Model a crane hook block assembly with side plates and lock nuts

Software: SOLIDWORKS

Task statement

Build a crane hook block as a millimetre assembly of eleven part files, using the supplied dimensioned diagrams diagram_01.png to diagram_12.png and their detail images. Where a sheet and this brief disagree, follow the values below.

Parts and quantities (34 component instances):

1. Lifting hook, qty 1. A T-handle key with a Ø30 x 5 collar (R3 fillet), a Ø20 x 31 shaft, a Ø14 x 3 neck and a Ø16 x 16 pin with a Ø3 cross hole. The double-claw handle is 130 long overall and 96 across, with R25/R19/R12 claw radii and R6 handle fillets.

2. Triangular support plate, qty 2. Plate 5 thick, 115 profile height and 76 base. It has 3x Ø15 corner holes, a Ø25 central bore and 3x Ø6 holes on a Ø35 PCD.

3. Hook anchor body, qty 1. A block with Ø16 trunnions carrying Ø12 x 10 pins at both ends (mirrored), Ø38 seat bosses with Ø32 grooves, a Ø25 through bore and an R3 boss fillet.

4. End bush flange, qty 2. A revolved Ø51 x 12 flange with an R2 edge fillet, a Ø16 centre bore and 3x Ø6 holes on PCD 35.

5. Plate spacer, qty 3. A Ø22 x 46 body with Ø15 x 18 journals at both ends, 82 overall.

6. Flanged bush, qty 1. A Ø25 x 28 shank with a Ø30 x 3 flange and a Ø20 through bore.

7. Flat washer, qty 9. Ø30 OD, Ø17 bore, 3 thick.

8. Hex bolt M6 x 12, qty 6. A 9 AF x 3 head with a 0.5 x 0.5 head chamfer.

9. Slotted bushing (lock nut M16), qty 1. Ø30 x 15 with a Ø16 bore, a Ø3 cross hole, 4 axial slots and a 1x45° chamfer.

10. Slotted ring (lock nut M12), qty 2. Ø25 x 8 with a Ø12 bore, 4 spanner slots 4 wide x 2 deep and a 1x45° chamfer.

11. Slotted round nut (lock nut M15), qty 6. Ø27 x 7 with a Ø15 bore, 4 spanner slots 4 wide and a 1x45° chamfer.

Assembly layout:

- Mount the two support plates parallel, seated against the shoulders of the three spacers' Ø22 x 46 bodies, with the spacer journals passing through the corner holes.
- Secure each journal end with a washer and an M15 lock nut.
- Bolt the end bushes to the plate centre bores with the six M6 bolts.
- Carry the hook anchor between the plates on its trunnions.
- Pass the hook through the anchor and bush, retained by the M16 lock nut.

The overall envelope is approximately 90 x 178.5 x 111.98. Fix the hook as the base component and fully locate every other part with concentric, coincident and parallel mates, leaving no mate errors.

Modelling practice:

- Give every feature a descriptive name that states its size, for example "Bore Ø15" or "Spanner Slots 4x4mm".
- Use mirror features for symmetric journals, pins and grooves.

- Assign a steel material (Steel or Plain Carbon Steel) to each part.
- Fill in the Description, PartNo and Material custom properties on every part and on the assembly. The assembly is Crane_Hook_Assembly.

Rubrics

- **R1:** The model shall be an assembly in millimetres containing 34 unsuppressed, resolved component instances drawn from 11 distinct part files.
- **R2:** The model shall contain 9 flat washer instances of Ø30 OD, Ø17 bore and 3 mm thickness.
- **R3:** The model shall contain 6 hex bolt instances with a Ø6 x 12 shank and a 9 AF x 3 mm head.
- **R4:** The model shall contain 6 slotted round nuts of Ø27 x 7 with a Ø15 bore and 4 spanner slots.
- **R5:** The model shall contain 3 plate spacers 82 mm overall, with a Ø22 x 46 body and Ø15 x 18 journals at both ends.
- **R6:** The model shall contain 2 triangular support plates 5 mm thick, each with 3x Ø15 corner holes, a Ø25 central bore and 3x Ø6 holes on a Ø35 PCD.
- **R7:** The model shall contain 2 end bush flanges of Ø51 x 12 with a Ø16 centre bore and 3x Ø6 holes on PCD 35.
- **R8:** The model shall contain 2 slotted rings of Ø25 x 8 with a Ø12 bore and 4 spanner slots.
- **R9:** The model shall contain a hook part with a Ø30 x 5 collar, a Ø20 shaft, a Ø16 pin and a Ø3 cross hole.
- **R10:** The model shall contain a hook anchor part with Ø16 trunnions, Ø12 pins, Ø38 seat bosses and a Ø25 through bore.
- **R11:** The model shall contain a flanged bush with a Ø25 x 28 shank, a Ø30 x 3 flange and a Ø20 through bore, and a Ø30 x 15 slotted bushing with a Ø16 bore.
- **R12:** The model shall have an overall assembled envelope of approximately 90 x 179 x 112 mm.
- **R13:** The model shall have the hook component fixed and all other components located by mates, with no mate in error.
- **R14:** The model shall use concentric, coincident and parallel mate types to position the components.
- **R15:** The model shall use descriptive, size-bearing feature names in the parts, such as "Bore Ø15" or "Journal Ø15x18", rather than default names.
- **R16:** The model shall use mirror features for the symmetric spacer journals and the anchor trunnion pins.
- **R17:** The model shall assign a steel material (Steel or Plain Carbon Steel) to every part and carry Description, PartNo and Material custom properties on each part and on the assembly.

