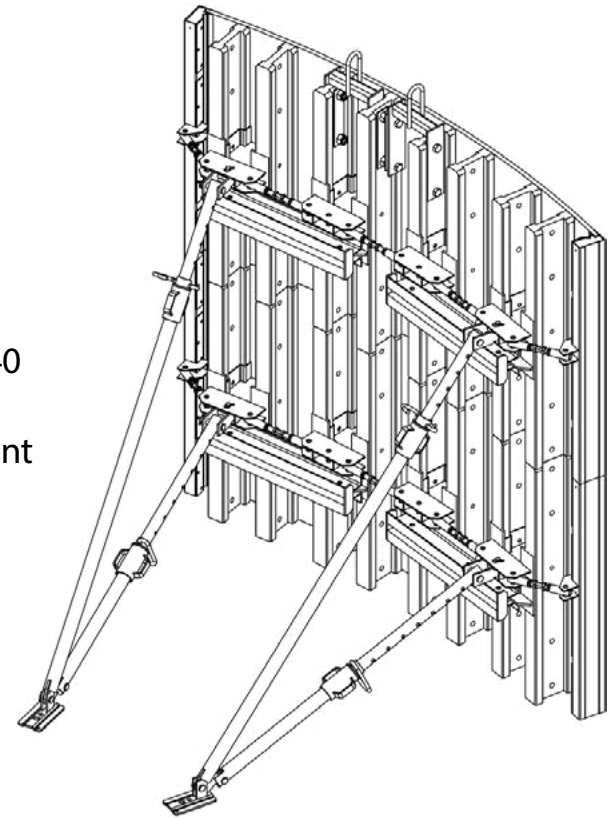
(1) Plywood
(2) Spacer
(3) Stop-end tie
(4) Superplate
(5) Stop-end tie with extension
(6) Guide plate

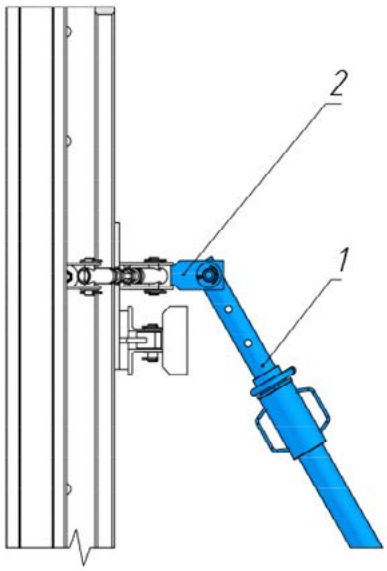
PLUMBING ACCESSORIES

Support braces 340, support braces 540 and adjustable plumbing struts secure the elements against wind loads, and make it easier to plumb and align the formwork.

The formwork elements must be held stable in every phase of the construction work

- Dismantle Heads of Support brace 340 or 540
- Assemble Heads RD
- Fix Panel strut with Circular formwork element

