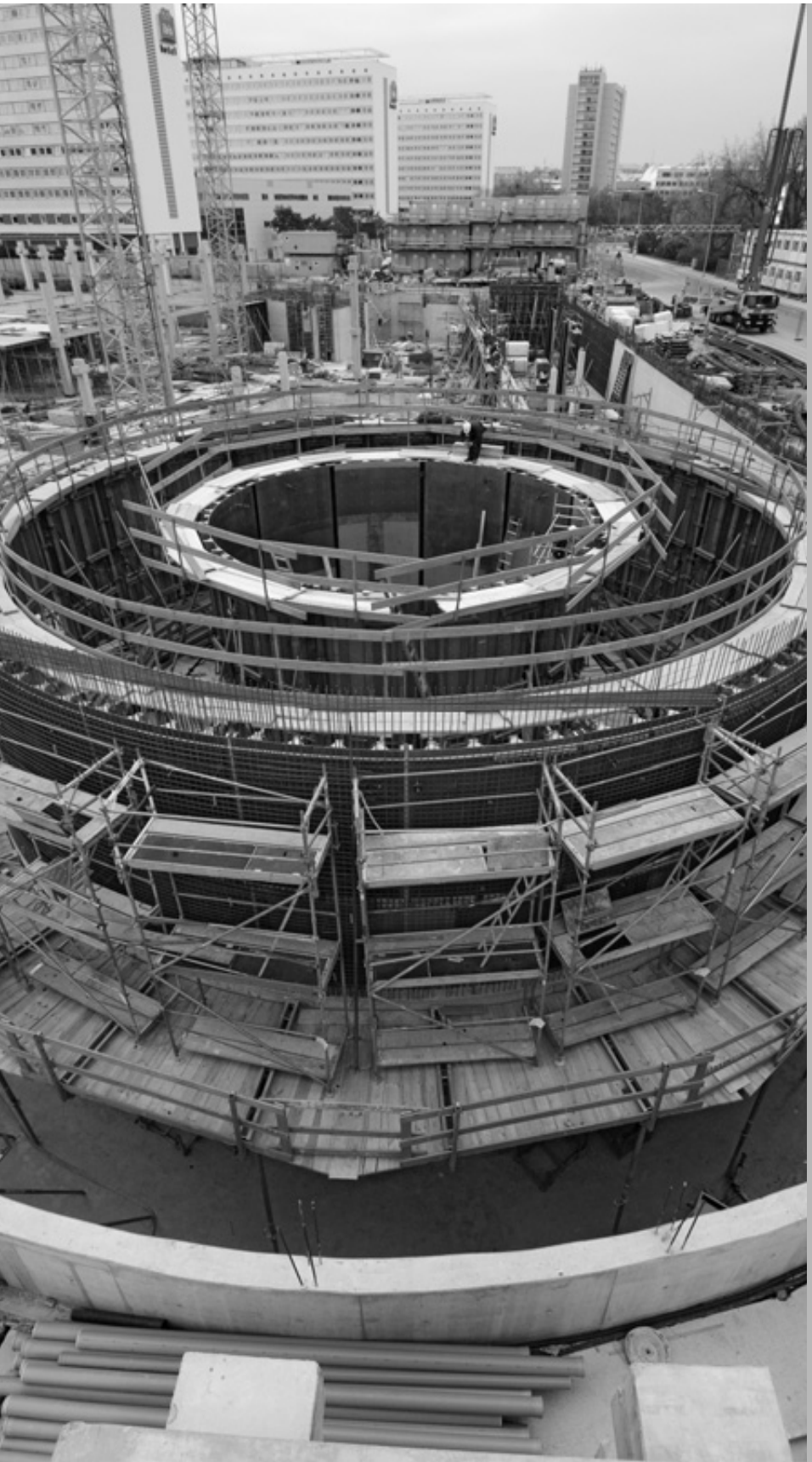
RONDA®

Circular wall formwork

Instructions for assembly and use



October 2009, english

Keep for later use!

HÜNNEBECK

A BRAND COMPANY

1.0 Table of Contents

2.0 Product features

Hünnebeck's RONDA Circular Formwork is a radii-adjustable circular formwork which consists of ready-to-use shuttering elements.
Adjustment of shuttering-radii can be performed on the job-site by means of the integrated turnbuckles. Any desired radius greater than 4.0 metres is possible.
An optimum adaptation to the given structure will be assured through two different widths for the inner elements as well as for the outer ones and also by three element heights (3.0 m, 2.0 m, 1.50 m).
The maximum permissible concrete pressure is 60 kN/m².
The **RONDA shuttering element** is provided with a ductile high-quality plywood sheet (14 mm thick) which is connected to stiffening trapezoid profiles by means of flat-headed screws. The edges of the plywood sheet are protected by the special vertical edge profiles.
All vertical steel members are connected by means of turn-buckles which can take either tension or compression forces. The arrangement of the adjusting turnbuckles between the stiffening profiles results in a very low construction height and assures an optimum storage of the shuttering elements. Fine adjustment of the crane-positioned shuttering elements is made possible through a lever edge at the ends of the stiffened profiles. Crane eyes are integrated in each shuttering element for shifting by crane.

2.1 General Information

These instructions for erection and use provide important information about the installation and application of the **Hünnebeck RONDA Circular Formwork** as well as pre-cautions which are necessary for the safe erection and the reliable use. These instructions are intended for the effective work with the **RONDA Circular Formwork**. Please read the instructions care-fully prior to erection and use of the **RONDA Circular Formwork** and keep it handy as a reference book.

2.2 Safety Instructions

Important information regarding the intended use and safe application of formwork and falsework

The contractor is responsible for drawing up a comprehensive risk assessment and a set of installation instructions. The latter is not usually identical to the assembly instructions.

- **Risk Assessment**
  The contractor is responsible for the compilation, documentation, implementation and revision of a risk assessment for each construction site. His employees are obliged to implement the measures resulting from this in accordance with all legal requirements.
- **Installation Instructions**
  The contractor is responsible for compiling a written set of installation instructions. The assembly instructions forms part of the basis for the compilation of a set of installation instructions.
- **Assembly Instructions**
  Formwork is technical work equipment which is intended for commercial use only. The intended use must take place exclusively through properly trained personnel and appropriately qualified supervising personnel. The assembly instructions are an integral component of the formwork construction. They comprise at least safety guidelines, details on the standard configuration and intended use, as well as the system description.
  The functional instructions (standard configuration) contained in the assembly instructions are to be complied with as stated. Enhancements, deviations or changes represent a potential risk and therefore require separate verification (with the help of a risk assessment) or a set of installation instructions which comply with the relevant laws, standards and safety regulations. The same applies in those cases where formwork and/or falsework components are provided by the contractor.
- **Availability of the Assembly Instructions**
  The contractor has to ensure that the assembly instructions provided by the manufacturer or formwork supplier are available at the place of use. Site personnel are to be informed of this before assembly and use takes place, and that they are available at all times.
- **Representations**
  The representations shown in the assembly instructions are, in part, situations of assembly and not always complete in terms of safety considerations. The safety installations which have possibly not been shown in these representations must nevertheless be available.
- **Storage and Transportation**
  The special requirements of the respective formwork constructions regarding transportation procedures as well as storage must be complied with. By way of example, name the appropriate lifting gear to be used.

Material Check

GSV Güteschutzverband Betonschalungen

Formwork and falsework material deliveries are to be checked on arrival at the construction site/place of destination as well as before each use to ensure that they are in perfect condition and function correctly. Changes to the formwork materials are not permitted.

- **Spare Parts and Repairs**
  Only original components may be used as spare parts. Repairs are to be carried out by the manufacturer or authorized repair facilities only.
- **Use of Other Products**
  Combining formwork components from different manufacturers carries certain risks. They are to be individually verified and can result in the compilation of a separate set of assembly instructions required for the installation of the equipment.
- **Safety Symbols**
  Individual safety symbols are to be complied with.

Examples:

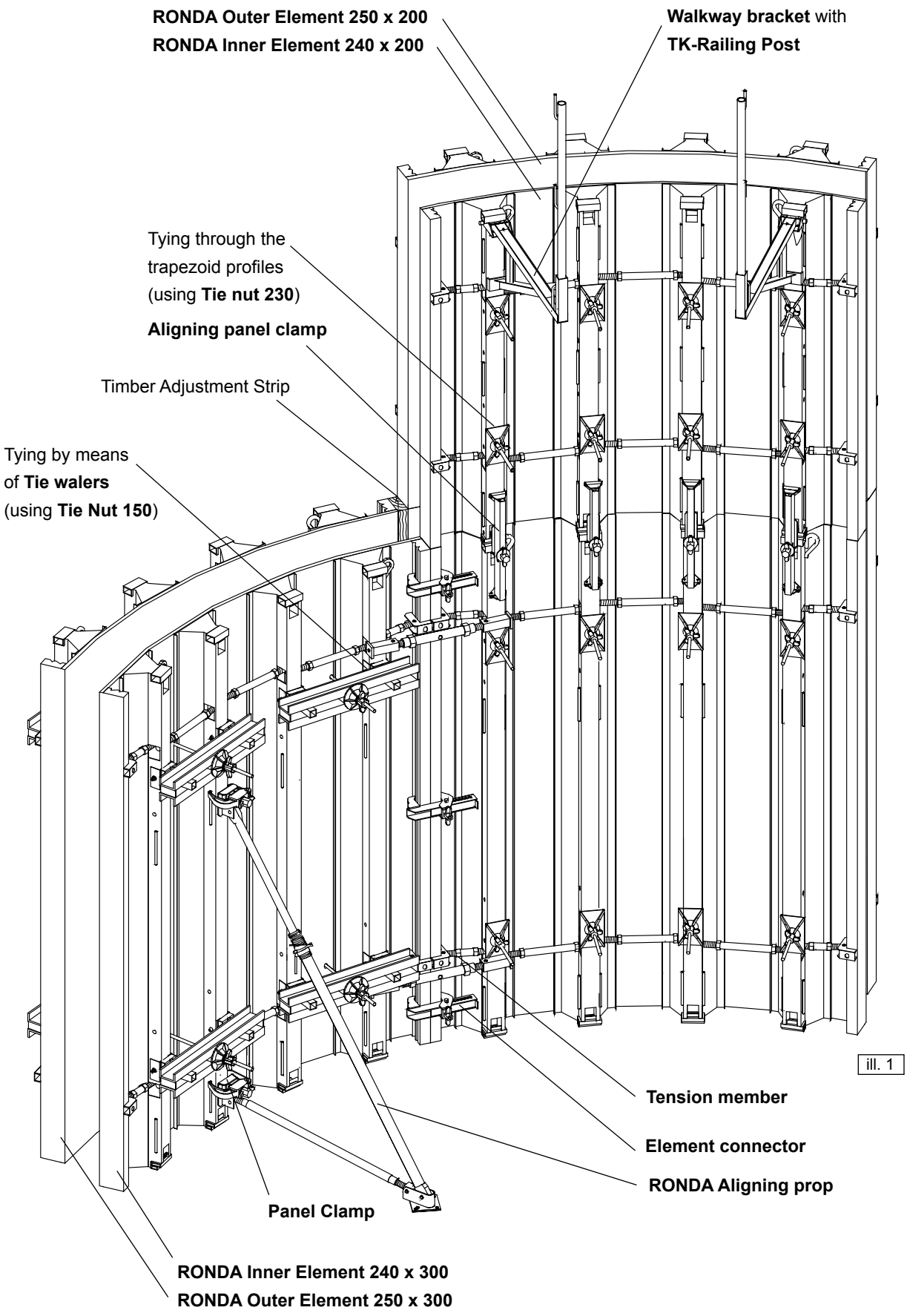
Safety information:
non-compliance can lead to damage to materials or risk to the health of site personnel (also life)

Visual check:
the intended operation is to be carried out through a visual check.