Input files

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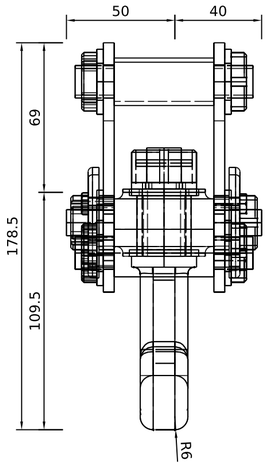
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Deliverables

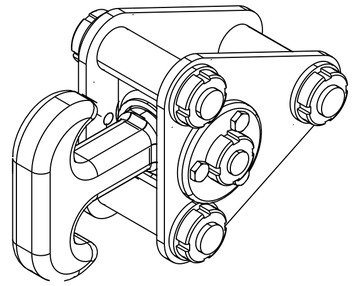
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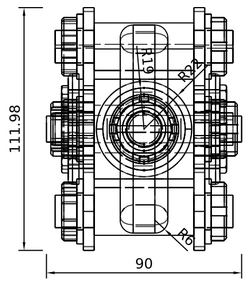
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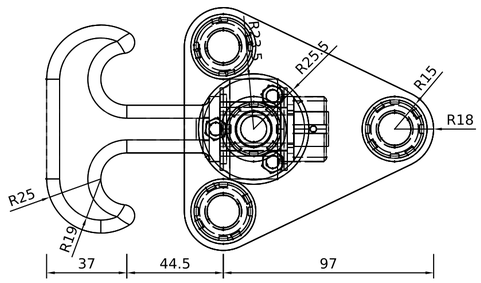
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