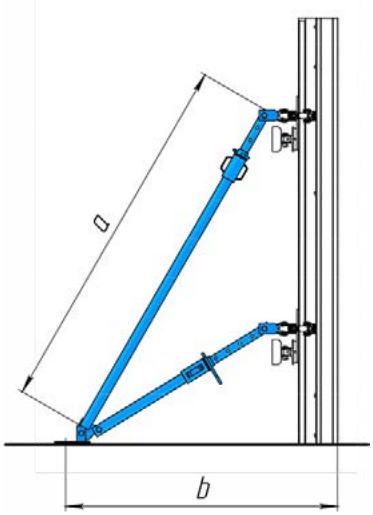




(1) Support brace
(2) Head RD

SUPPORT BRACE 340

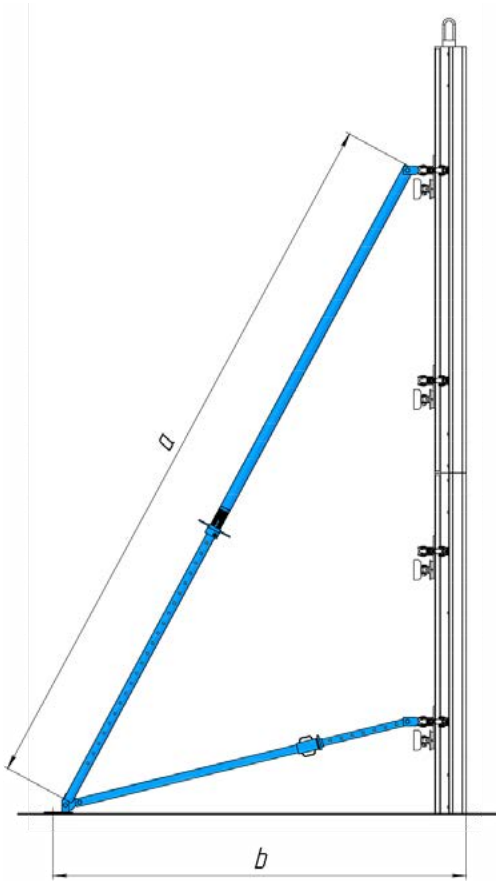
Retractable brace length, m	Allowable load	
	Pressure, kN	Stretching, kN
2.00	22.0	15.0
2.20	21.0	
2.40	17.5	
2.60	14.5	
2.80	12.5	
3.00	11.0	
3.20	9.5	
3.40	8.0	



a ... 190.8 - 341.8 cm
b ... 119.4 - 178.8 cm

SUPPORT BRACE 540

Retractable brace length, m	Allowable load	
	Pressure, kN	Stretching, kN
3.20	30.0	30.0
3.40	30.0	
3.60	30.0	
3.80	25.5	
4.00	21.5	
4.20	19.0	
4.40	16.5	
4.60	15.0	
4.80	13.5	
5.00	12.0	
5.20	11.0	
5.40	10.0	
5.50	9.5	

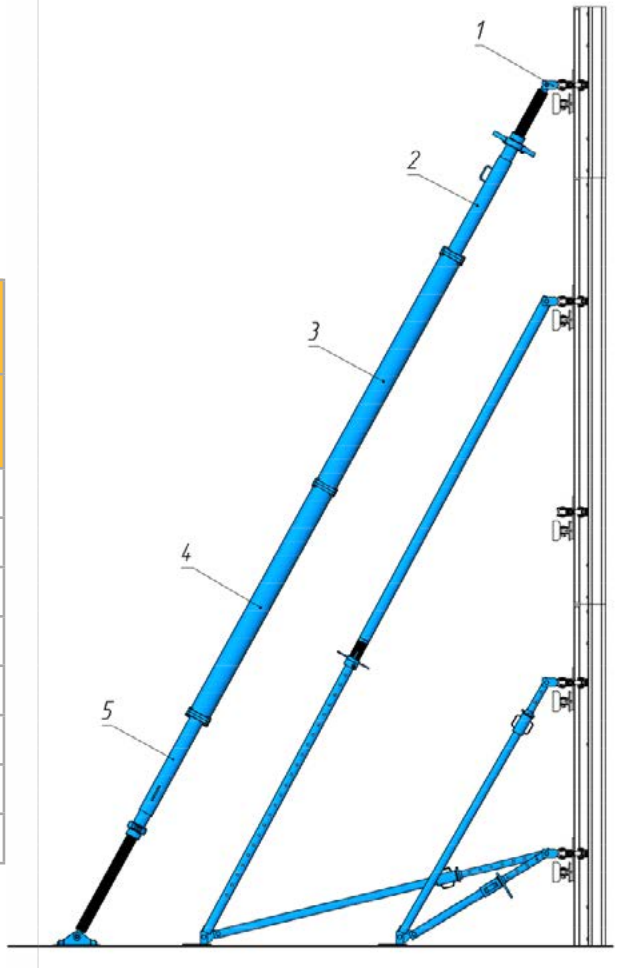


a ... 310.5 - 549.2 cm
b ... 224.1 - 274.9 cm

ADJUSTABLE PLUMBING STRUT

Consist of:
1. Spindle head
2. Spindle element without end-hinge
3. Extension strut 3.70 m
4. Extension strut 2.40 m
5. Spindle element with end-hinge