Note:
supplementary information for safe, correct and professional execution of work activities.

- **Miscellaneous**
  Technical improvements and modifications are subject to change without notice.
  For the safety-related application and use of the products, all current country-specific laws, standards as well as other safety regulations are to be complied with without exception. They form a part of the obligations of employers and employees regarding industrial safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction.
  This also includes the basic assembly, dismantling and the transport of the formwork and falsework constructions or their components. The complete construction is to be checked during and after assembly.

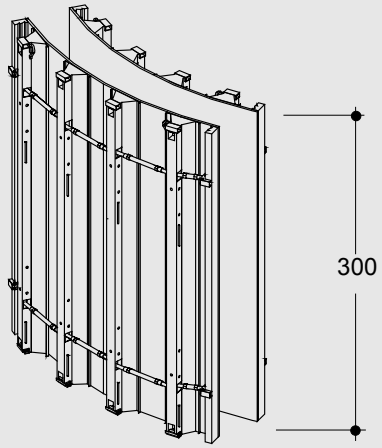
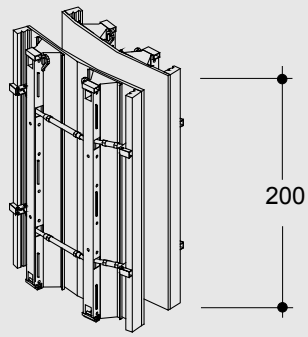
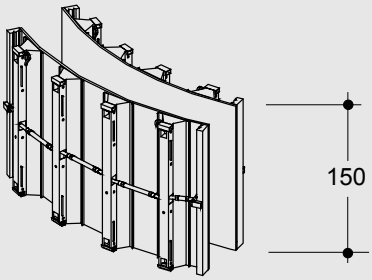
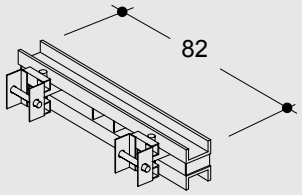
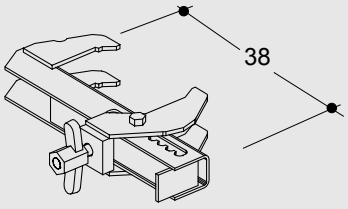
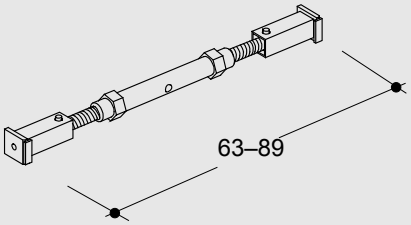
3.0 Overview



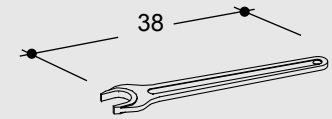
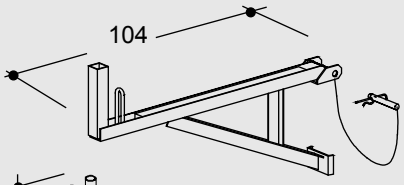
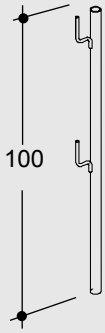
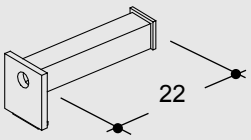
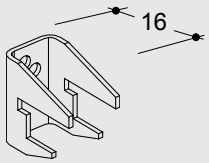
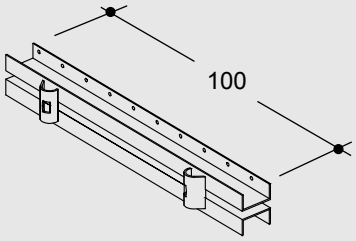
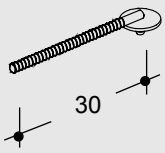
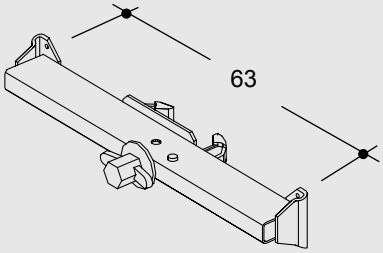
ill. 1

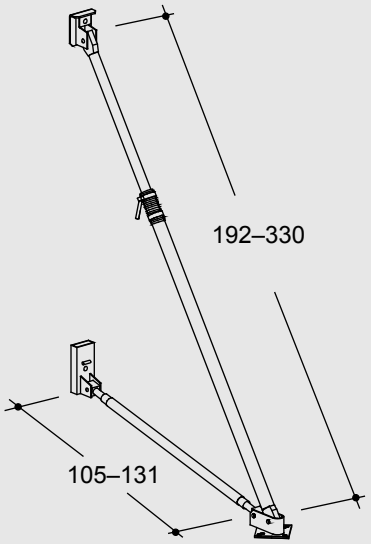
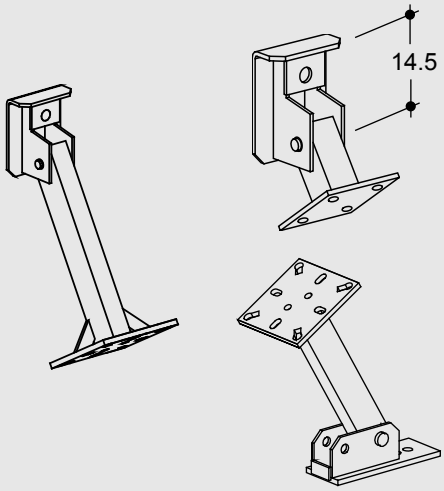
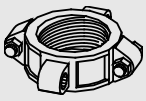
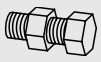
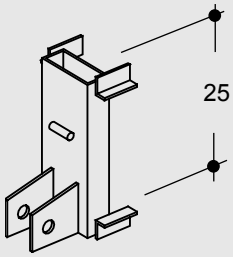
4.0 Components

RONDA®

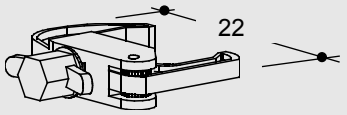
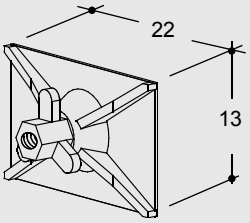
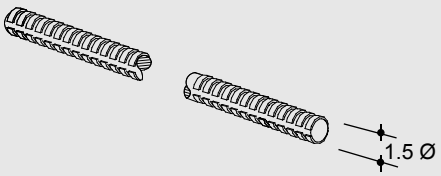
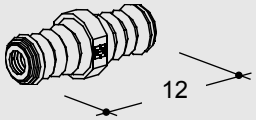
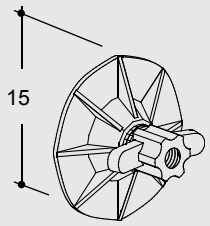
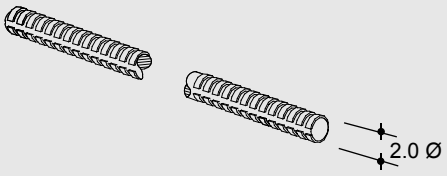
	Description	Art. No.	Weight kg/item
	**RONDA Outer element 250 x 300**	529 600	367.17
	RONDA Outer element 128 x 300	529 610	213.79
	RONDA Inner element 240 x 300	529 621	362.69
	RONDA Inner element 123 x 300	529 632	211.53
	**RONDA Outer Element 250 x 200**	529 643	264.17
	RONDA Outer Element 128 x 200	529 654	153.17
	RONDA Inner Element 240 x 200	529 665	260.59
	RONDA Inner Element 123 x 200	529 676	150.87
	**RONDA Outer Element 250 x 150**	529 687	190.85
	RONDA Outer Element 128 x 150	529 698	111.17
	RONDA Inner Element 240 x 150	529 702	188.61
	RONDA Inner Element 123 x 150	529 713	110.14
	The 14 mm thick plywood facing is supported by hot-dip galvanized stiffening profiles. The required radius has to be adjusted via the integrated turnbuckles (designed for tension and compression loads). Every formwork element is provided with crane eyes for transport by crane. All elements are equipped with a lever edge for fine adjustment on the ground.		
	**Tie waler** Distributes the tie load onto 2 neighbouring trapezoid profiles. Connecting bolts with spring cotters are attached and cannot be lost.	524 949	24.64
	**Element connector** Used for the connection of elements. Can also be applied with timber infill up to 15 cm.	526 000	5.50
	**Tension member** Used for overlapping the panel joint of the inner formwork when exceeding radii of more than 10.0 m. The **Tension member** has to be installed on the trapezoid profiles at the level of the turnbuckles.	548 387	7.15

4.0 Components

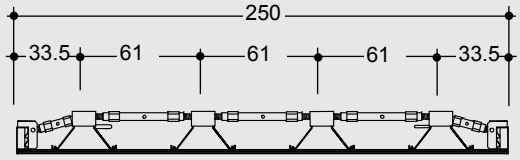
	Description	Art. No.	Weight kg/item
	**Open-jawed spanner (w.a.f. 46)** Facilitates the operation of turnbuckles.	542 460	0.78
	**Walkway bracket** To be attached to the trapezoid profile and secured by means of the integrated bolt.	524 950	13.30
	**TK-Railing Post** Inserted into the **Walkway bracket**, it serves as support for railing boards (provided by site).	193 220	4.50
	**Head tie pocket** Serves as guiding device when placing a tie rod directly above the shuttering element. (Permissible load F= 12 kN). (DW 15)	526 547	1.40
	**Edge tie fastener MR** Used for module-independent tying in the region of the stopend (tie rods DW15). Perm. load = 10.0 kN	566 667	2.40
	**Multi purpose waler** Used for stopends. Fastened to the elements by means of each 2 Waler spanners and tension Nuts.	450 764	13.10
	**Waler spanner** Required for fastening the **Multi purpose waler**. (To be provided 2 times per waler).	452 053	0.76
	**Tension nut** To be provided 1 time per **Waler spanner**. Perm. load = 40.0 kN	197 332	0.65
	**Aligning panel clamp** Connects height-extended shuttering elements. Arrangement at each stiffening trapezoid profile to be required.	448 000	5.50