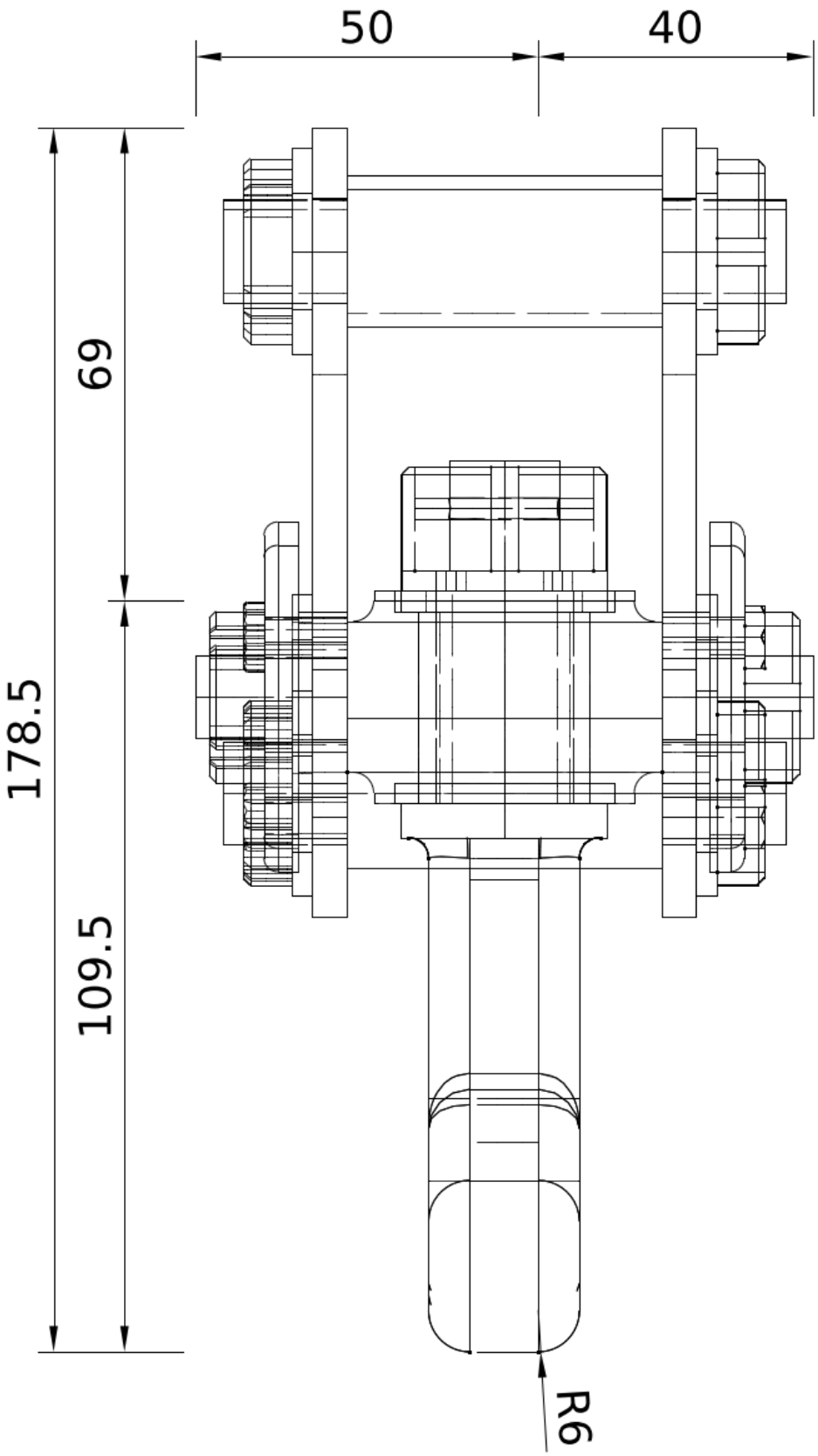
RIGHT SIDE VIEW

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

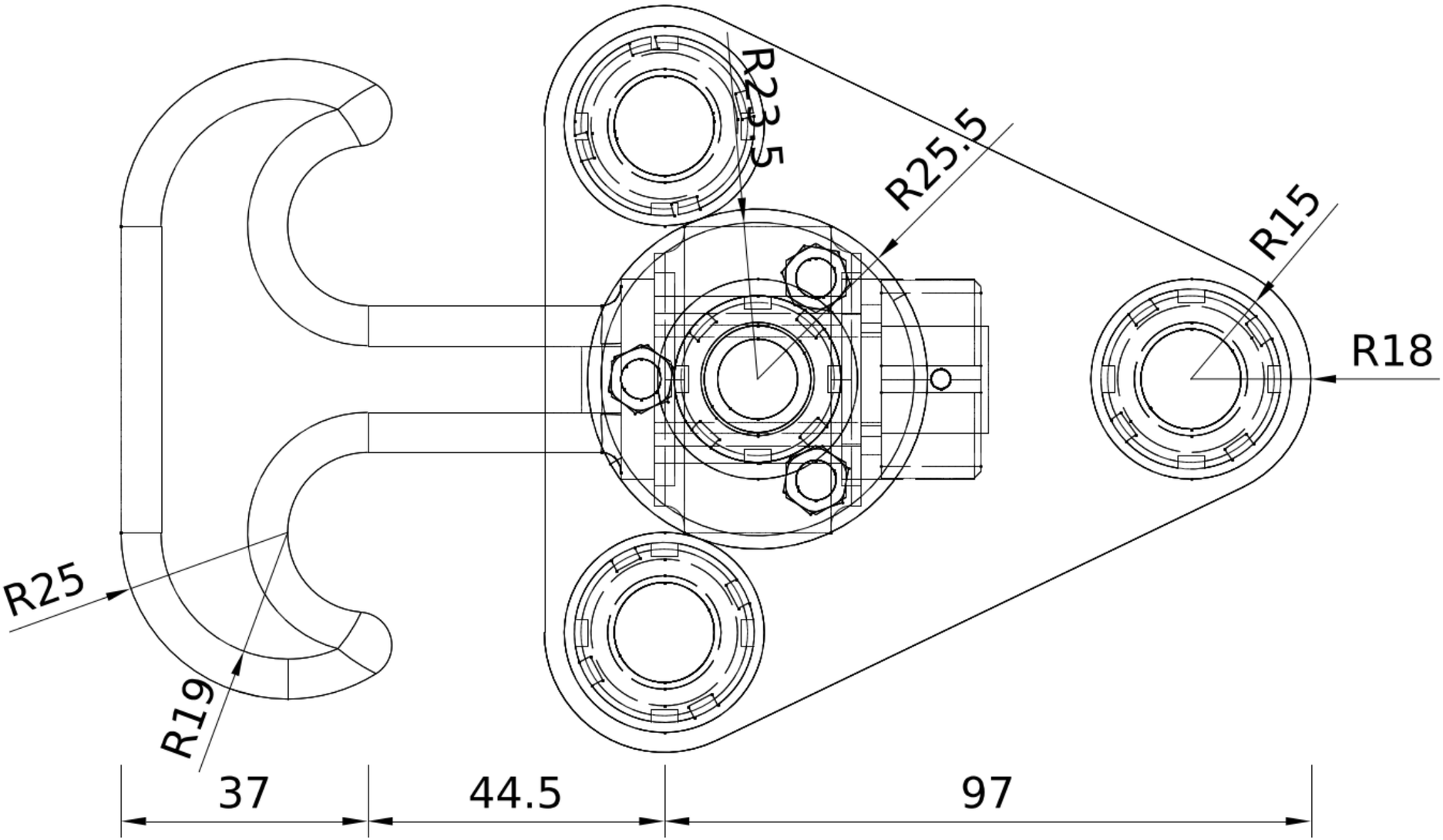
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TITLE	SIZE
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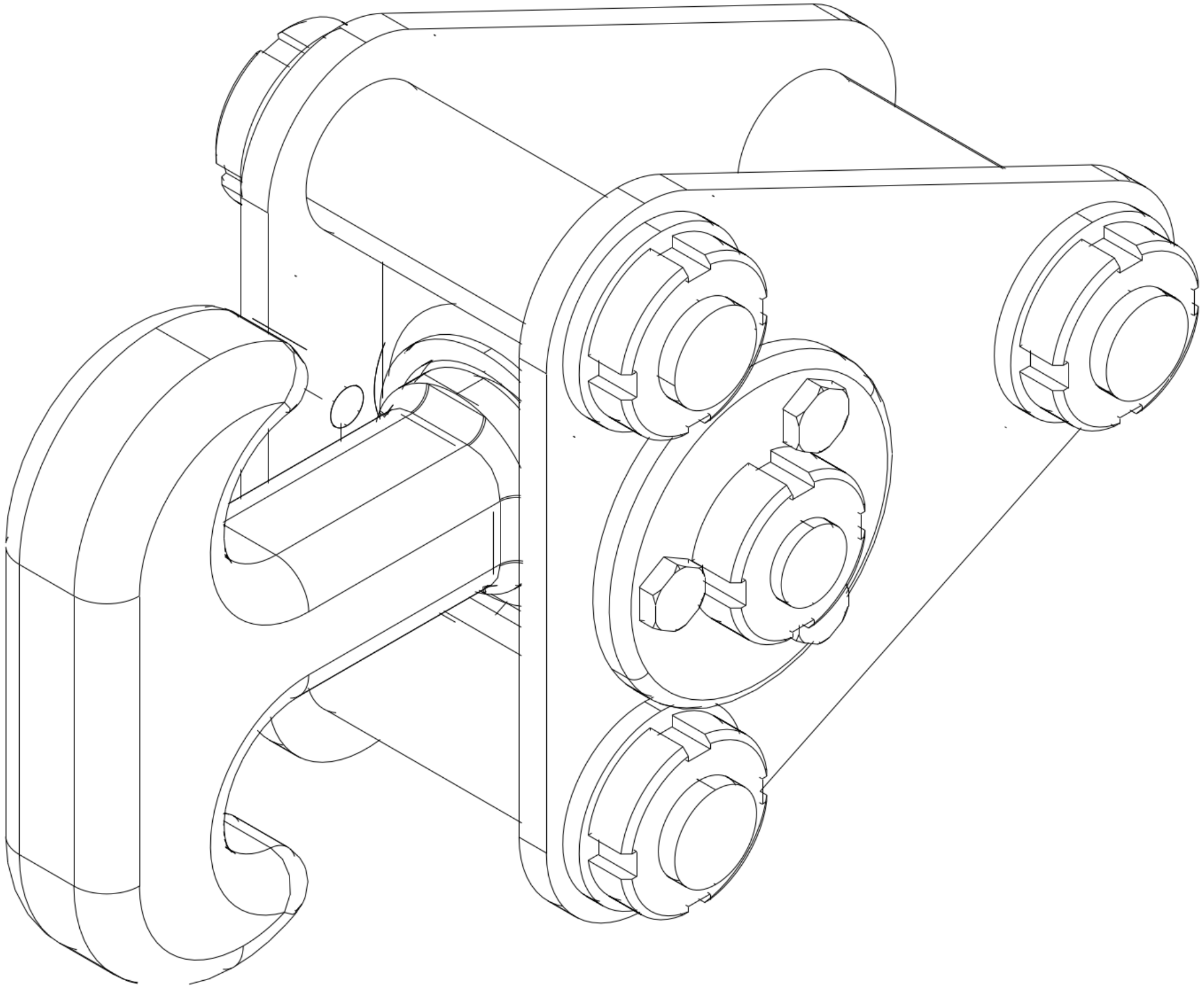
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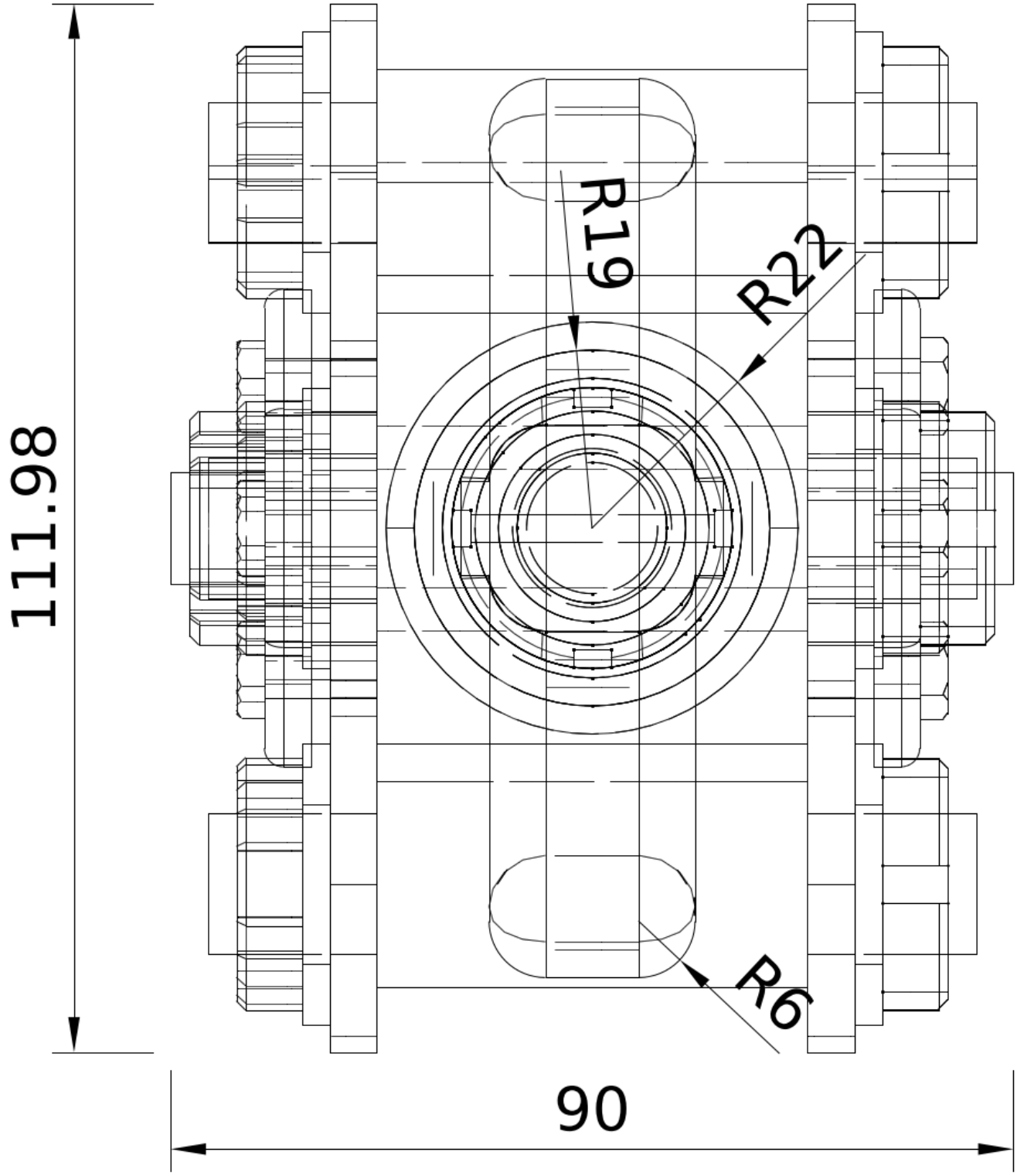
TOP VIEW