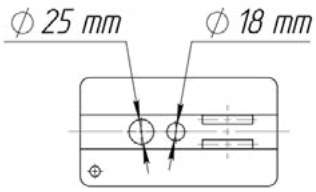
Length, L	Allowable axis load on pressure, kN			Intermediate parts	
	min. L	half L	max. L	Short 2.40	Long 3.70
6.0-7.4	40.0	40.0	27.8	-	1
7.1-8.5	40.0	38.2	24.3	2	-
8.4-9.8	40.0	35.6	21.7	1	1
9.7-11.1	40.0	31.7	19.0	-	2
10.8-12.2	40.0	27.8	16.1	2	1
12.1-13.5	34.2	24.1	13.4	1	2
13.4-14.8	27.1	21.5	12.2	-	3
14.5-15.9	20.8	17.5	9.5	2	2
	Allowable axis load on tension - 40 kN				

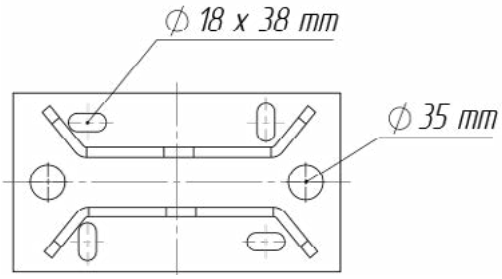


The spindle head must be secured to the waling with a connecting pin and spring cotter. The length of the adjustable plumbing strut should be the same as the height of the formwork to be supported.

Footplate and anchorage

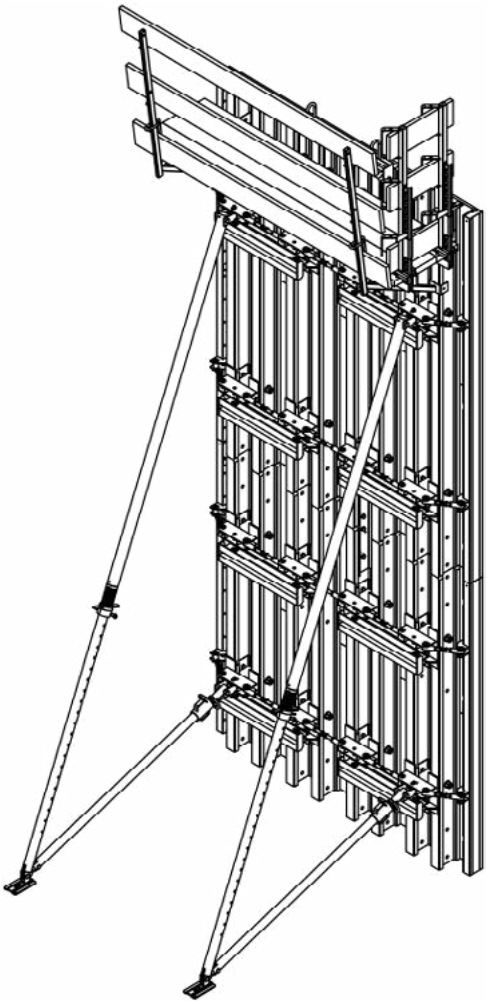
- Drilled holes in the footplates





- Anchor the plumbing accessories in such a way as to resist tensile and compressive forces.
- Required load-bearing capacity of anchor bolt is min. 13.5 kN
- Required concrete strength is 25 N/mm^2 (concrete C20/25)
- The anchoring bolt can be re-used few times over (depend on manufacturer).

POURING PLATFORMS



Beam wall bracket

is lightweight bracket for making working platforms.
- Max. influence width: 2.00 m

Floor decking

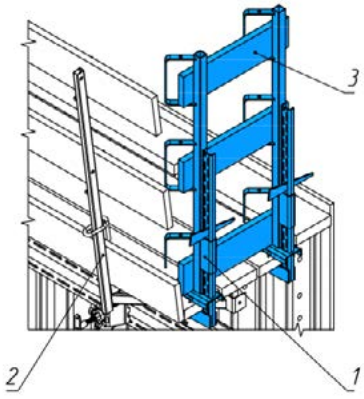
- Deck-boards min. 20x5 cm
- Guard-rail boards min. 20x3 cm
- Deck-boards fix with 3 square bolts M10x120 per bracket