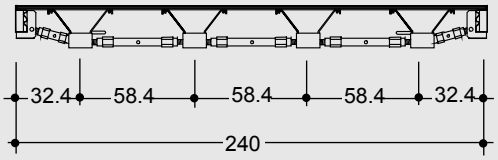
	Description	Art. No.	Weight kg/item
	**RONDA Aligning prop** Used for aligning and supporting the formwork. Applicable to shuttering heights of up to 4.5 m at a horizontal spacing of maximum 2.5 metres. The **RONDA Aligning prop** has to be connected to the backside of the trapezoid profiles by means of 2 **Panel clamps**. Perm load: 8 kN at maximum extension.	453 070	25.60
	RONDA Prop adapter	453 080	3.20
	RONDA Prop adapter new	601 622	6.76
	**Strut base joint** Standard tubular steel props can be applied to from inclined props by using these parts. Each steel prop connection requires 4 **bolts M12x30 with Nut** at the top plate and base plate. **Counter nuts** have to be provided additionally to make the props tensile-proof. **RONDA Prop adapter** is attached to the **RONDA- elements** by means of a **Panel clamp**. **To be provided additionally:** Steel prop (required size)	566 369	7.70
	Counter nut A / 260 DB / 300 DB (for EUROPLUS *new* 20-250, 20-300, 30-150 EUROPLUS props 260 DB and 300 DB)	107 107	0.90
	**Counter nut AS / 350 DB / 410 DB** (for EUROPLUS *new* 20-350, 20-400, EUROPLUS *new* 30-250, 30-300, 30-350, EUROPLUS props 350 DB)	107 118	1.00
	Counter nut 400 EC / 550 DC (for EUROPLUS *new* 20-550, 30-400, (for EUROPLUS props 400 EC and 550 DC)	562 051	1,39
	**Counter nut 350 EC / 450 DB** (for EUROPLUS props 350 EC and 450 DB)	587 675	1.50
	Bolt + nut M12 x 30 4.6 (8 pcs. required)	005 210	0.06
	**RONDA - BKS Connector** Used for making the connection of BKS-Props or similar heavy props possible when bracing greater shuttering heights. To be provided for the connection of the prop (in addition): 2 **Panel clamps**	533 138	3.08
	1 hexagon **bolt M20 x 80 with nut 4.6**	489 801	0.40

4.0 Components

	Description	Art. No.	Weight kg/item
	**Panel clamp** For the connection of all aligning props to the **RONDA formwork**.	448 010	3.01
	**Tie nut 230** Has to be used when tying directly through the trapezoid profiles because of its large supporting area.	048 344	2.40
	**Tie rod 100 (DW 15)** **Tie rod 130 (DW 15)** Permissible load acc. to DIN 18216, Loading Class 90-DIN (not weldable). **Safety information:** Do not weld or heat tie rods because of danger of unheralded failure!	024 387 020 481	1.44 1.87
	**Water stop 15** Used for watertight concrete (D+W 15). Lost material.	164 400	0.55
	**100 Plugs 24-27K** For sealing the tie holes in the shuttering skin after use. 100 pcs./ packet.	581 483	0.40
	**Tie nut 150** To be required when using **Tie walers** because of the higher bearing loads due to the double distance of the tie rods.	531 481	1.51
	**Tie rod 100 / 20** **Tie rod 130 / 20** Permissible load acc. to DIN 18216, Loading Class 150-DIN (not weldable). **Safety information:** Do not weld or heat tie rods because of danger of unheralded failure!	531 600 531 610	2.56 3.33

Outer element 250

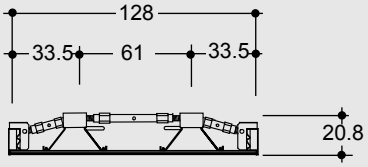


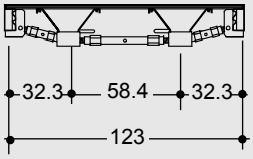


Inner element 240

ill. 2

Outer element 128

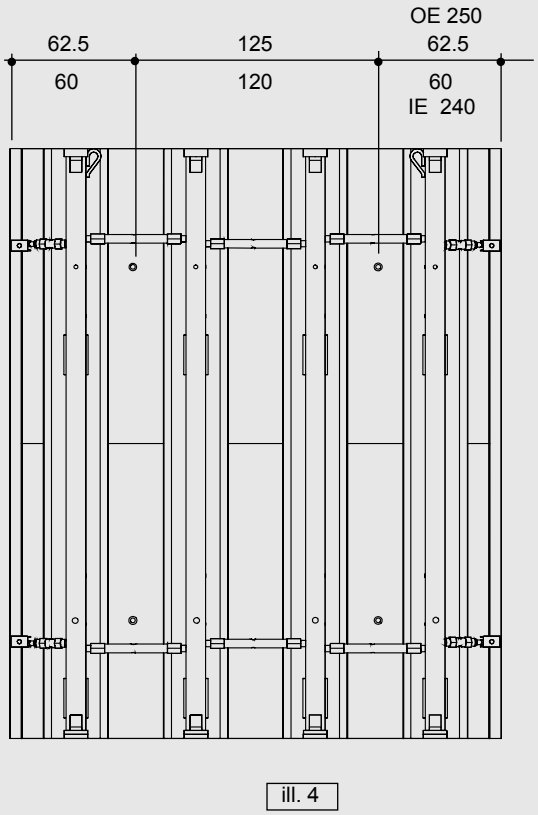




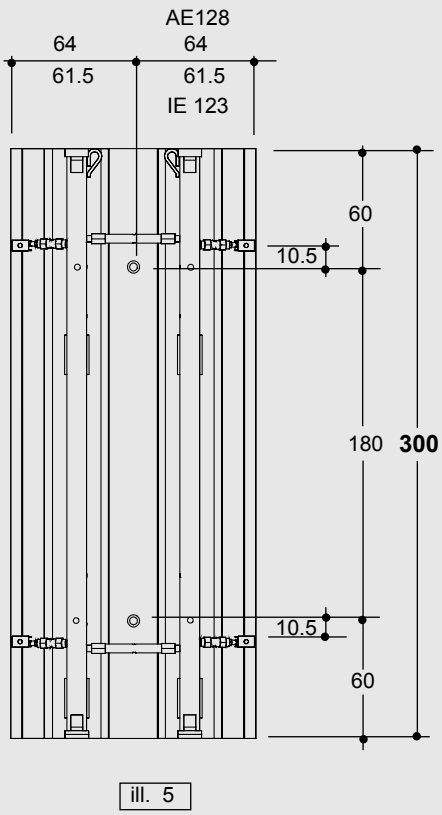
Inner element 123

ill.3

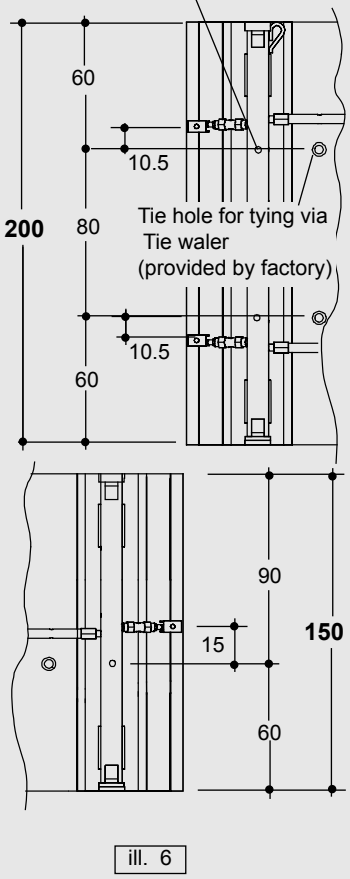
Drill-hole only in the trapezoid profile (for tying purposes, the shuttering skin has to be drilled additionally).



ill. 4



ill. 5



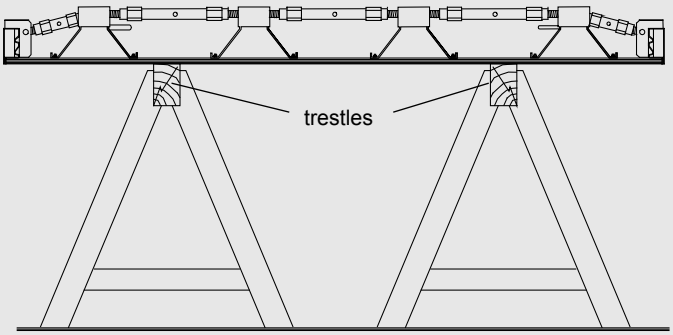
ill. 6

6.0 Adjustment of radii

Preparations for work

All **RONDA elements** are delivered to the job-site as straight elements. These elements can be placed onto two assembling trestles by crane for the adjustment of radii.
The assembling trestles must be stable and strong enough to bear the loads from the elements.
The supporting main bearers of the trestles should be arranged parallel with the trapezoid profiles of the shuttering elements (as shown right).

ill. 7-1



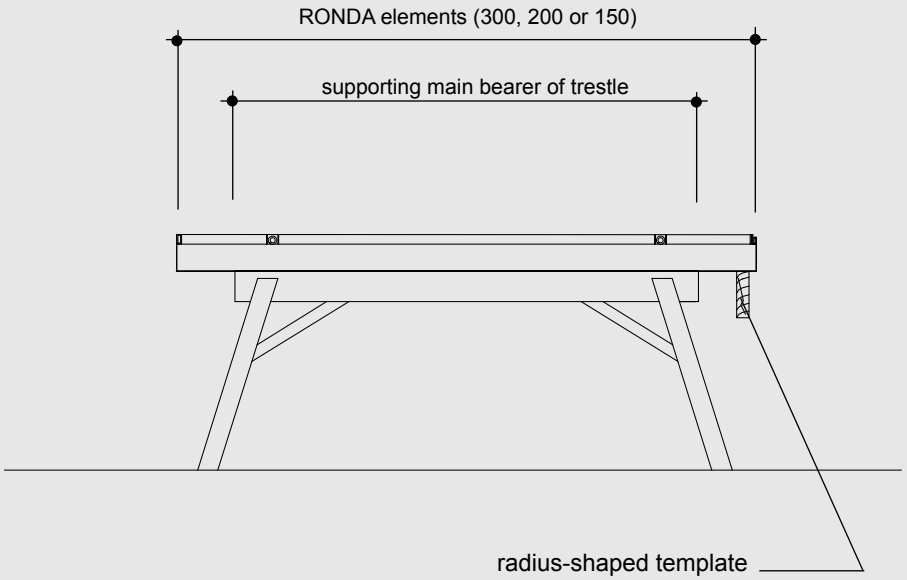
The main bearers of the trestles must be shorter than the height of the **RONDA element** to be adjusted.
That means it will be possible to check the adjustment procedure constantly by means of radius-shaped templates.