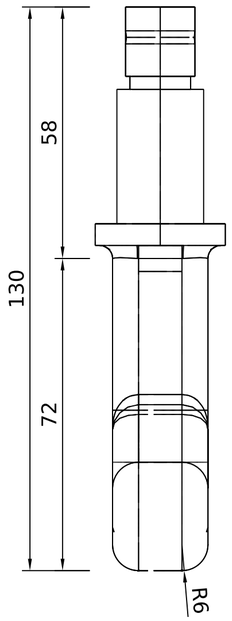
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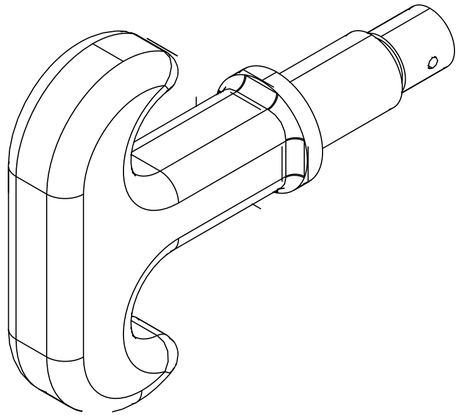
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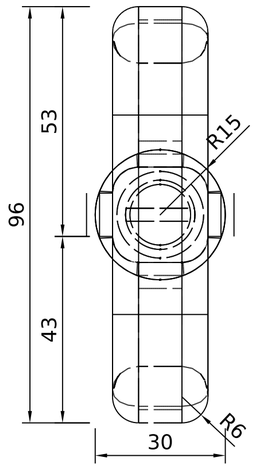
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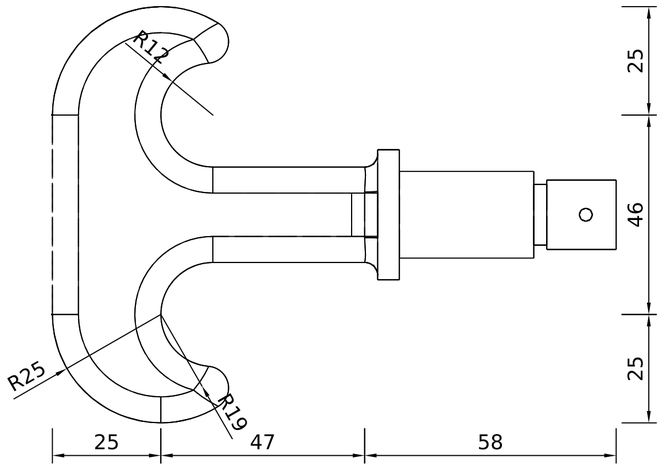
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