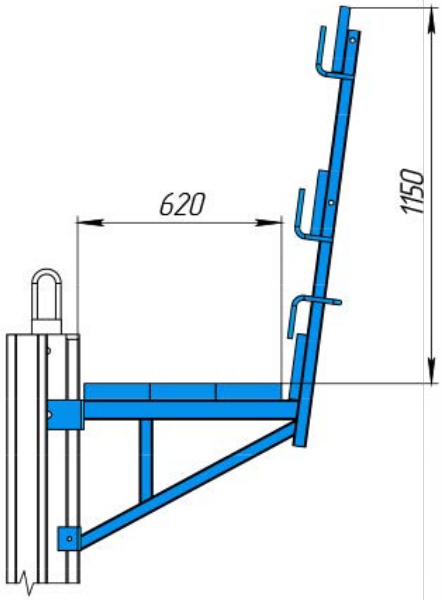
Guide rail clamp

- Attached with integral clamp:
• on the timber beam
• on the floor slab
- Guard-rail boards or scaffold tubes can be used as the safety barrier

Suitable for side guards on exposed platform-ends

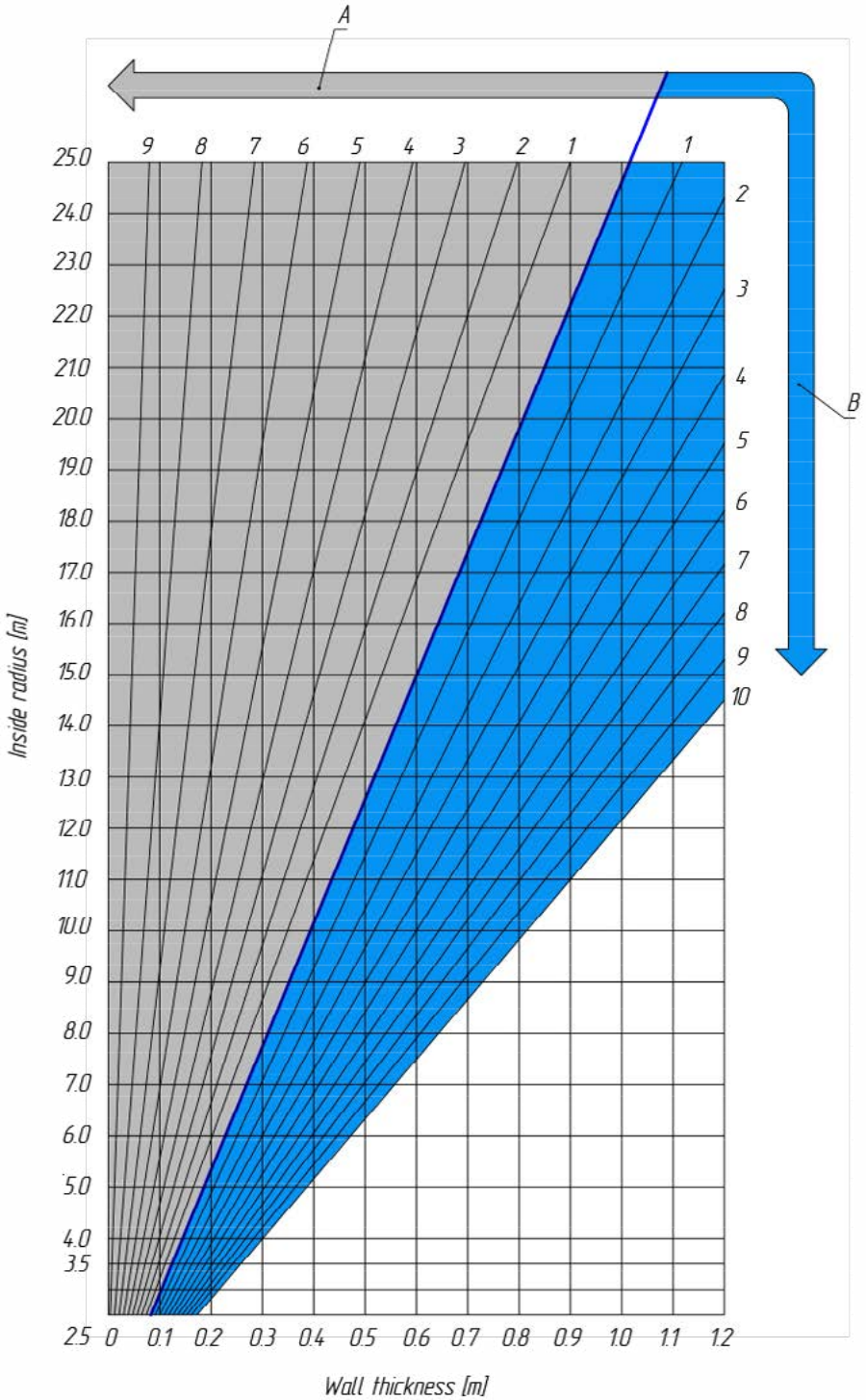
1 – Guide rail clamp
2 – Beam wall bracket
3 – Guard-rail boards





