



TRANSPORT BEAM
R60
WLL - 60t, $L_{\max} = 12\text{m}$



Manufacturer: **ANDARON**

Contractor:

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1. Related standards and technical conditions

- 1. PN-EN 13155+A2:2009** Cranes. Safety. Non-fixed load lifting attachments.
- 2. PN-EN 1990:2004** Eurocode – Basic design rules of structures.
- 3. PN-EN 1991-1-1:2004** Eurocode 1: Actions on structures. Part 1-1
General actions. Densities, self-weight,
imposed loads for buildings.
- 4. PN-EN 1993-1-1:2006** Eurocode 3: Design of steel structures.
Part 1-1: General rules and rules for buildings.
- 5. PN-EN 1993-1-8:2006** Eurocode 3. Design of steel structures.
Part 1-8. Design of joints.
- 6. PN-EN 1090-1:2010** Execution of steel structures and aluminium structures.
Part 1: Requirements for conformity assessment
of structural components.
- 7. PN-EN 1090-2:2009** Execution of steel structures and aluminium structures.
Part 2: Technical requirements for the execution
of steel structures.

2. Related documents

- PL-2101-01** Comparison;
- PL-2101-02** Element RK60/1;
- PL-2101-03** Element R60/1; R60/2; R60/3; R60/4; R60/0,5;
- PL-2101-04** Element RK60/0,5;
- PL-2101-05** Element R60/0,25;
- PL-2101-10** Positions: plates; profiles

3. Static-resistance calculations

Calculations made in accordance with the following standards:
PN-EN 13155 + A2:2009, PN-EN 1993-1-1 and PN-EN 1993-1-8.

Steel design strength:

according to Table 3.1 of the PN-EN 1993-1-1 standard:

steel: S355JR: $t \leq 40\text{mm}$ → $f_y = 355 \text{ MPa}$
→ $f_u = 510 \text{ MPa}$

Coefficients in accordance with PN-EN 1993-1-1 and PN-EN 1993-1-8:

- partial factors:

$$\gamma_{M0} = 1,0$$

$$\gamma_{M1} = 1,0$$

$$\gamma_{M1} = 1,25$$

- correlation coefficient:

$$\beta_w = 0,9$$

During the mechanical strength test without static tests (based on
PN-EN 13155+A2:2009 Appendix A sec. A.1.1), the following load was taken into account:

$$X = S + 2 \times S_{DOR}$$

where:

S_{DL}

- load resulting from cross-bar weight

S_{DOR}

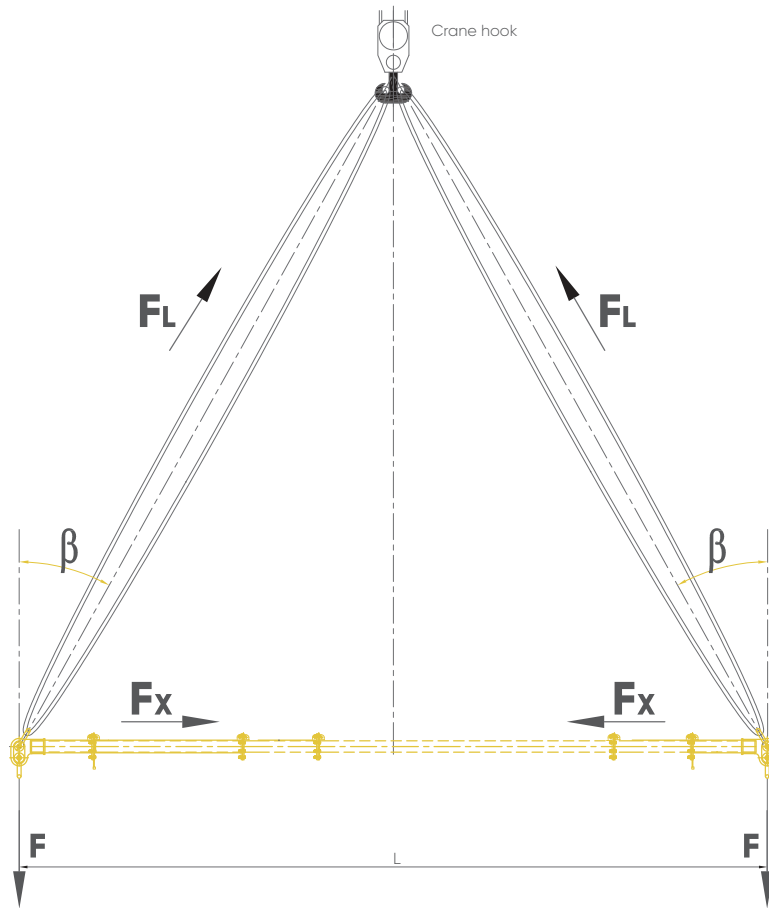
- load resulting from working load limit

