

RSTEEL[®]



RT non-standard STEEL PARTS

Technical manual

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1. DESCRIPTION OF THE SYSTEM

RT non-standard steel parts are steel plates or angle steels equipped with anchor bars. They are installed to concrete elements before casting and are used in attachment of concrete elements.

Table 1. RT non-standard steel parts

Steel part	Main use
RT15, RT16	Element support
RT25, RT26	Element support
RT36, RT37	Angled fastening
RT39E	Edge attachment
RT43	Edge attachment
RT45	Edge attachment
RT46	Edge attachment



2. MATERIALS AND ORDERING CODES

Table 2. RT steel parts

Part	Material	Standard
Plate	S235JR+AR	EN 10025
Plate	S355J2+N	EN 10025
Angle plate	S235J2+N	EN 10025
Ribbed steel bar	B500B	EN 10080 (SFS 1300)

Table 3. Stainless RTR steel parts

Part	Material	Standard
Plate	1.4301	EN 10088
Angle plate	1.4301	EN 10088
Ribbed steel bar	B500B	EN 10080 (SFS 1300)
Ribbed steel bar	B600XB	SFS 1259

Stainless steel parts RTR are manufactured with B500B bars. With ordering code RTRr steel part is completely stainless and the anchor bars are B600XB steel.

Table 4. Acid resistant RTH steel parts

Part	Material	Standard
Plate	1.4401	EN 10088
Angle plate	1.4401	EN 10088
Ribbed steel bar	B500B	EN 10080 (SFS 1300)

3. MANUFACTURING AND TOLERANCES

3.1. Manufacturing method

Steel plates:	Thermal or mechanical cutting
Steel rebars:	Mechanical cutting
Welding:	MAG welding, manual or robotic
Welding class:	B (EN ISO 5817)
Execution class:	EXC2 (EN 1090-2) [more demanding classes according to a separate guideline]

3.2. Manufacturing tolerances

Plate side lengths:	± 2 mm if $L \leq 120$ mm ± 4 mm if $120 \text{ mm} < L \leq 2000$ mm
Plate straightness:	L/150
Total height:	± 10 mm
Rebar location:	± 5 mm
Rebar spacing:	± 5 mm
Rebar inclination:	$\pm 5^\circ$

3.3. Surface treatment

Protective painting shall be applied to the visible surfaces of the steel parts. The steel parts are delivered with a minimum 40 μm shop priming. Upon request the steel parts are delivered with a 60 μm epoxy painting or hot dip galvanized according to galvanizing standard. Stainless and acid-proof steel parts are delivered without protective painting.

3.4. Quality control and manufacturing markings

Manufacturing and quality control of the RT non-standard steel parts is done according to EN 1090-2.

RT non-standard steel parts are marked with at least the manufacturer, type and identifier, manufacturing date of the steel part, FI and BY (Concrete Association of Finland) logo.

4. RESISTANCES

4.1. Design concept

The resistances of RT non-standard steel parts are calculated according to limit state dimensioning method according to EN1992-1-1, EN1993-1-1 and EN1993-1-8. Resistances are calculated for concrete C25/30.

The resistances have been calculated with respect to static loads in ultimate limit state. For dynamic and fatigue loads the resistances need to be separately checked on a case-by-case basis.