The adjustment of radii should always be carried out by 2 persons who will then be able to operate the turnbuckles in both rows at the same time. There are 2 possibilities of adjusting the turnbuckles:

1. Using the single-headed spanner (w.a.f.46)
2. Using a round bar or a short tie rod (18 mm dia.)

Exactly fabricated radius-shaped templates (longer than 2.5 metres, made from plywood) have to be provided by site for checking the precise adjustment of elements.
The inner and outer elements require different templates.

ill. 7-2

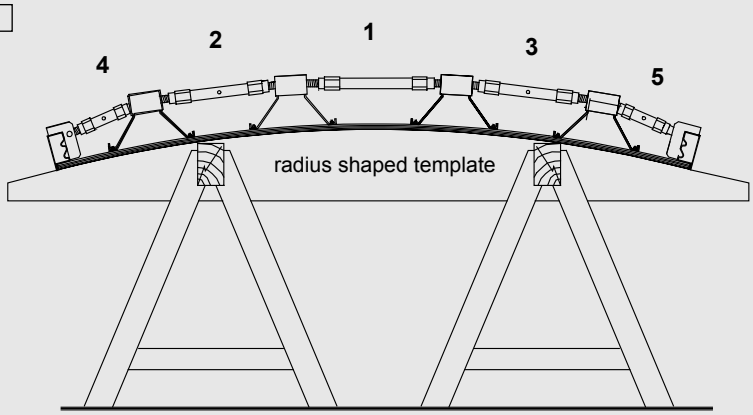


Adjusting procedure

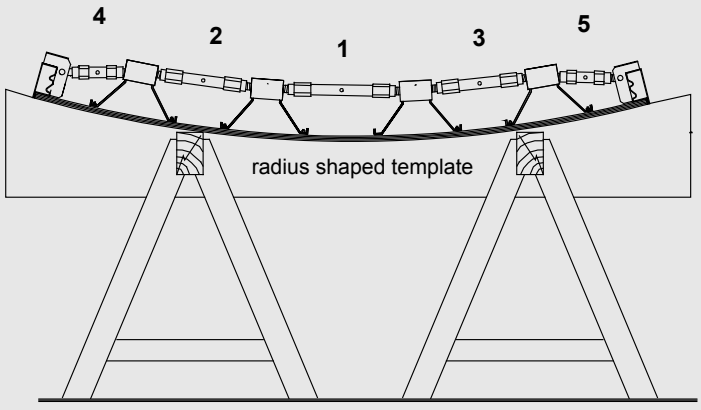
At first, all turnbuckles have to be screwed up to tight fitting without clearance.
Afterwards, the curvature has to be adjusted step by step.
The turnbuckles should be operated accordingly to the numbered working steps given in the illustrations 7-3 and 7-4.
At every working step the intermediate turnbuckles should be turned by half rotations and the two outer turnbuckles only by quarter-turns. Both rows of turnbuckles must be screwed simultaneously.

This working procedure has to be repeated until the curvature has the correct shape of the template.
Between the different steps, the actual curve should always be controlled. (Checking on the plywood side).
The adjusted ready-to-use **RONDA-element** will then be lifted from the trestles by crane and shifted to the place of use or another place for intermediate storage.
Every **RONDA-element** is equipped with 2 crane eyes for this procedure.

ill. 7-3



ill. 7-4



Adjustment of upright elements

Generally, all **RONDA elements** can also be adjusted to the relevant radii in standing (upright) position. The adjusting procedure is the same as described before.
But, in this case for safety reasons, it is very important to brace the standing elements by inclined props or other types of struts to avoid tilting at working procedure.

7.0 Possible radii

Minimum radius
min. R = 2.75 m

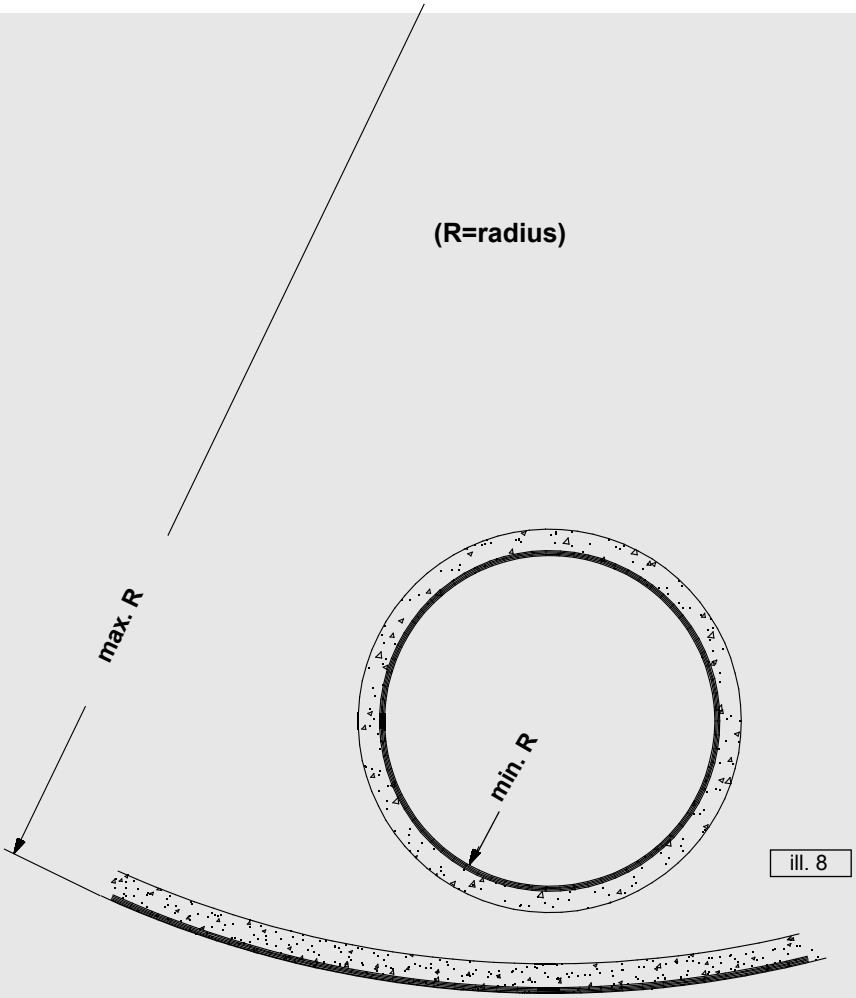
When using **RONDA elements** with plywood **14 mm thick** at a max. concrete pressure of **40 kN/m².**

Minimum radius
min. R = 3.00 m

When using **RONDA elements** with plywood **18 mm thick** at a max. concrete pressure of **40 kN/m².**

Minimum radius
min. R = 4.00 m

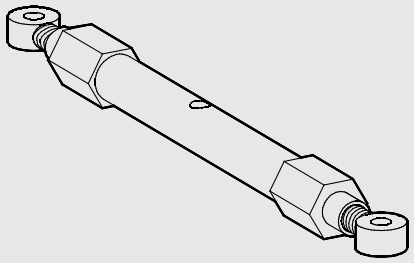
When using **RONDA elements** with plywood **14 mm thick** at a max. concrete pressure of **60 kN/m².**



ill. 8

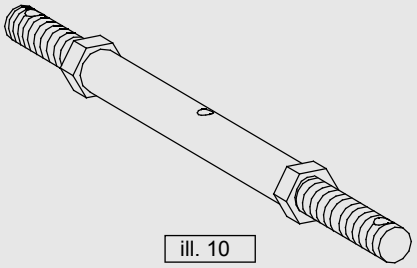
maximum radius
max R = 35.0 m*

*= when using **RONDA elements** as of production year 4/1994.
They can be identified by the execution of the turnbuckles as depicted in ill. 21a.



ill. 9

The **maximum radius** is limited to **25.0 m** when using **RONDA elements** produced before this date.
Type of turnbuckles as shown in ill. 21b.



ill. 10

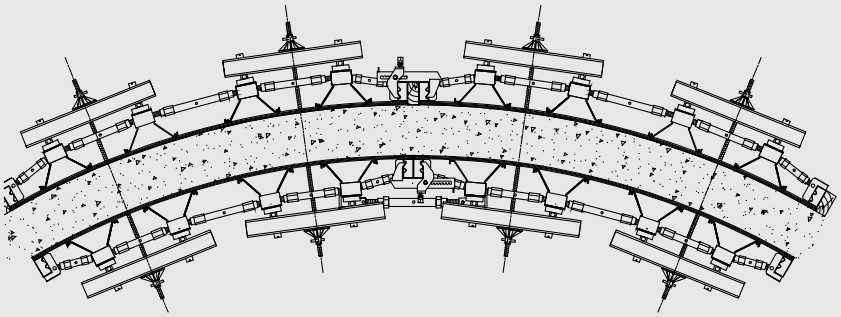
Important note!
Regular cleaning and greasing of the turnbuckles facilitates the adjusting procedure later on!

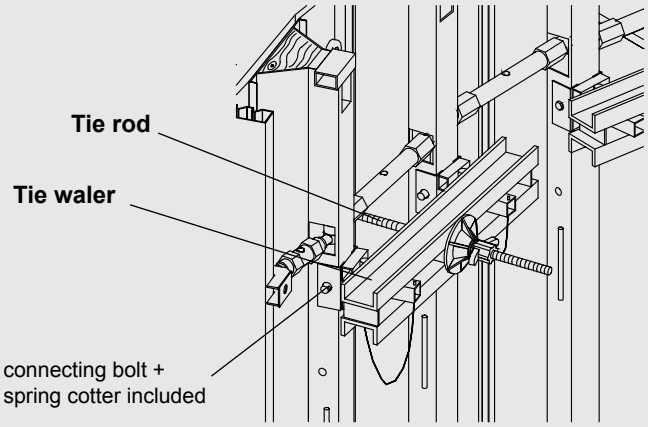
8.0 Tying

It is possible to choose between 2 tying variants when using the **RONDA Circular Formwork**. You can either use the **Tie walers** or the holes in the trapezoid profiles.
By using **Tie walers** with **RONDA elements**, you will be able to save every second wall tie.
That is why the **RONDA elements** are already equipped with these relevant tie holes for economical reasons.
But, in this case, the application of 20 mm thick tie rods is absolutely necessary when assuming a concrete pressure of more than 50 kN/m² because of the large influence area per wall tie.

Tying with Tie walers

ill. 12

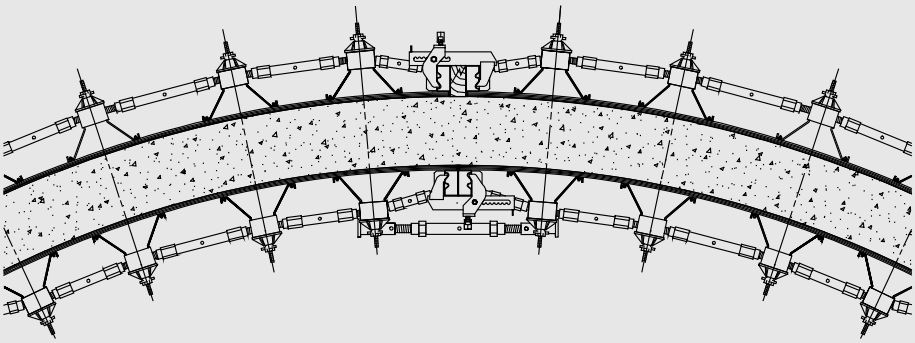




ill 11

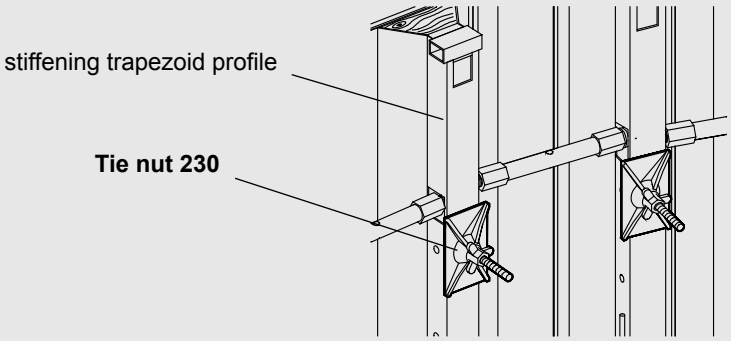
Tying without Tie walers

Using the second this tying variant the wall ties are directly positioned in the middle of the trapezoid profiles. That means tying of each trapezoid profile inside and outside is necessary. All trapezoid profiles are already provided with tie holes, but the plywood sheet has to be drilled additionally, on site (tie holes 24 mm in dia.).



ill 12

When tying is executed directly through the trapezoid profiles, the large **Tie nut 230** has to be used.