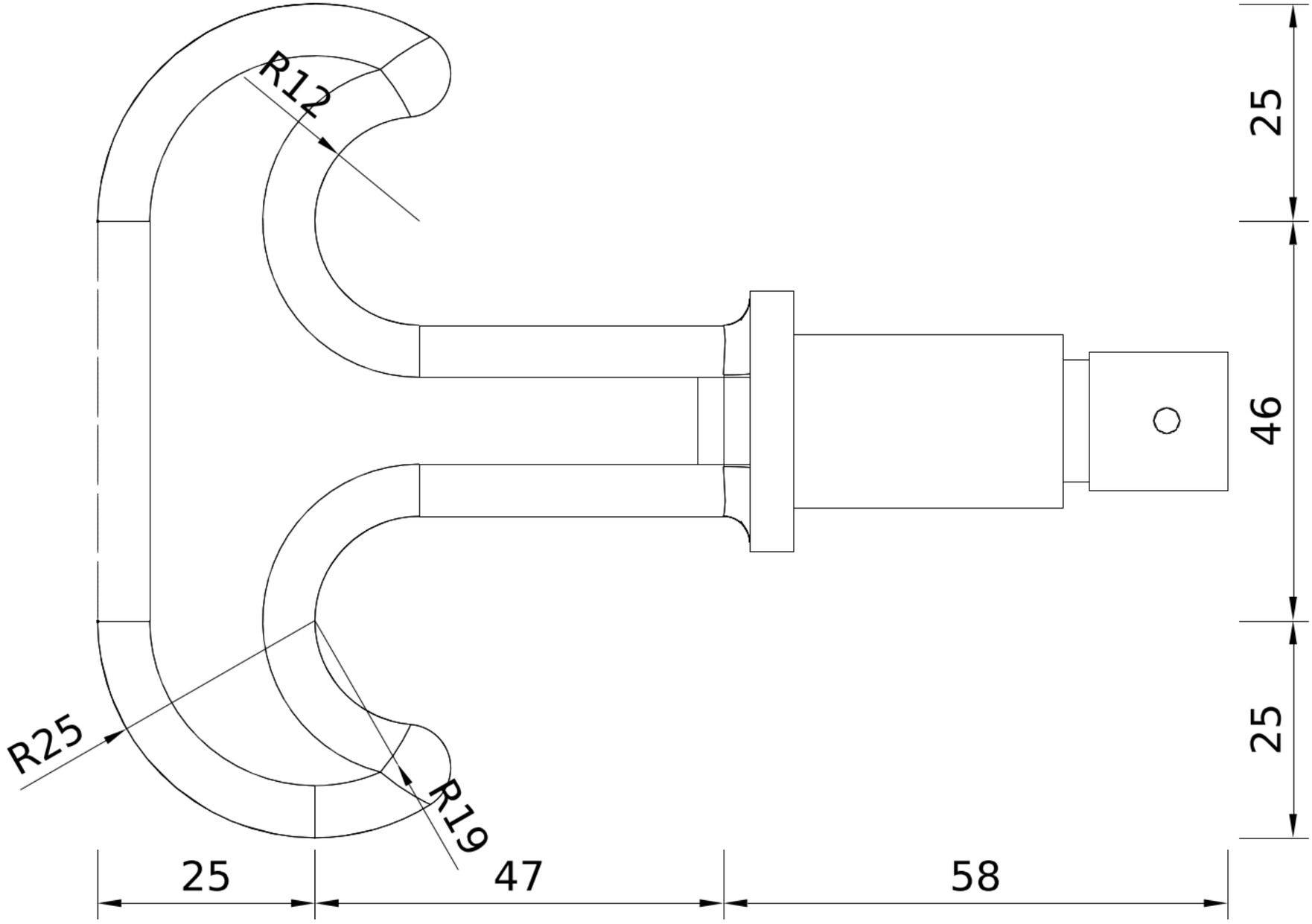
RIGHT SIDE VIEW

NOTES
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2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