4.2. Dimensions and design resistances

4.2.1. RT15

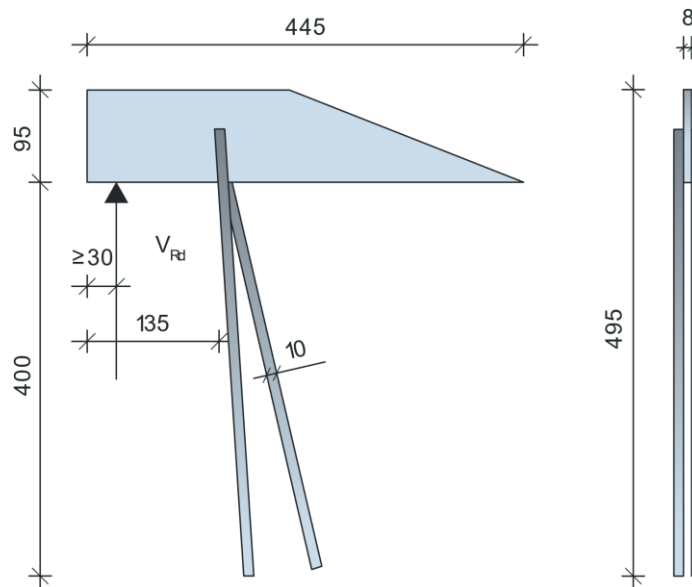


Figure 1. RT15 dimensions

Table 5. RT15 resistance values

Steel part	V_{Rd} , [kN]
RT15	37.1
RTR15, RTRr15, RTH15	37.1

4.2.2. RT16

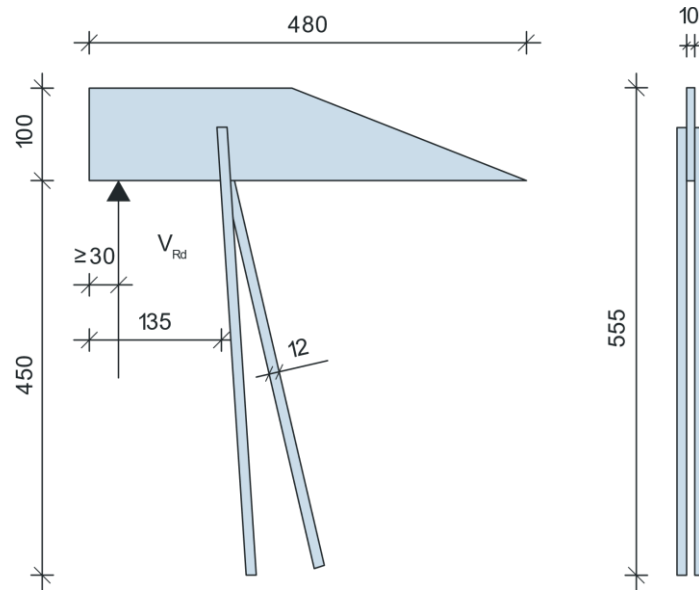


Figure 2. RT16 dimensions

Table 6. RT16 resistance values

Steel part	V_{Rd} , [kN]
RTR16	64.5
RTR16, RTRr16, RTH16	64.5

4.2.3. RT25

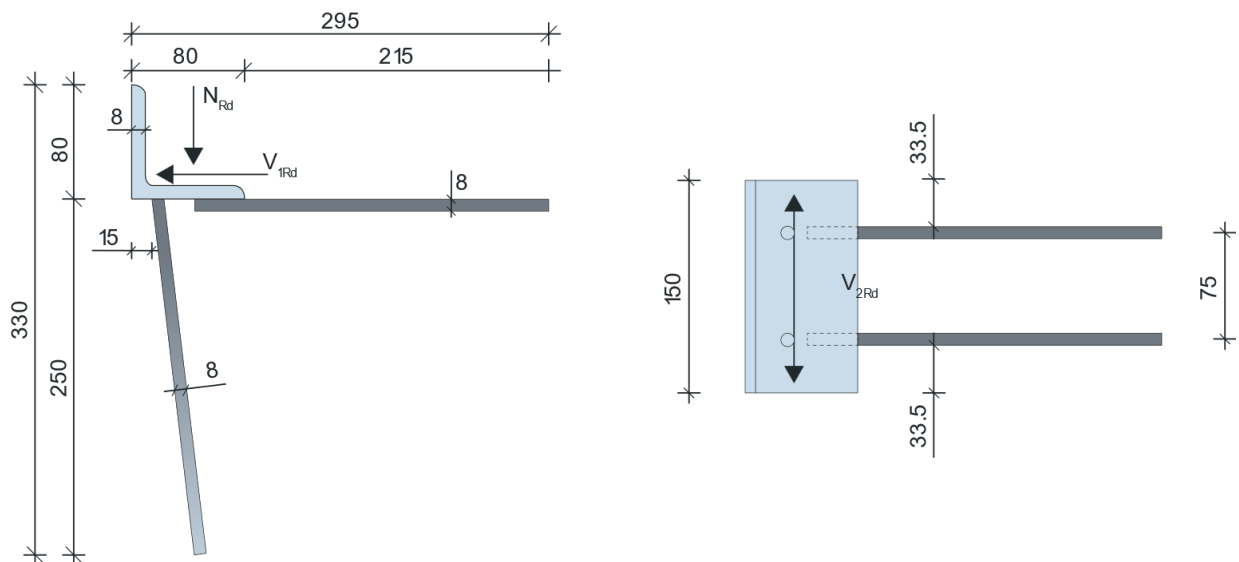


Figure 3. RT25 dimensions

Table 7. RT25 resistance values