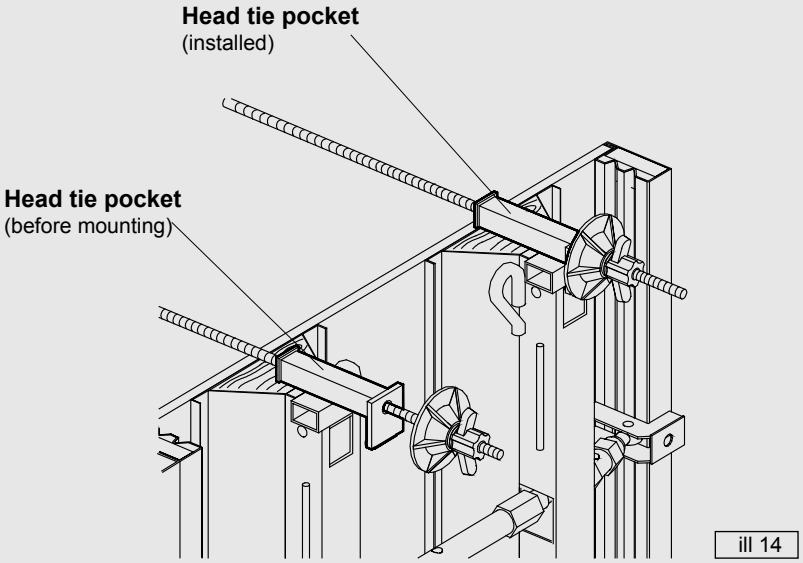
ill 13

8.0 Tying

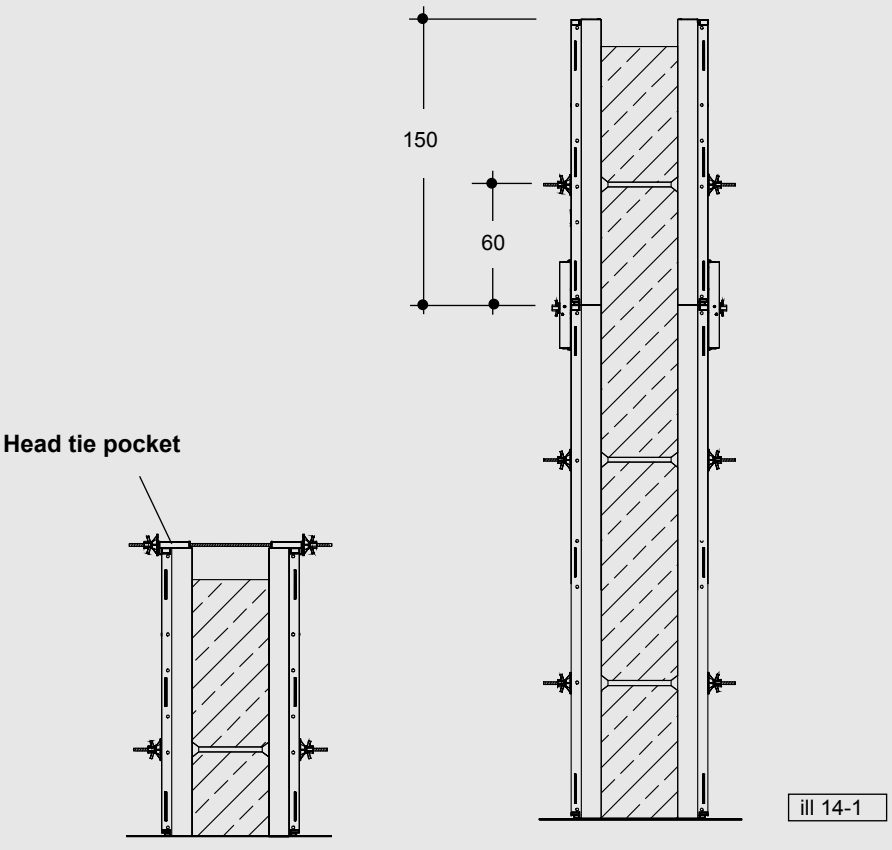
The positions of the tie rods are already defined by the factory-made holes in the plywood or in the trapezoid profiles. But it is possible to displace the top tying spot by means of the **Head tie pocket***.

*= The 1.50 m high elements have always to be applied with the **Head tie pocket** at top (ill 14).
In case of height extension through 1.50 m high **RONDA elements**, the upper tie rod (**Head tie-bearing**) can be left out with this element (ill 14-1).

Use of Head tie pockets



ill 14



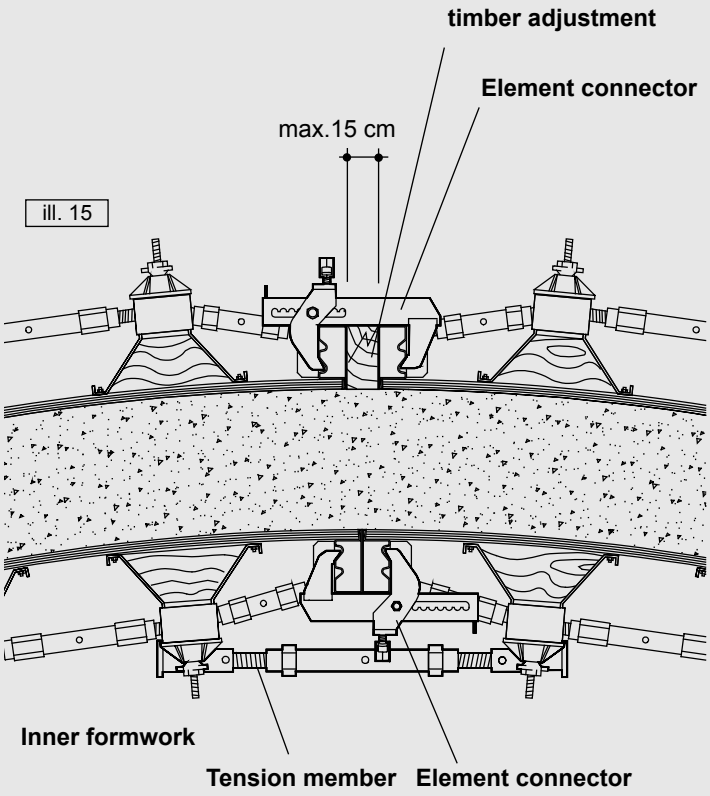
ill 14-1

9.0 Connection of elements

The **RONDA elements** are connected at the vertical joint by means of Element connectors. These clamps can be positioned at any desired height on the edge profiles.
As a rule, one **Element connector** has to be arranged per linear metre of vertical joint (e. g. 5 clamps at a formwork height of 4.5 m).
The **Element connector** connects elements without or with timber adjustment strip.

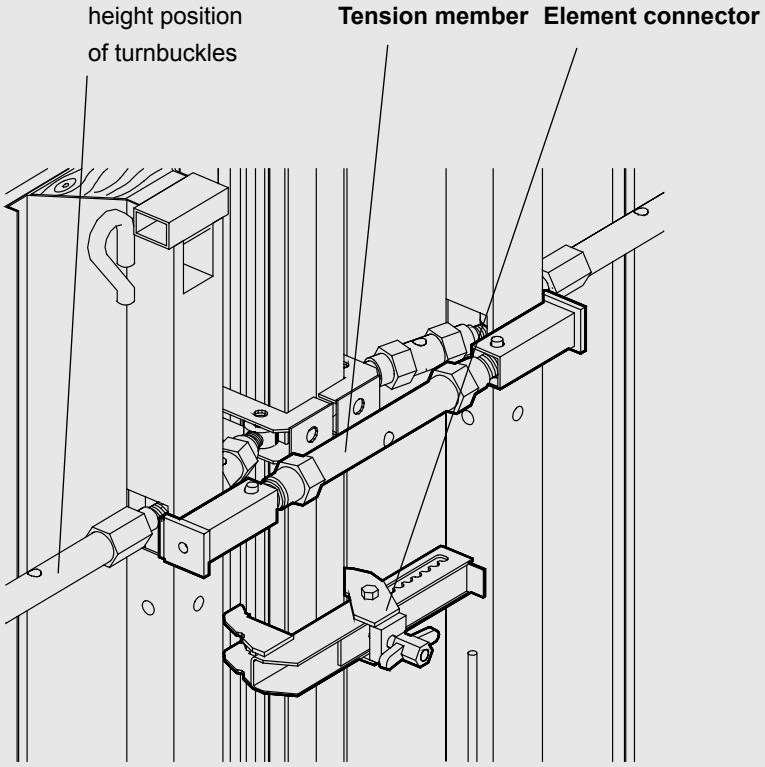
The adjustment range of the Element connector allows timber adjustments of up to 15 cm.
For tightening or releasing the clamp, it is recommended to use the **MANTO-Ratchet** (Art.no. 408780), size w.a.f.36.
By using this ratchet, all **Tie nuts** can be operated comfortably, too. And, in addition to that, the use of the ratchet goes gently on the material in contrast with operations by means of a hammer.

Outer formwork with timber adjustment



ill. 15

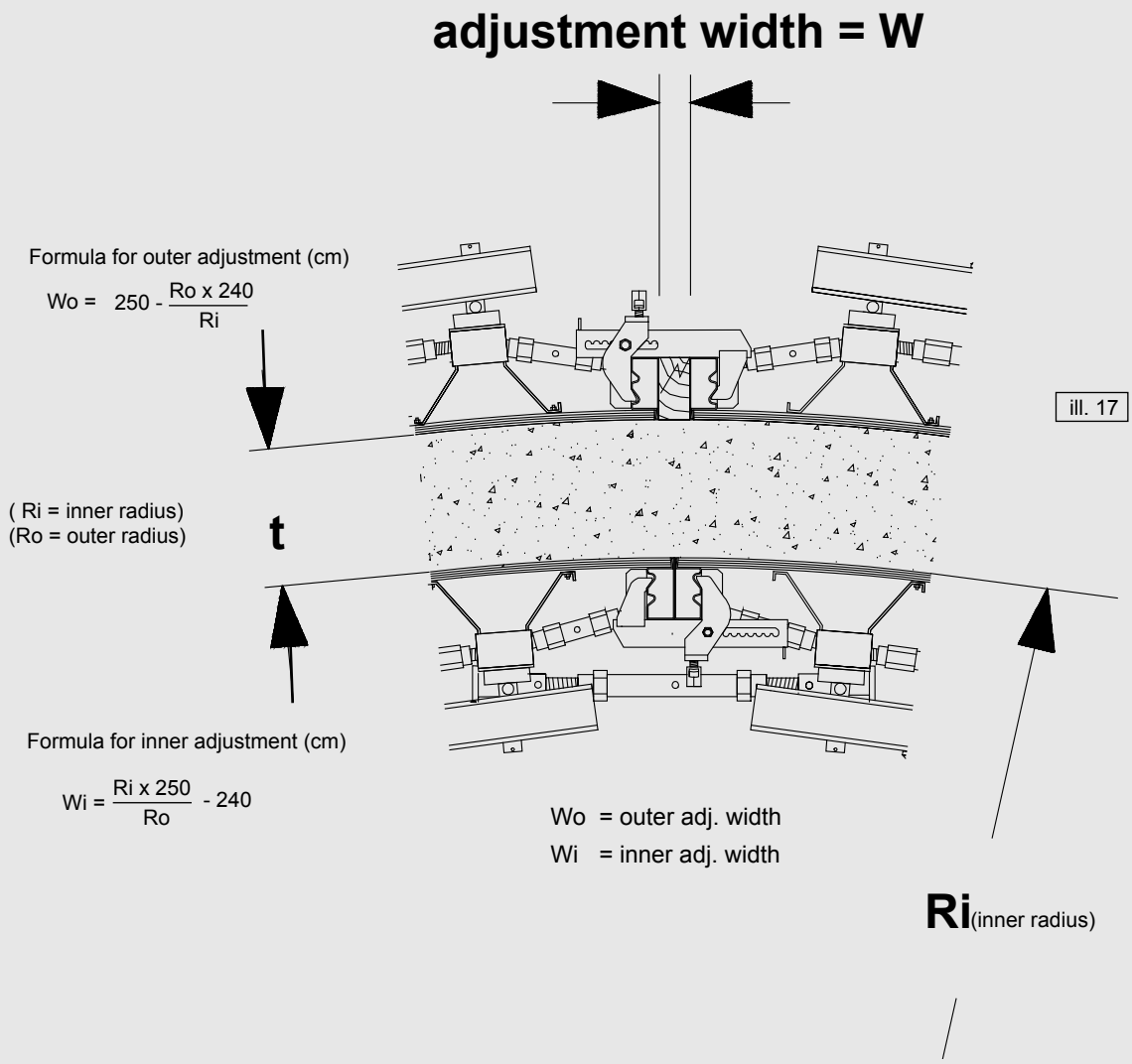
The element joints of the inner formwork have to be provided with **Tension members** at the levels of the turnbuckles in case of radii greater than 10 metres. The crooked ends of this component are inserted into the openings of the trapezoid profiles. Then, the threaded spindle has to be turned as far as to get a tight seat and that the **Tension member** will not have any clearance.
A strong tightening of the Tension member is not necessary.