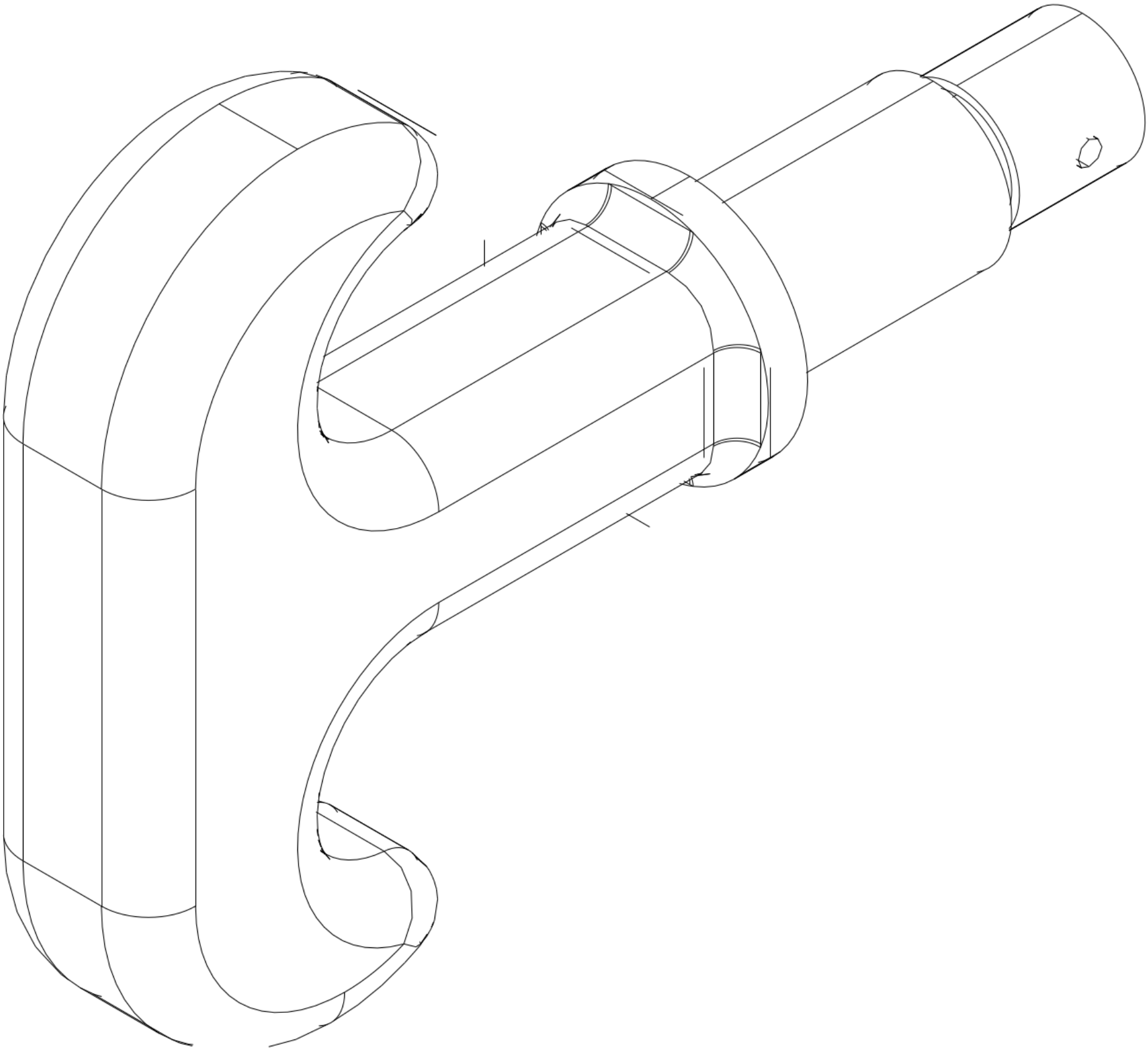
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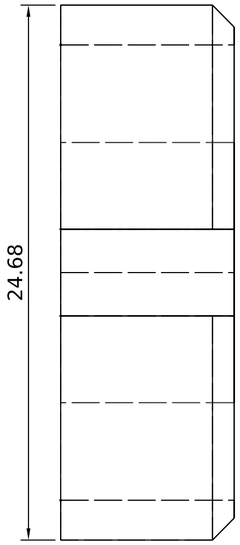
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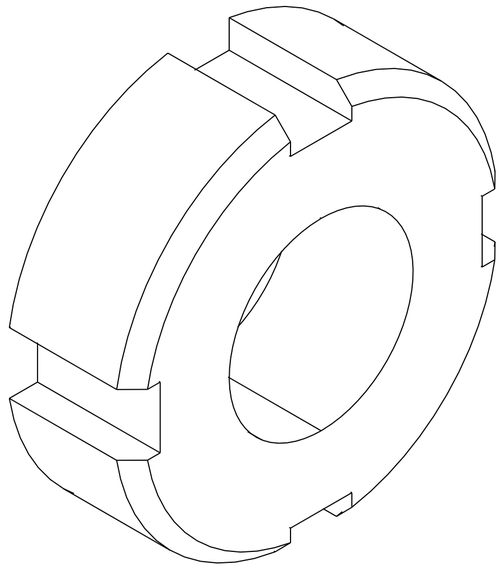
RIGHT SIDE VIEW



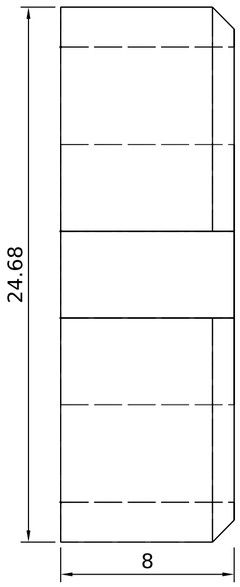
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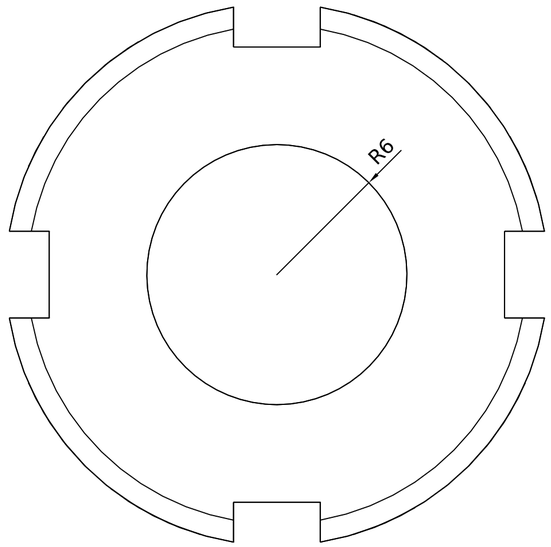
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