Steel part	N_{Rd} , [kN]	V_{1Rd} , [kN]	V_{2Rd} , [kN]
RTR25	90.6	16.3	7.5
RTR25, RTRr25, RTH25	83.1	13.2	7.5

4.2.4. RT26

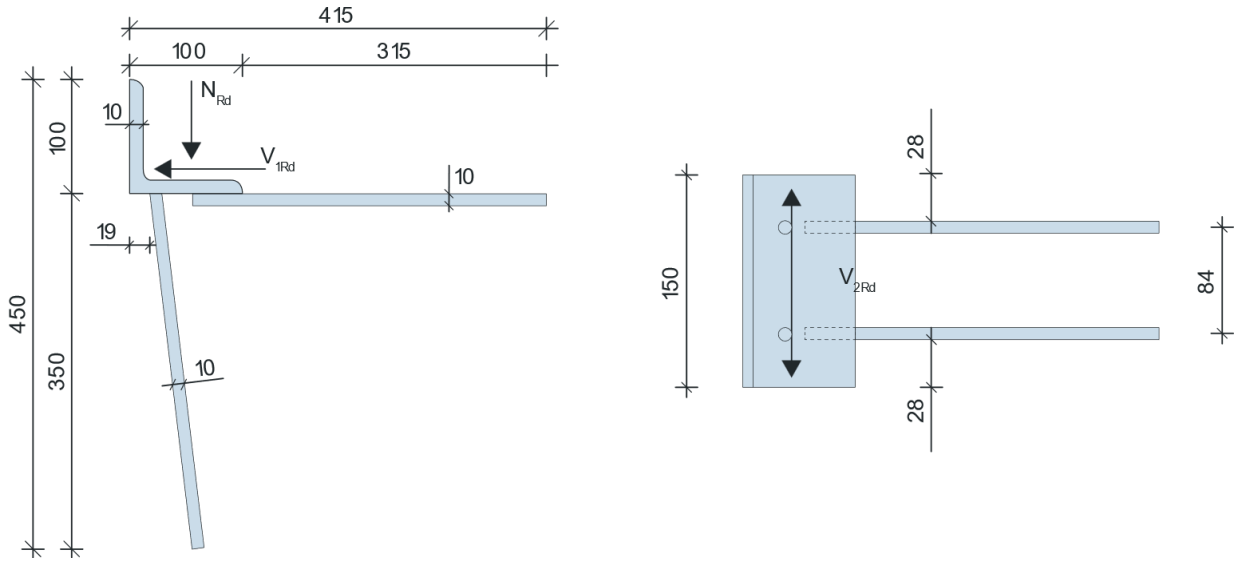


Figure 4. RT26 dimensions

Table 8. RT26 resistance values

Steel part	N_{Rd} , [kN]	V_{1Rd} , [kN]	V_{2Rd} , [kN]
RT26	121.5	25.5	12.4
RTR26, RTRr26, RTH26	112.1	20.6	12.4

4.2.5. RT36

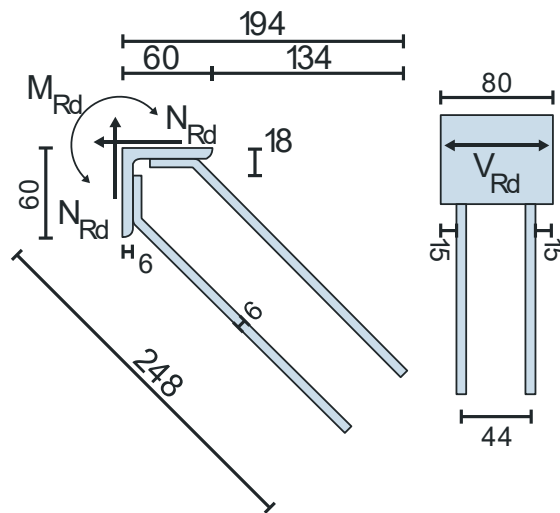


Figure 5. RT36 dimensions

Table 9. RT36 resistance values

Steel part	N_{Rd} , [kN]	V_{Rd} , [kN]	M_{Rd} , [kNm]
RT36	7.5	5.0	0.56
RTR36, RTRr36, RTH36	7.5	5.0	0.56