ill. 16

10.0 Timber adjustment

The exact length adjustment of the curved **RONDA elements** to existing ground plans of circular structures is made possible by using small timber adjustments in the joint of two neighbouring panels. The width of the timber adjustment depends on the radius and wall thickness. The adaptation to the exact measure may be necessary either within the inner formwork or outer formwork.
Timber adjustments of the outer formwork are marked in the table by „minus-sign“ (e.g. -6.0 cm). Adjustment widths for radii and wall thicknesses which are not contained in the table have to be calculated either acc. to the given formulas or must be found by interpolation.



ill. 17

Widths of timber adjustments (cm)

The adjustment widths shown in the table may not be taken for shuttering a complete circle.

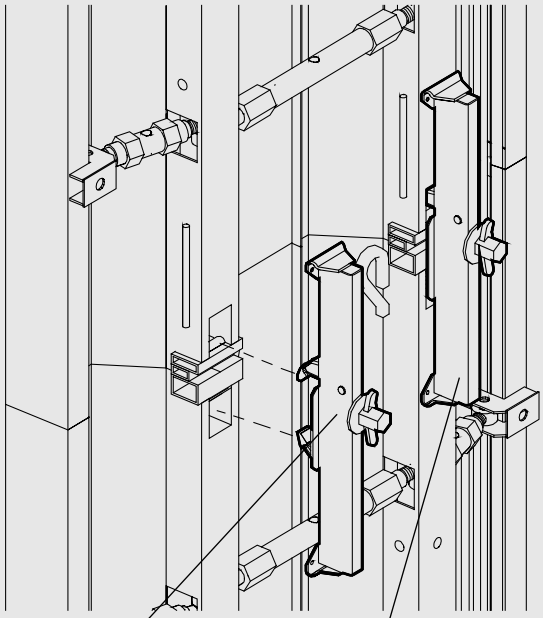
Ri = inner radius (cm)	**t =** thickness of concrete wall (cm)													
	10	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**
275	1.2	-3.1	-7.5	-11.8										
400	3.9	1.0	-2.0	-5.0	-8.0	-11.0	-14.0							
500	5.1	2.7	0.4	-2.0	-4.4	-6.8	-9.2	-11.6	-14.0					
600	5.9	3.9	1.9	—	-2.0	-4.0	-6.0	-8.0	-10.0	-12.0	-14.0			
700	6.5	4.8	3.1	1.4	-0.3	-2.0	-3.7	-5.4	-7.1	-8.9	-10.6	-12.3	-14.0	
800	6.9	5.4	3.9	2.4	1.0	-0.5	-2.0	-3.5	-5.0	-6.5	-8.0	-9.5	-11.0	-12.5
900	7.3	5.9	4.6	3.2	1.9	0.6	-0.7	-2.0	-3.3	-4.7	-6.0	-7.3	-8.7	-10.0
1000	7.5	6.3	5.1	3.9	2.7	1.5	0.4	-0.8	-2.0	-3.2	-4.4	-5.6	-6.8	-8.0
1100	7.7	6.6	5.5	4.4	3.4	2.3	1.2	0.2	-0.9	-2.0	-3.1	-4.2	-5.3	-6.4
1200	7.9	6.9	5.9	4.9	3.9	2.9	1.9	1.0	—	-1.0	-2.0	-3.0	-4.0	-5.0
1300	8.1	7.1	6.2	5.3	4.4	3.4	2.5	1.6	0.7	-0.2	-1.1	-2.0	-2.9	-3.8
1400	8.2	7.3	6.5	5.6	4.8	3.9	3.1	2.2	1.4	0.5	-0.3	-1.1	-2.0	-2.9
1500	8.3	7.5	6.7	5.9	5.1	4.3	3.5	2.7	1.9	1.2	0.4	-0.4	-1.2	-2.0
1600	8.4	7.7	6.9	6.2	5.4	4.6	3.9	3.2	2.4	1.7	1.0	0.2	-0,.5	-1.3
1700	8.5	7.8	7.1	6.4	5.7	5.0	4.3	3.6	2.9	2.2	1.5	0.8	0.1	-0.6
1800	8.6	7.9	7.3	6.6	5.9	5.2	4.6	3.9	3.2	2.6	1.9	1.3	0.6	—
1900	8.7	8.0	7.4	6.8	6.1	5.5	4.8	4.2	3.6	3.0	2.3	1.7	1.1	0.5
2000	8.8	8.1	7.5	6.9	6.3	5.7	5.1	4.5	3.9	3.3	2.7	2.1	1.5	1.0
2100	8.8	8.2	7.6	7.1	6.5	5.9	5.3	4.8	4.2	3.6	3.1	2.5	1.9	1.4
2200	8.9	8.3	7.7	7.2	6.6	6.1	5.5	5.0	4.4	3.9	3.4	2.8	2.3	1.8
2300	8.9	8.4	7.8	7.3	6.8	6.3	5.7	5.2	4.7	4.2	3.6	3.1	2.6	2.1
2400	9.0	8.4	7.9	7.4	6.9	6.4	5.9	5.4	4.9	4.4	3.9	3.4	2.9	2.4
2500	9.0	8.5	8.0	7.5	7.0	6.5	6.1	5.6	5.1	4.6	4.1	3.7	3.2	2.7
2600	9.0	8.6	8.1	7.6	7.1	6.7	6.2	5.7	5.3	4.8	4.4	3.9	3.4	3.0
2700	9.1	8.6	8.2	7.7	7.3	6.8	6.4	5.9	5.5	5.0	4.6	4.1	3.7	3.2
2800	9.1	8.7	8.2	7.8	7.3	6.9	6.5	6.0	5.6	5.2	4.8	4.3	3.9	3.5
2900	9.1	8.7	8.3	7.9	7.4	7.0	6.6	6.2	5.8	5.3	4.9	4.5	4.1	3.7
3000	9.2	8.8	8.3	7.9	7.5	7.1	6.7	6.3	5.9	5.5	5.1	4.7	4.3	3.9
3100	9.2	8.8	8.4	8.0	7.6	7.2	6.8	6.4	6.0	5.6	5.3	4.9	4.5	4.1
3200	9.2	8.8	8.4	8.1	7.7	7.3	6.9	6.5	6.2	5.8	5.4	5.0	4.6	4.3
3300	9.2	8.9	8.5	8.1	7.7	7.4	7.0	6.6	6.3	5.9	5.5	5.2	4.8	4.4
3400	9.3	8.9	8.5	8.2	7.8	7.5	7.1	6.7	6.4	6.0	5.7	5.3	5.0	4.6
3500	9.3	8.9	8.6	8.2	7.9	7.5	7.2	6.8	6.5	6.1	5.8	5.4	5.1	4.8

11.0 Height extension and adjustment

Three different element heights (1.5 m, 2.0 m, 3.0 m) of the **RONDA Circular Formwork** are available for the adaptation to the required height of the concrete structure.
The **RONDA elements** can be combined in steps of 50 cm. Only elements with the same widths can be placed on top of one another.

The one-piece **MANTO Aligning panel clamp** is used for the connection of elements at the horizontal element joints.

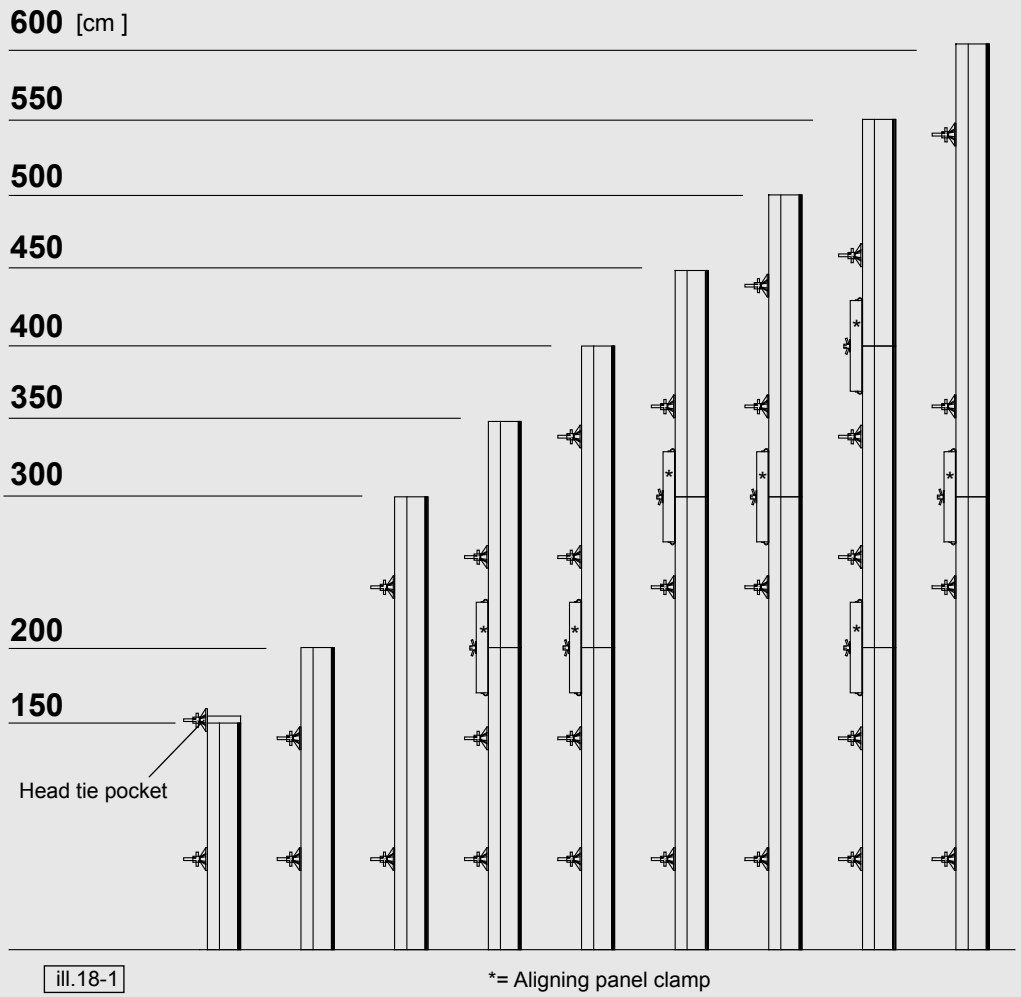
Generally, one **MANTO Aligning panel clamp** has to be positioned on every trapezoid profile as shown in the illustrations.
The claws of the **MANTO Aligning panel clamp** mesh with the reinforced ends of the trapezoid profiles. There are special openings in the backside of each profile for this connection. The extended **RONDA elements** will get a perfect alignment and be tension-proof by tightening the wing Nut with the help of a **MANTO-Ratchet** or a hammer.