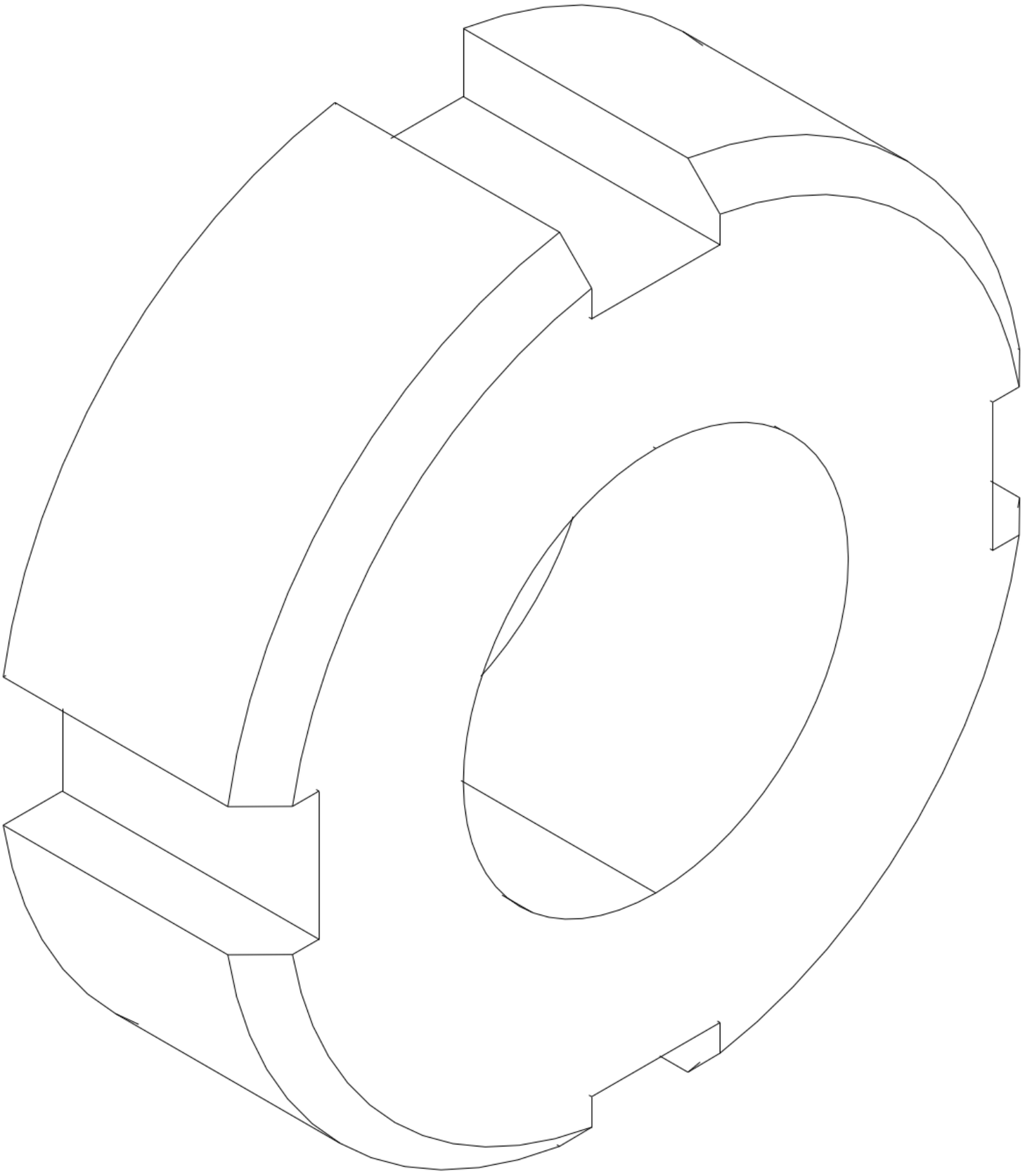
RIGHT SIDE VIEW

NOTES
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2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

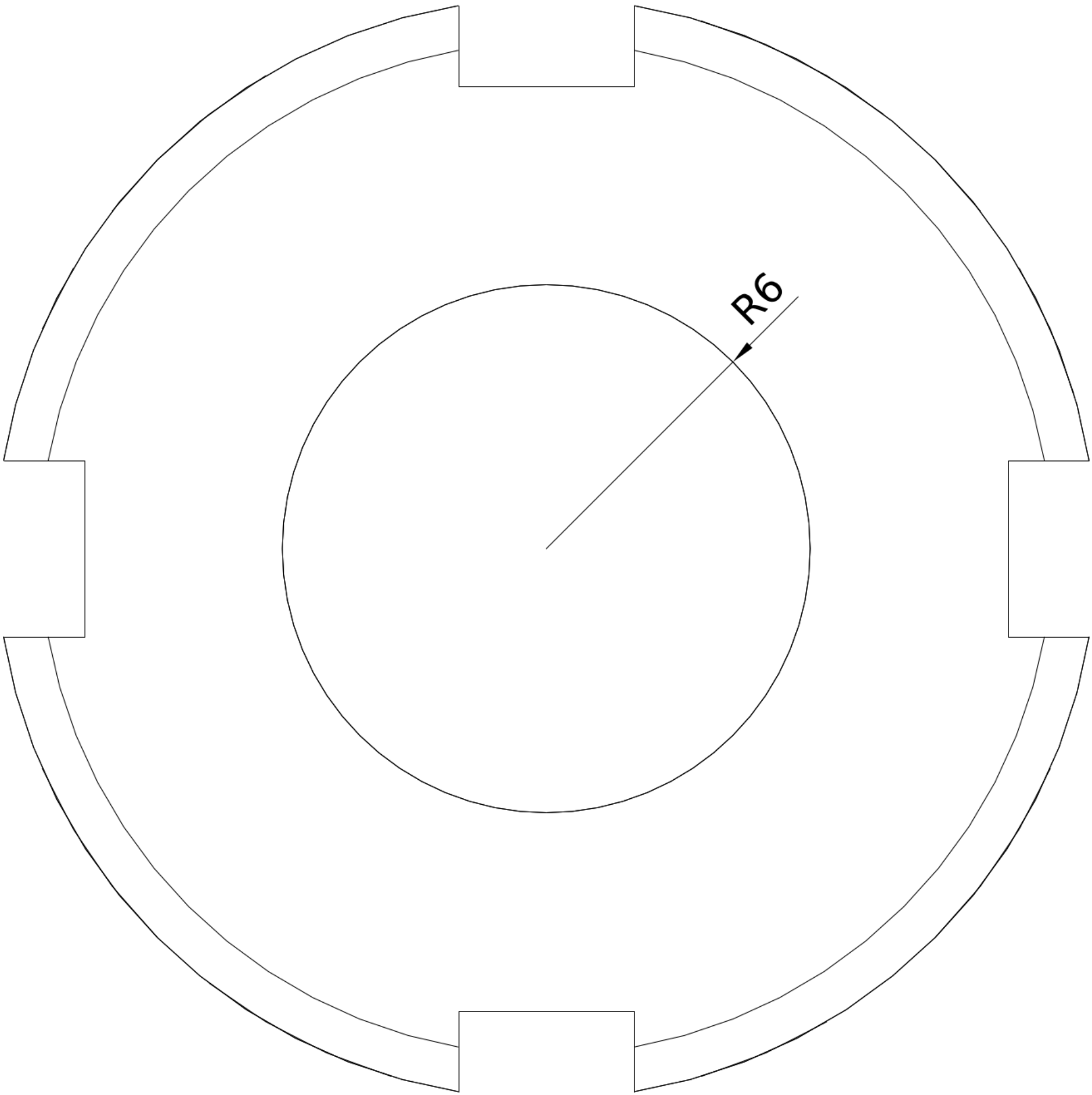
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MILLIMETRES	**5:1**	