4.2.6. RT37

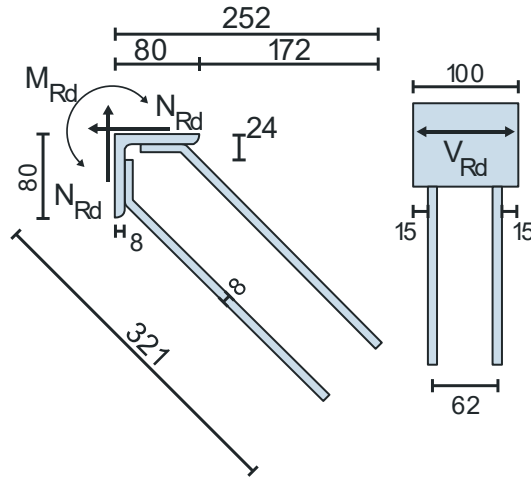


Figure 6. RT37 dimensions

Table 10. RT37 resistance values

Steel part	N_{Rd} , [kN]	V_{Rd} , [kN]	M_{Rd} , [kNm]
RT37	15.71	10.13	1.58
RTR37, RTRr37, RTH37	15.71	10.13	1.58

4.2.7. RT39E

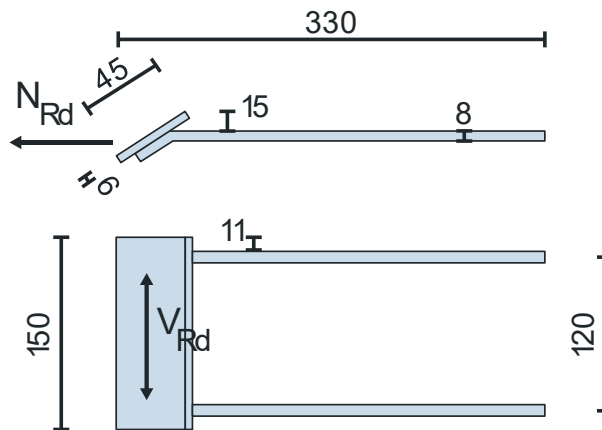


Figure 7. RT39E dimensions

Table 11. RT39E resistance values

Steel part	N_{Rd} , [kN]	V_{Rd} , [kN]
RT39E	12.7	11.96
RTR39E, RTRr39E, RTH39E	12.7	11.96

4.2.8. RT43

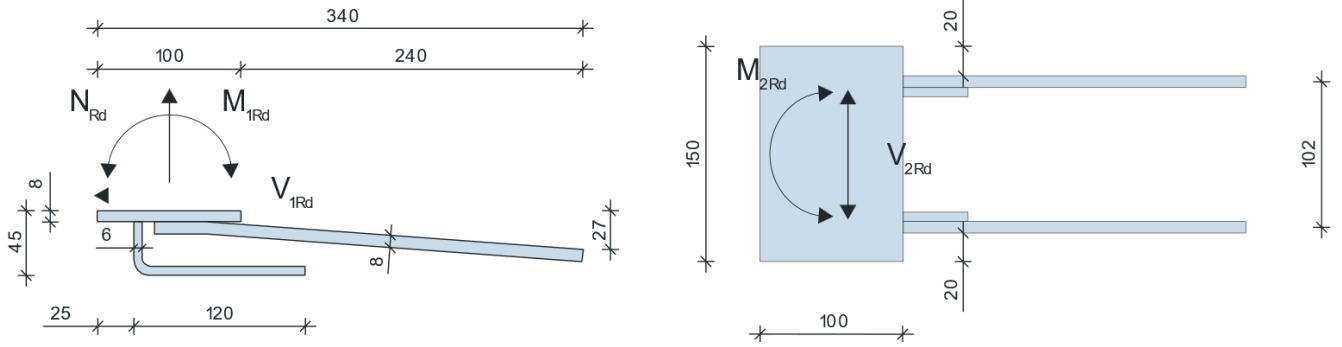


Figure 8. RT43 dimensions

Table 12. RT43 resistance values

Steel part	N_{Rd} , [kN]	V_{1Rd} , [kN]	V_{2Rd} , [kN]	M_{1Rd} , [kNm]	M_{2Rd} , [kNm]
RT43	7.62	26.0	8.66	0.24	0.73
RTR43, RTRr43, RTH43	6.49	22.82	7.26	0.21	0.64