ill. 18

Aligning panel clamp before attaching

Aligning panel clamp already in final position

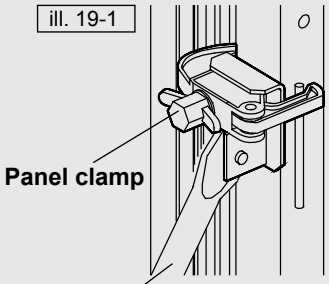


ill.18-1

12.0 Aligning props

The **RONDA Circular Formwork** can be braced and aligned by means of **MANTO Aligning props** up to heights of approx. 4.0 m.
The **MANTO Aligning props** can either be fastened each with 2 **Panel clamps** to the trapezoid profiles or at the element joint (without timber infill).

ill. 19-1

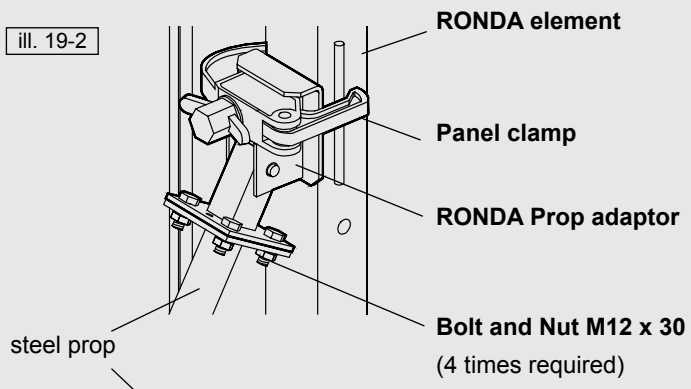


ill. 19

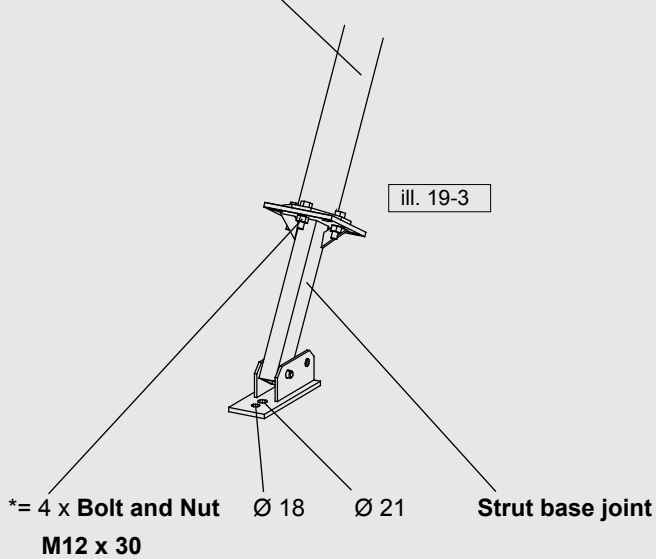
Bracing and aligning of higher **RONDA elements** (H > 4.0 m) should be executed by means of standard tubular steel props. The steel props have to be provided with an additional Counter nut which allows the props to take tension and compression loads.
The **RONDA Prop adaptor** and the **Panel clamp** are required for the connection of each steel prop to the **RONDA formwork**. At the base of the steel props the **Strut base joint** is needed for fixing the braced elements. 4 **Bolts M12 x 30** are required for each head plate and base plate of the steel props, additionally.

The permissible tension load of the steel props (with counter Nut) is **15 kN**. Compression loads acc. to load table.

ill. 19-2

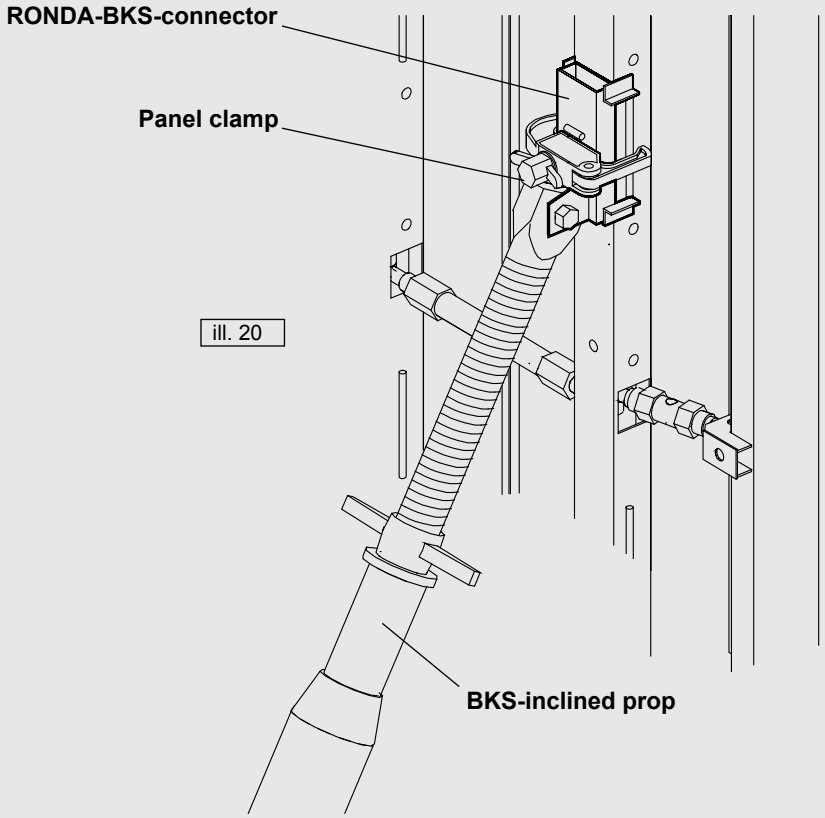


ill. 19-3



12.0 Aligning props

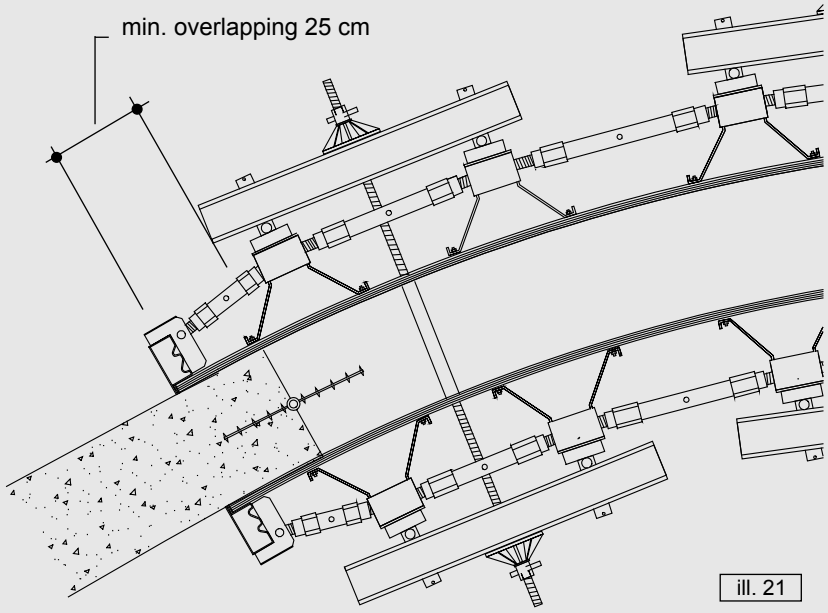
BKS-props can be combined up to maximum lengths of approx. 12.0 m.
Further information can be taken from the erection instructions of the **MANTO formwork**.



ill. 20

13.0 Wall connection

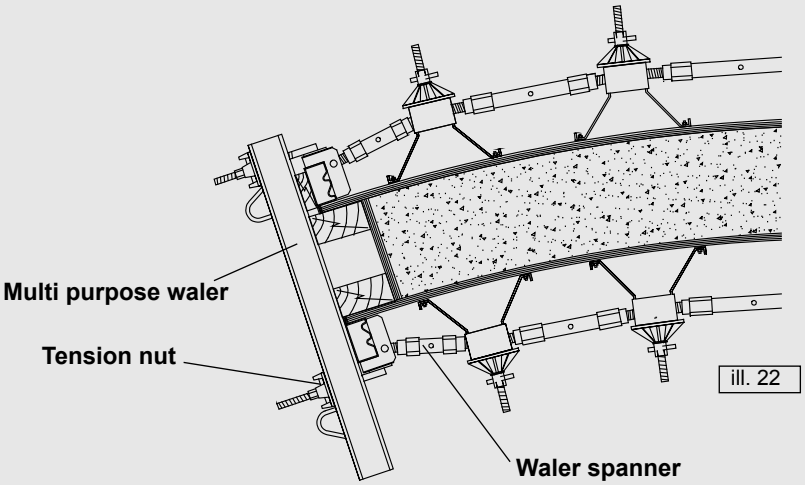
When connecting **RONDA elements** to an existing wall, the elements must overlap by at least 25 cm.



ill. 21

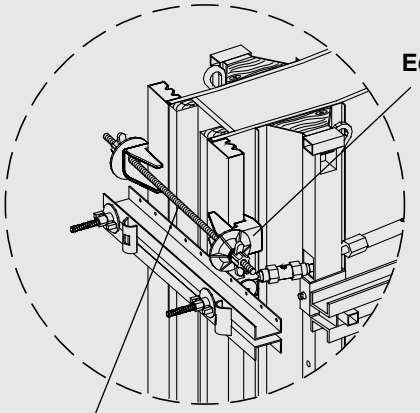
14.0 Stopend

Loads resulting from the stopend design will be transferred via cross walers (e. g. **Multi purpose waler**) and **Waler spanners** into the **RONDA elements**. The waler is connected by means of 2 **Waler spanners** and 2 **Tension nuts** and has to be installed at the level of the turnbuckles.