Coefficient 2 takes into account dynamic impacts generated during lifting
and the static test

**O-2103 Calcultions ' R60, spreader beam , WLL-60t, Lmax= 12m' available at the company
headquarters: Andaron Sp. z o.o. st. Katowicka 11, 42-530 Dąbrowa Górnicza.**

4. Technical data of the R60 spreader beam

Spreader beam – diagram (see fig. PL-2103-01):



Marks:

L - length of spreader beam

WLL - capacity - working load limit

β - tilt angle

$L_{z(\min)}$ - min. length of the sling

WLL_z - min. working load limit of the sling

Available spreader beam configurations (see fig. PL-2103-01):

Length Spreader beam	Recommended spreader beam configurations								Bolt M20x70 - 8.8	Beam weight
	Beam elements									
L(m)	RK60/0,5	RK60/1	R60/0,25	R60/0,5	R60/1	R60/2	R60/3	R60/4	(pc)	(kg)
12	RK60/1	R60/2	R60/4	R60/3	R60/1	RK60/1			40	750,43
11,5	RK60/1	R60/2	R60/3	R60/4	R60/0,5	RK60/1			40	731,80
11	RK60/1	R60/4	R60/3	R60/2	RK60/1				32	681,00
10,5	RK60/1	R60/1	R60/3	R60/4	R60/0,5	RK60/1			40	694,54
10	RK60/1	R60/4	R60/3	R60/1	RK60/1				32	643,74
9,5	RK60/1	R60/3	R60/4	R60/0,5	RK60/1				32	625,11
9	RK60/1	R60/4	R60/3	RK60/1					24	574,31
8,5	RK60/1	R60/2	R60/4	R60/0,5	RK60/1				32	587,85
8	RK60/1	R60/2	R60/4	RK60/1					24	537,05
7,5	RK60/1	R60/1	R60/4	R60/0,5	RK60/1				32	550,59
7	RK60/1	R60/1	R60/4	RK60/1					24	499,79
6,5	RK60/1	R60/4	R60/0,5	RK60/1					24	481,16
6	RK60/1	R60/4	RK60/1						16	430,36
5,5	RK60/1	R60/3	R60/0,5	RK60/1					24	443,91
5	RK60/1	R60/3	RK60/1						16	393,11
4,5	RK60/1	R60/2	R60/0,5	RK60/1					24	406,65
4	RK60/1	R60/2	RK60/1						16	355,85
3,5	RK60/1	R60/1	R60/0,5	RK60/1					24	369,39
3	RK60/1	R60/1	RK60/1						16	318,59
2,5	RK60/1	R60/0,5	RK60/1						16	299,96
2	RK60/1	RK60/1							8	249,16
1,5	RK60/0,5	R60/0,5	RK60/0,5						16	262,70
1	RK60/0,5	RK60/0,5							8	211,90

5. Working load table

Length
Spreader beam

L (m)	$\beta = 30^\circ$		
	WLL (t)	$L_{Z(\min)}$ (m)	WLL _Z (t)
12	56	12	32
11,5	56	11,5	32
11	58	11	34
10,5	58	10,5	34
10	60	10	35
9,5	60	9,5	35
9	60	9	35
8,5	65	8,5	38
8	65	8	38
7,5	70	7,5	40
7	70	7	40
6,5	75	6,5	43
6	75	6	43
5,5	80	5,5	46
5	80	5	46
4,5	85	4,5	49
4	85	4	49
3,5	85	3,5	49
3	90	3	52
2,5	90	2,5	52
2	90	2	52
1,5	90	1,5	52
1	90	1,0	52

RECOMMENDED CONFIGURATION

L (m)	$\beta = 15^\circ$		
	WLL (t)	$L_{Z(\min)}$ (m)	WLL _Z (t)
12	90	23,2	47
11,5	90	22,2	47
11	90	21,3	47
10,5	90	20,3	47
10	90	19,3	47
9,5	90	18,4	47
9	90	17,4	47
8,5	90	16,4	47
8	90	15,5	47
7,5	90	14,5	47
7	90	13,5	47
6,5	90	12,6	47
6	90	11,6	47
5,5	90	10,6	47
5	90	9,7	47
4,5	90	8,7	47
4	90	7,7	47
3,5	90	6,8	47
3	90	5,8	47
2,5	90	4,8	47
2	90	3,9	47
1,5	90	2,9	47
1	90	1,9	47

L (m)	$\beta = 45^\circ$		
	WLL (t)	$L_{Z(\min)}$ (m)	WLL _Z (t)
12	30	8,5	21
11,5	30	8,1	21
11	32	7,8	23
10,5	32	7,4	23
10	34	7,1	24
9,5	34	6,7	24
9	34	6,4	24
8,5	36	6,0	25
8	37	5,7	26
7,5	38	5,3	27
7	40	4,9	28
6,5	41	4,6	29
6	42	4,2	30
5,5	43	3,9	30
5	44	3,5	31
4,5	46	3,2	33
4	48	2,8	34
3,5	49	2,5	35
3	50	2,1	35
2,5	50	1,8	35
2	50	1,4	35
1,5	50	1,1	35
1	50	0,7	35