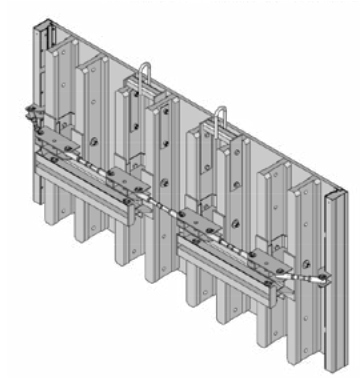
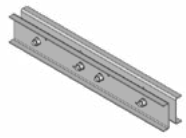
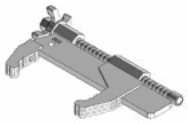
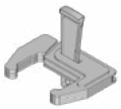
DETERMINING THE REQUIRED WIDTHS OF FITTING-TIMBER

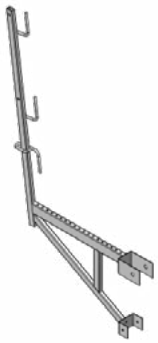
Closure diagram



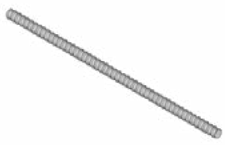
(A) Closure on inside [cm]
(B) Closure on outside [cm]

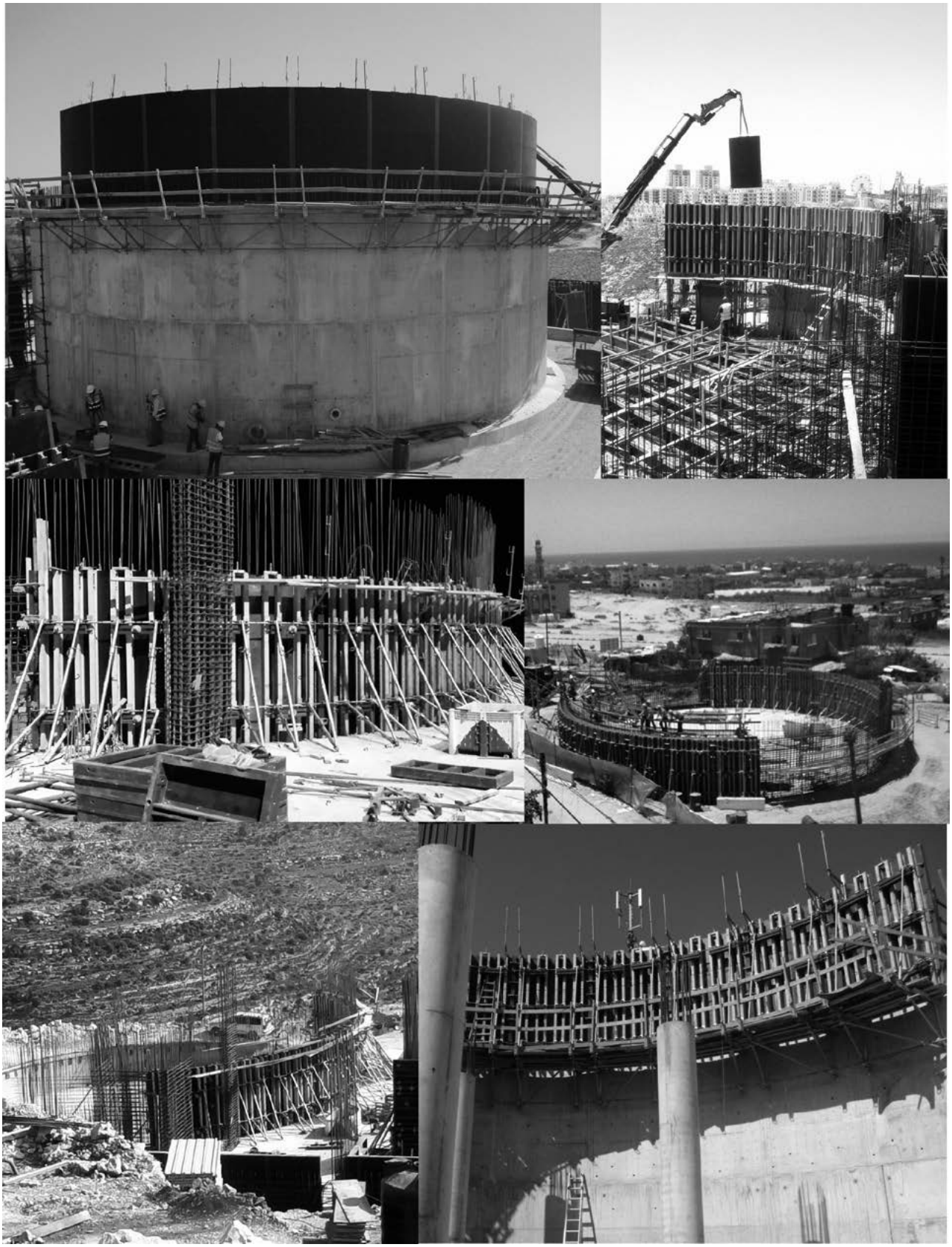
COMPONENT OVERVIEW

Item		[kg]	Article nº
Panel Ringform 	2.50x3.00m 2.40x3.00m 2.50x2.40m 2.40x2.40m 2.50x1.20m 2.40x1.20m	543,90 532,67 483,26 472,08 261,25 257,25	25 100 000 25 102 000 25 104 000 25 106 000 25 108 000 25 110 000
Stacking plate Ringform 		9,41	25 504 100
Adjustable clamp Ringform 	50-100mm 0-50mm	5,00 4,53	25 500 100 25 502 100
Clamp device Varimax 		3,90	11 902 100
Guide plate 	0.90m 1.50m	11,35 18,85	11 912 000 11 914 000

Item	[kg]	Article nº
Stop-end tie Varimax 	1,76	11 906 100
Wall bracket H20 	11,46	23 700 100
Guide rail clamp 	12,40	52 400 100
Supporting strut Ringform 340 	32,92	25 508 100

Item	[kg]	Article nº
Supporting strut Ringform 540 	52,71	25 510 100
Adjustable plumbing strut 		
Strut head Ringform 	1,95	25 506 100
Spindle element without end-hinge 	36,62	11 934 000
Extension strut 3.70 m 	78,75	11 936 000
Extension strut 2.40 m 	54,13	11 938 000
Spindle element with end-hinge 	43,81	11 940 000

Item		[kg]	Article nº
Rod connector 	15	0,50	95 214 100
Superplate 	15	1,22	95 200 100
Plastic tube 22 mm 	2.00m	0,36	99 100 400
Plastic cone 22 mm 		0,005	99 102 400
Tie rod 15.0 mm 	0.50m 0.75m 1.00m 1.25m 1.50m 1.75m 2.00m 2.25m 2.50m 2.75m 3.00m	0,80 1,20 1,60 2,00 2,40 2,80 3,20 3,60 4,00 4,40 4,80	92 050 300 92 075 300 92 100 300 92 125 300 92 150 300 92 175 300 92 200 300 92 225 300 92 250 300 92 275 300 92 300 300



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