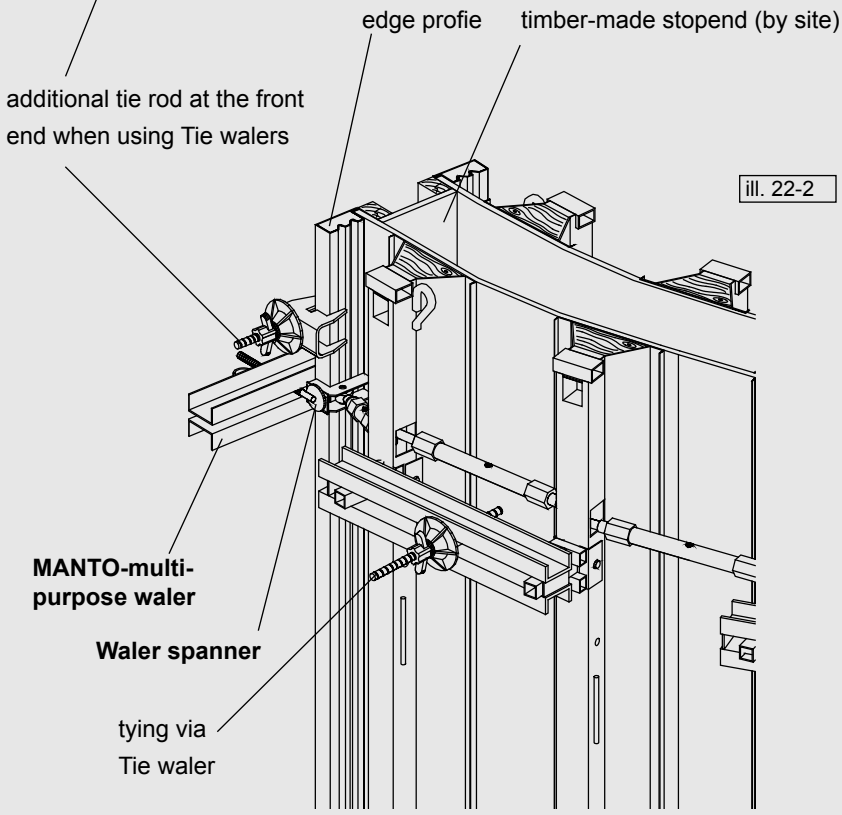


ill. 22

When applying **RONDA-elements** according to the method „tying with **Tie waler**“, then additional tie rods will have to be arranged at the front end of formwork.
These additional tie rods have to be installed by means of **Edge tie bearings** at the heights of the stopend walers.



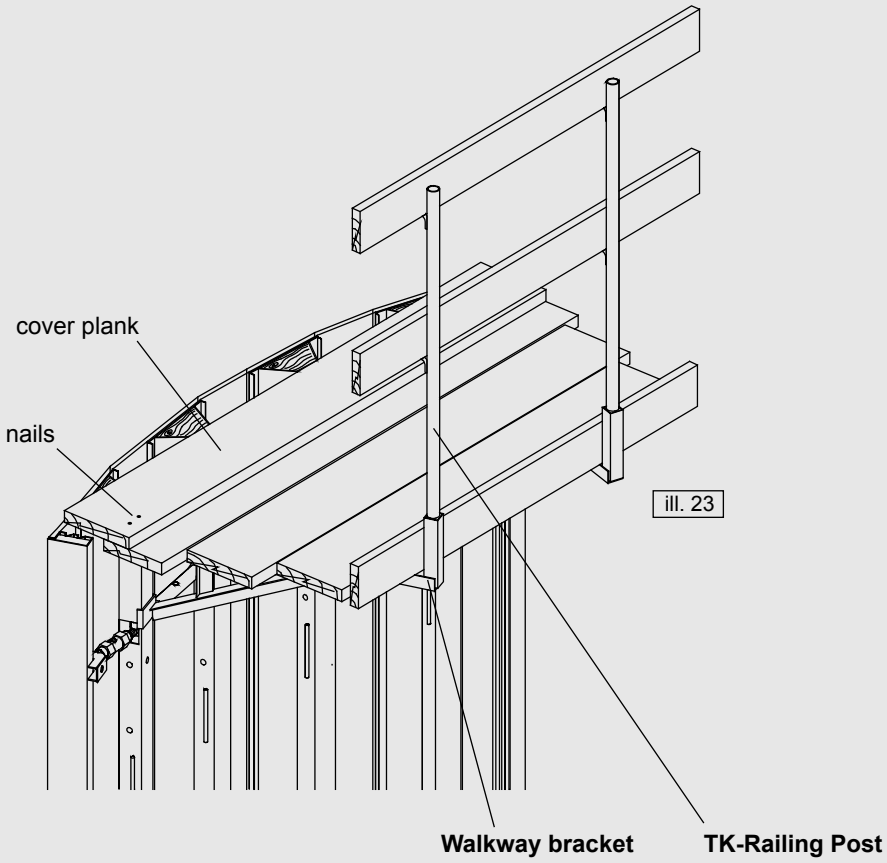
ill. 22-1



ill. 22-2

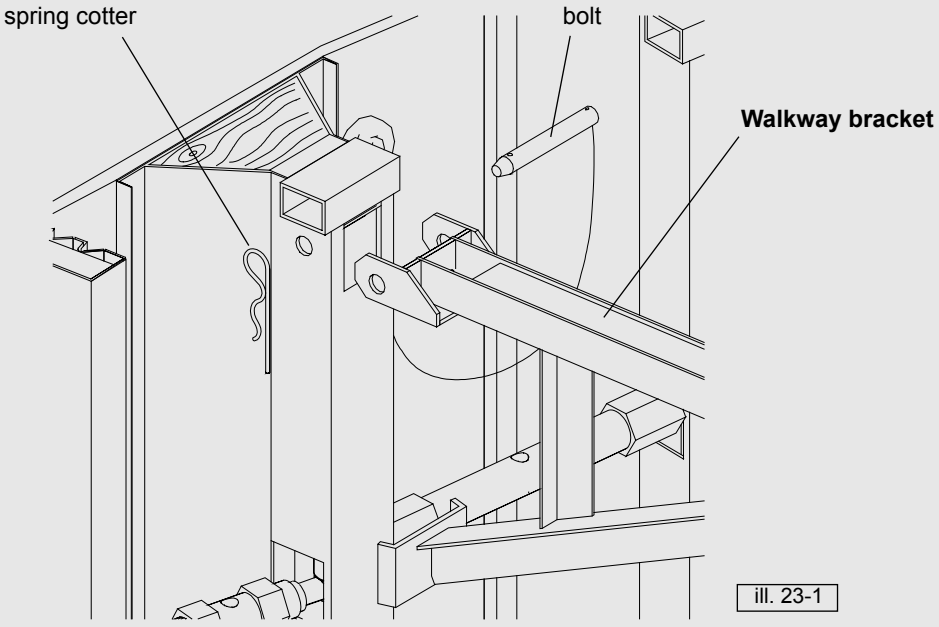
15.0 Walkway brackets

Normally, the walkway platform is arranged on the **RONDA elements** inside.
The connection of the **Walkway bracket** is achieved by using the upper connection hole of the trapezoid profile and by fastening the suspension claw of the bracket with the integrated bolt and spring cotter.



ill. 23

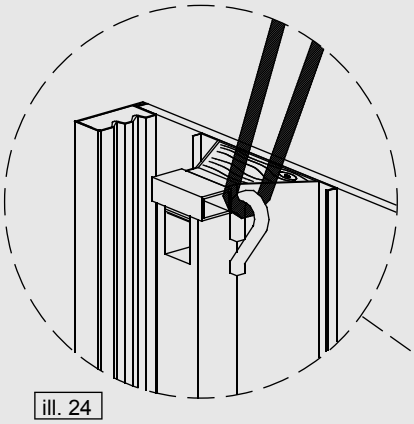
The maximum distance between the **Walkway brackets** should not be more than **2.0 m**. After inserting the **TK-Railing Posts**, the **Walkway brackets** must immediately be covered with planks and provided with the three-part railing.
Planks and railing components have to be supplied by site and must be executed in accordance with local regulations and safety rules. The gap between the inner elements of the **RONDA element** and the platform planking has to be covered by means of a cover plank.
The cover plank should be secured by nails. It protects the **RONDA element** against dirt and slurry from concrete.
The permissible load of the walkway platform is **1.50 kN/m².**



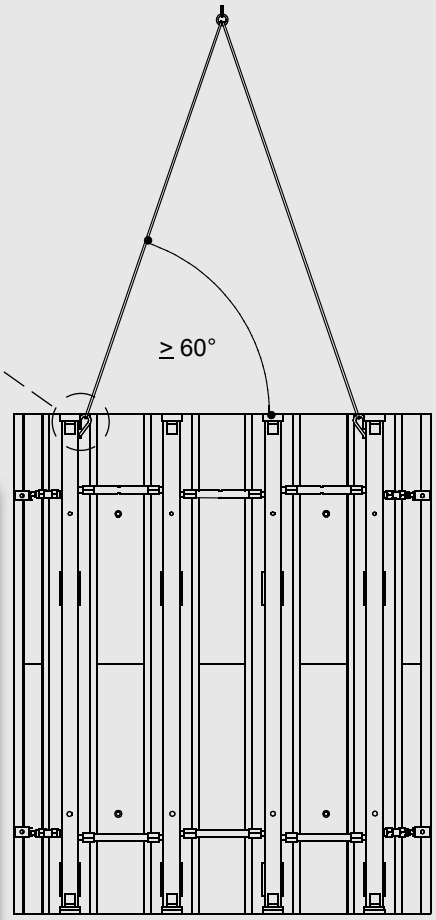
ill. 23-1

16.0 Shifting of elements by crane

All **RONDA elements** are equipped with 2 crane eye-bolts which are welded to the steel profiles.
The eye-bolts allow attachment of crane ropes for lifting and shifting of individual elements or combined units.
The maximum weight of one combined unit for shifting is limited to 1,000 kgs (= 10.0 kN). This permissible load is equal to approx. 20 m² of **RONDA formwork**.
The lengths of the crane ropes have to be chosen so, that no high horizontal forces will be caused (angle of ropes > 60°).



ill. 24



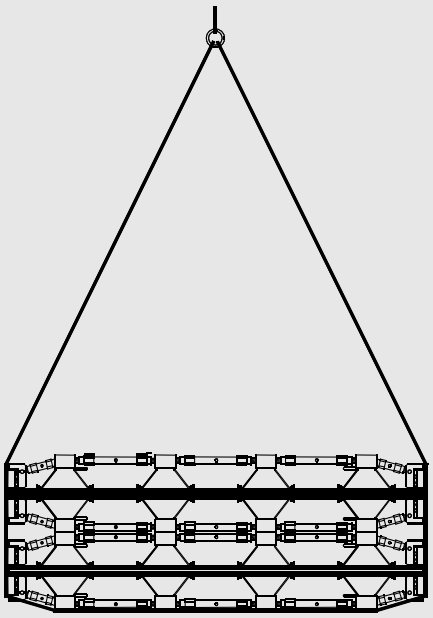
ill. 25

Important note!
As shown in the illustration, crane slings have to be attached to **each of** the integrated **suspension eyes** of the element.
Fixed in this way, the crane slings will then be picked up by the crane hook.

It is **not allowed** to attach the crane hook or crane tackle directly to the suspension eyes of the formwork!

When transporting elements of the **RONDA formwork** in bundles (e. g. 2,3, or 4 individual elements), then the crane ropes will have to be attached in rectangular position regarding the stiffening trapezoid profiles of the elements.

Max. 4 **RONDA elements** should be arranged in one bundle as transportation unit.
The elements have to be put together as straight pieces (i. e. without curvature) as shown in the picture.
Plywood face to plywood face must be the arrangement for transportation when being delivered to the job-site and the other way round.



ill. 26

Inspection:
The **RONDA elements** have to be put together as straight pieces (i. e. without curvature) as shown in the picture.
Plywood face to plywood face must be the arrangement for transportation when being delivered to the job-site and the other way round.

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