4.2.9. RT45

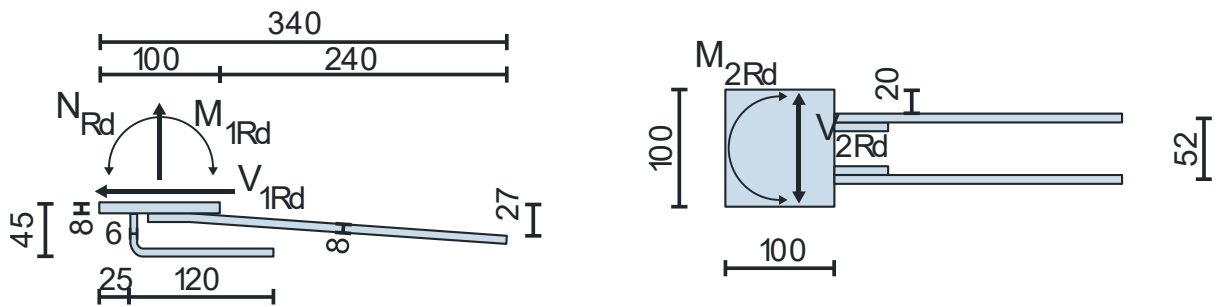


Figure 9. RT45 dimensions

Table 13. RT45 resistance values

Steel part	N_{Rd} , [kN]	V_{1Rd} , [kN]	V_{2Rd} , [kN]	M_{1Rd} , [kNm]	M_{2Rd} , [kNm]
RT45	5.99	20.5	6.8	0.19	0.57
RTR45, RTRr45, RTH45	5.11	17.96	5.71	0.16	0.50

4.2.10. RT46

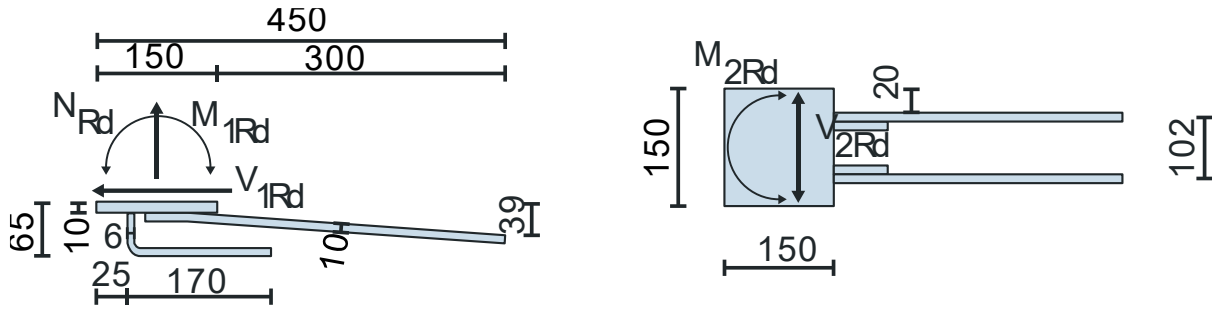


Figure 10. RT46 dimensions

Table 14. RT46 resistance values

Steel part	N_{Rd} , [kN]	V_{1Rd} , [kN]	V_{2Rd} , [kN]	M_{1Rd} , [kNm]	M_{2Rd} , [kNm]
RT46	8.60	43.49	13.53	0.38	1.81
RTR46, RTRr46, RTH46	7.04	39.14	12.01	0.31	1.51

4.3. Resistance for combined load effects

If multiple load effects act simultaneously on RT non-standard steel part the resistance shall be checked with the following equation:

$$\frac{N_{1Ed}}{N_{1Rd}} + \frac{N_{2Ed}}{N_{2Rd}} + \frac{V_{1Ed}}{V_{1Rd}} + \frac{V_{2Ed}}{V_{2Rd}} + \frac{M_{1Ed}}{M_{1Rd}} + \frac{M_{2Ed}}{M_{2Rd}} \leq 1$$

Where subscript "Ed" means the ultimate limit state value for the dimensioning value of the load effect and "Rd" the corresponding resistance of the steel plate.