Symbols:

- WLL (t) - working load limit
- L (m) - length of the transport beam
- β - inclination angle
- WLL_Z (t) - minimum working load limit of the sling
- $L_{Z(\min)}$ (m) - min. sling length

6. Force values

Length
Spreader beam

L (m)	$\beta = 30^\circ$		
	F (Kn)	F_x (Kn)	F_L (Kn)
12	280,0	161,7	323,7
11,5	280,0	161,7	323,7
11	290,0	167,4	335,3
10,5	290,0	167,4	335,3
10	300,0	173,2	346,8
9,5	300,0	173,2	346,8
9	300,0	173,2	346,7
8,5	325,0	187,6	375,6
8	325,0	187,6	375,6
7,5	350,0	202,1	404,5
7	350,0	202,1	404,4
6,5	375,0	216,5	433,3
6	375,0	216,5	433,3
5,5	400,0	230,9	462,1
5	400,0	230,9	462,1
4,5	425,0	245,4	491,0
4	425,0	245,4	491,0
3,5	425,0	245,4	491,0
3	450,0	259,8	519,8
2,5	450,0	259,8	519,8
2	450,0	259,8	519,8
1,5	450,0	259,8	519,8
1	450,0	259,8	519,7

L (m)	$\beta = 15^\circ$		
	F (Kn)	F_x (Kn)	F_L (Kn)
12	450,0	120,6	466,3
11,5	450,0	120,6	466,2
11	450,0	120,6	466,2
10,5	450,0	120,6	466,2
10	450,0	120,6	466,2
9,5	450,0	120,6	466,2
9	450,0	120,6	466,2
8,5	450,0	120,6	466,2
8	450,0	120,6	466,1
7,5	450,0	120,6	466,1
7	450,0	120,6	466,1
6,5	450,0	120,6	466,1
6	450,0	120,6	466,1
5,5	450,0	120,6	466,1
5	450,0	120,6	466,1
4,5	450,0	120,6	466,1
4	450,0	120,6	466,1
3,5	450,0	120,6	466,1
3	450,0	120,6	466,0
2,5	450,0	120,6	466,0
2	450,0	120,6	466,0
1,5	450,0	120,6	466,0
1	450,0	120,6	466,0

L (m)	$\beta = 45^\circ$		
	F (Kn)	F_x (Kn)	F_L (Kn)
12	150,0	150,0	212,7
11,5	150,0	150,0	212,7
11	160,0	160,0	226,8
10,5	160,0	160,0	226,8
10	170,0	170,0	240,9
9,5	170,0	170,0	240,9
9	170,0	170,0	240,8
8,5	180,0	180,0	255,0
8	185,0	185,0	262,0
7,5	190,0	190,0	269,1
7	200,0	200,0	283,2
6,5	205,0	205,0	290,3
6	210,0	210,0	297,3
5,5	215,0	215,0	304,4
5	220,0	220,0	311,4
4,5	230,0	230,0	325,6
4	240,0	240,0	339,7
3,5	245,0	245,0	346,8
3	250,0	250,0	353,8
2,5	250,0	250,0	353,8
2	250,0	250,0	353,7
1,5	250,0	250,0	353,7
1	250,0	250,0	353,7

7. Requirements concerning operation of the device

- The spreader beam is used to lift and transport loads of up to 90t for the following configuration: L=1m, every half a meter up to L=12m in accordance with this manual;
- The beam should be used only in combination with a lifting device equipped with appropriate sling (rope or chain);
- The load should be suspended symmetrically, so as the center of gravity is situated halfway between suspension eyebolts on the beam. Lifting hooks should be equipped with protection gear holding the eyebolts in place; the gear should be kept in good repair.
- Do not leave the loaded beam unsupervised;
- The load should be lifted vertically;
- Do not lift loads attached to the floor;
- Do not hang on the beam or the load;
- Do not place your hands under the sling, do not move the sling during lifting, transport, and lowering the load. The position of the sling may only be corrected when the load is securely placed on the floor;
- Identify all risks of collision of the beam with other objects or persons and prevent them.
- During transport of the cross bar or a large-size element using the cross bar, remember that at least 2 safety lines should be fixed to 2 opposite ends of the beam or the lifted element.
- The weight of the lifted load should be known and adjusted to the cross bar's working load limit in accordance with the tables.