5. APPLICATION

5.1. Minimum edge and center distances

Minimum edge and center distances of RT non-standard steel parts must be designed taking into account the design regulations given for concrete cover and anchoring of the ribbed steel bars.

5.2. Reinforcement of concrete

Concrete plinth must be reinforced to withstand the local load transfer from the steel part to the concrete. Concrete must have at least minimum reinforcement according to EN 1992-1-1. RT non-standard steel parts anchor bars must be placed inside the edge reinforcement of the concrete element. A ribbed steel bar must be placed inside the bending of the bent anchor bars.

6. INSTALLATION

6.1. Attachment to formwork

RT non-standard steel parts may be attached to formwork or reinforcement by nailing, gluing, double-sided tape or by pressing apparatus. RT non-standard steel parts must be attached securely so it cannot move during casting.

During the casting the free drop height of the concrete must be kept as low as possible to avoid separation of the concrete and dynamic loads to RT non-standard steel parts.

At RT non-standard steel parts the concrete must be compressed carefully, and special care must be taken to ensure that there are no holes or empty space under RT non-standard steel parts. RT non-standard steel parts cannot be vibrated.

6.2. Welding of attached structure parts

Welding of attached structure parts must be done according to designs. For demanding welding, it is recommended that the designer provides a welding design which shows e.g. welding order and the additives used. Before the welding process the welding area must be cleaned from all substances which may be detrimental to the weld. After the welding the weld joint and the steel parts are protected according to designs.

If the temperature is below -5°C , preheating of the welded parts is recommended.

6.3. Welding and bending of the anchors

The anchors of RT non-standard steel parts may be welded by all commonly used full-fusion welding methods.

The anchors of RT non-standard steel parts may not be bended without the permission of the designer. If the anchors are bended the resistances must be individually re-calculated for each case, the resistances in resistance tables can no longer be used.

7. SUPERVISION OF INSTALLATION

7.1. Minimum edge and center distances

Check list before casting:

- ✓ RT non-standard steel part is in good condition
- ✓ RT non-standard steel part is according to designs and in the right place
- ✓ RT non-standard steel part is attached firmly
- ✓ The required additional reinforcement is assembled

During the casting:

- ✓ RT non-standard steel part stays in the right place
- ✓ The concrete is thoroughly vibrated around the RT non-standard steel part

After the casting:

- ✓ The situation of the RT non-standard steel part is according to designs

7.2. Installation of connected structural parts

Check list for the installation of connected structural parts:

- ✓ RT non-standard steel part is according to designs
- ✓ The welding is done according to designs using professional welders
- ✓ The size and quality of the welds is checked according to designs
- ✓ The fire and corrosion treatment and other possible surface treatments of the steel parts are done according to designs

TECHNICAL MANUAL REVISIONS

04.11.2019 (RSteel)

- Graphic format

20.07.2022 (FA)

- Graphic format changed
- RT46 is added
- Resistance values changed (RT43, RT45)

07.08.2024 (AV)

- Graphic format changed
- Welding class: B

SUPPORT MATERIAL

DESIGN TOOLS

RSTEEL® Design Tool was created to facilitate the work of designers and offer the best and most transparent design process on the market. The free and fully cloud-based software guarantees seamless workflow within the design organization, as well as continuous support and updates.

rsteel-design.herokuapp.com

DESIGN COMPONENTS

We have created design components for Tekla as well as Revit and AutoCAD. More products will be created, and existing products will receive steady updates and fixes when needed.

warehouse.tekla.com/#/organization/u7be79e90-ace8-46ca-a26c-849a5dc4c283

proplib.com/rsteel

SALES AND TECHNICAL SUPPORT

Our excellent sales and support team will assist you with all your challenges and questions.

rsteel.fi/en/contact-us

DOCUMENTATION

All our products have been tested and have all necessary approvals and markings. You can find all related information on each products page.

rsteel.fi/en/products