8. Guidelines for operating the transport beam

In order to use the transport beam in a safe and correct manner, follow these instructions:

- Read the manual before operating the device;
- Follow the guidelines included in the load table;
- Follow the instructions for transport beam operators;
- Always use great care and work safely, trying to prevent risks;
- All defects and failures occurring during operation of the transport beam should be notified to the person responsible for the device;
- Do not resume work until the defect/failure is eliminated;
- Do not remove plates or signs from the beam; damaged plates and signs should be replaced with new ones.
- Make sure to store the transport beam in a place free of risk of mechanical damage to the beam;
- After each use, inspect the device and check its technical condition;
- The beam may be stored in an open-field yard.

9. Conditions of operation and use

The transport beam may only be used by an operator who has read this manual. Make sure the beam is used in accordance with safety regulations. Carry out regular inspections within dates provided, and record the results.

10. Health and safety at work regulations

Employees operating the beam must have the required qualifications. They are responsible for application of safe working methods and operation of the beam in accordance with its intended use and working load limits. In life- or health-threatening situations, the beam should be deactivated. You may reactivate it once the threat has been eliminated.

In particular, it is forbidden to:

- operate the device when sick or intoxicated;
- lift the load over people;
- leave the device, even for a short time, when load is suspended under the beam;
- operate the transport beam when the device is not working correctly.

In special cases, not provided for in local regulations and these recommendations, instructions of the management of the facility operating the device shall apply.

11. Operating and Maintenance Manual

Before operating the device:

- View the condition of the load-bearing structure of the transport beam;
- Check the overall condition of the beam, hooks, screws, and lifting gear (slings);
- Assemble the beam according to your needs, by connecting or disconnecting the beam parts you need. Non-preloaded connection should be made in accordance with PN-EN 1090-2. Screws should be tightened until first resistance is felt, successively from the middle of each multi-bolt joint, but they should not be overloaded. The 'first resistance' means tightening using manual force and a normal wrench (without extensions) or the point in which the impact wrench starts to block. The tightened screw should not move or visibly vibrate when tapped with a hammer. Screws should be tightened evenly on both sides of the joint.
- Place the sling of the lifting device in the suspension eyebolts of the beam
- Move the beam over the load. Operating the drive of the lifting device, place the beam close to the hooks of the transport sling. Put the sling hooks in place. Lift the load to approx. 500 mm and observe its movement. In case of any irregularities, lower the load and secure the load-bearing ties on the hook or the beam hooks;
- If there are no irregularities, continue transporting the load to the desired spot.

Follow these instructions when working with the transport beam:

- Stop its operation as soon as you detect any failure that may pose a risk to your health or safety;
- If danger occurs, slowly lower the load;
- Before operating the beam, identify and assess all risks of collision with objects, electrical wires, hydraulic or gas hoses, etc. Furthermore, take into account the risk of collision of the beam with other devices, and eliminate the risk as much as possible;

- The beam operator should be able to control the suspended load at all times. It is forbidden to operate the device in limited visibility situations;
- Do not operate the beam outdoors if the wind speed exceeds 10km/h..

Please follow the general health & safety at work regulations; all recommendations, provisions, and manuals referring to operation and use of lifting devices.

- After operation: transport the beam to the place of storage.

All malfunctions should be notified to the management.

12. Maintenance inspections

Maintenance inspections – every 90 days; they consist in a regular, planned inspection of operation of mechanisms and beam elements, as well as their technical condition and repair.

Inspections should include:

- the load-bearing structure – cracks and distortions of the structure are unacceptable;
- beam suspension eyebolts – cracks, distortions and wear exceeding 20% of the nominal diameter are unacceptable;
- connecting screws – cracks, distortions and wear under 95% of the nominal diameter are unacceptable (please note: M24 class screws, not lower than 8.8, D25 washers)
- plates and signs – their absence or illegibility is unacceptable;
- chain or rope slings – cracks, distortions or incompleteness of elements is unacceptable.
- rope slings – in accordance with PN-EN 13414.

Inspections may be carried out exclusively by a person authorized to perform maintenance of cranes.

Results of the inspection should be entered into the crane maintenance book.

Beam maintenance consists in keeping it clean, complete, and protected against corrosion. During the inspection, check the condition of anti-corrosion coating and use paints to fill any gaps. The load-bearing parts of the beam may be repaired only by the manufacturer.

13. Disposal

The device does not contain any substances or materials harmful to human health or the environment. Disposal of the worn product should be carried out without contamination of the environment, in accordance with all the local and national regulations, i.e. as follows:

- metal parts – selected and used as scrap metal for the steel industry.

14. Certificates



INSPECTION CARD

SIGNATURE AND
STAMP OF THE
MAINTENANCE
TECHNICIAN

DATE OF THE NEXT
INSPECTION

MAINTENANCE TECHNICIAN'S
ASSESSMENT

LIST OF ACTIONS PERFORMED
AND DEFECTS DETECTED

DATE OF INSPECTION

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