TITLE	SIZE
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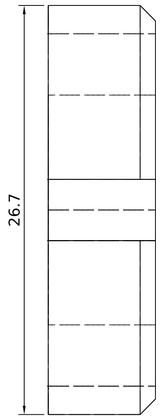
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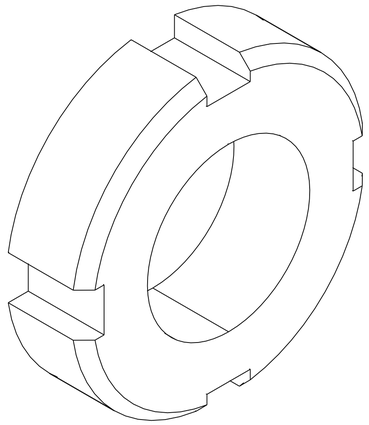
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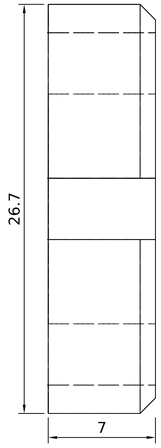
DETAIL 2 · VIEW 2 · SHEET ZONES E5-H8



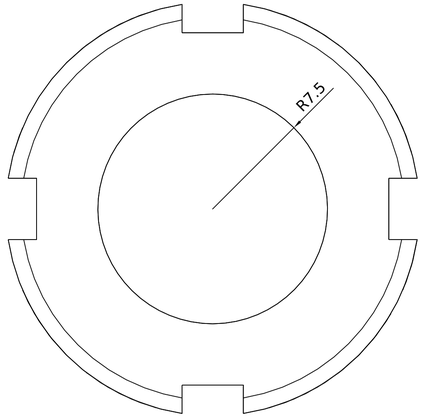
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



RIGHT SIDE VIEW

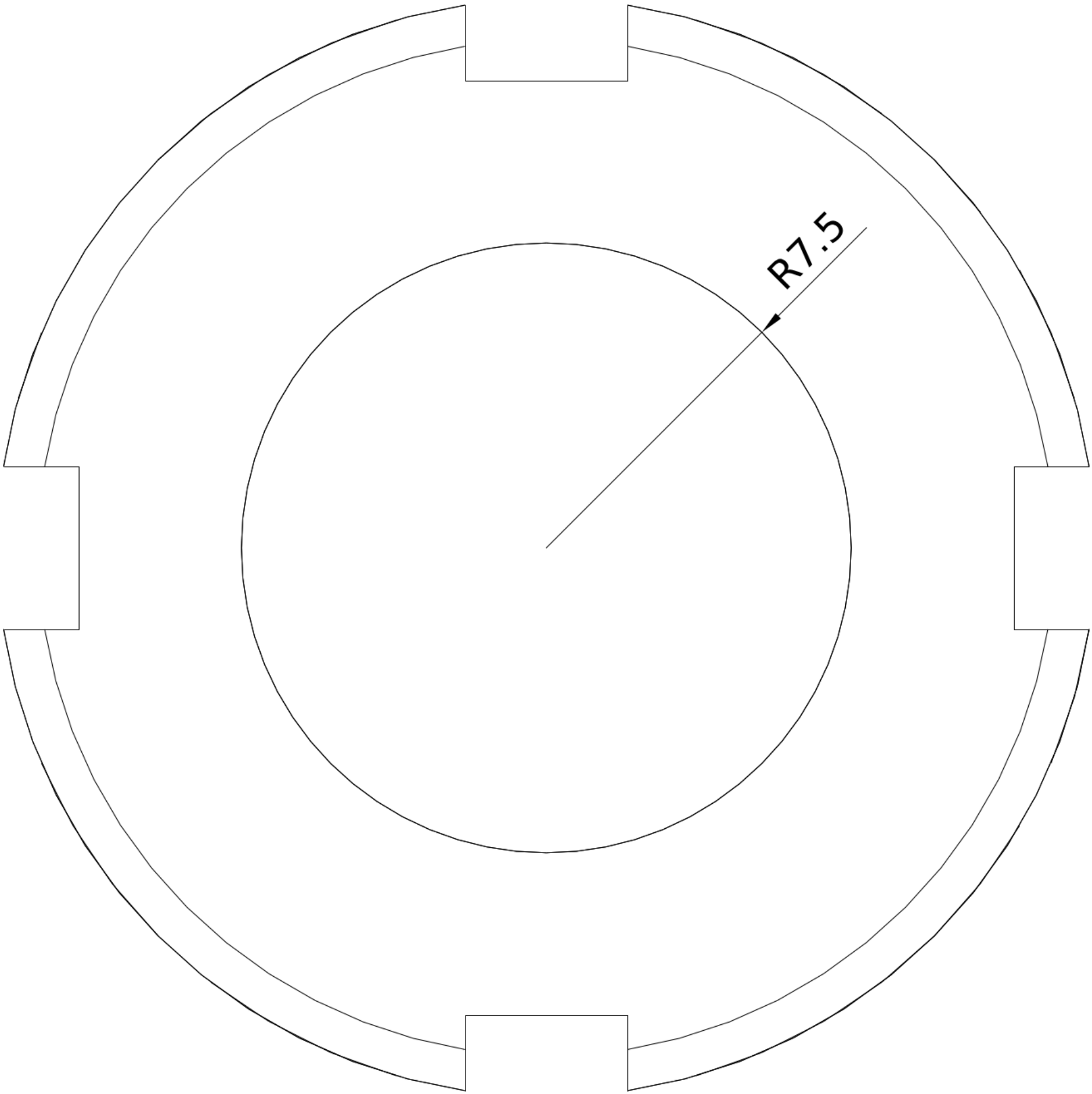
NOTES
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3. VIEWS IN THIRD ANGLE PROJECTION.

UNITS	SCALE	PROJECTION
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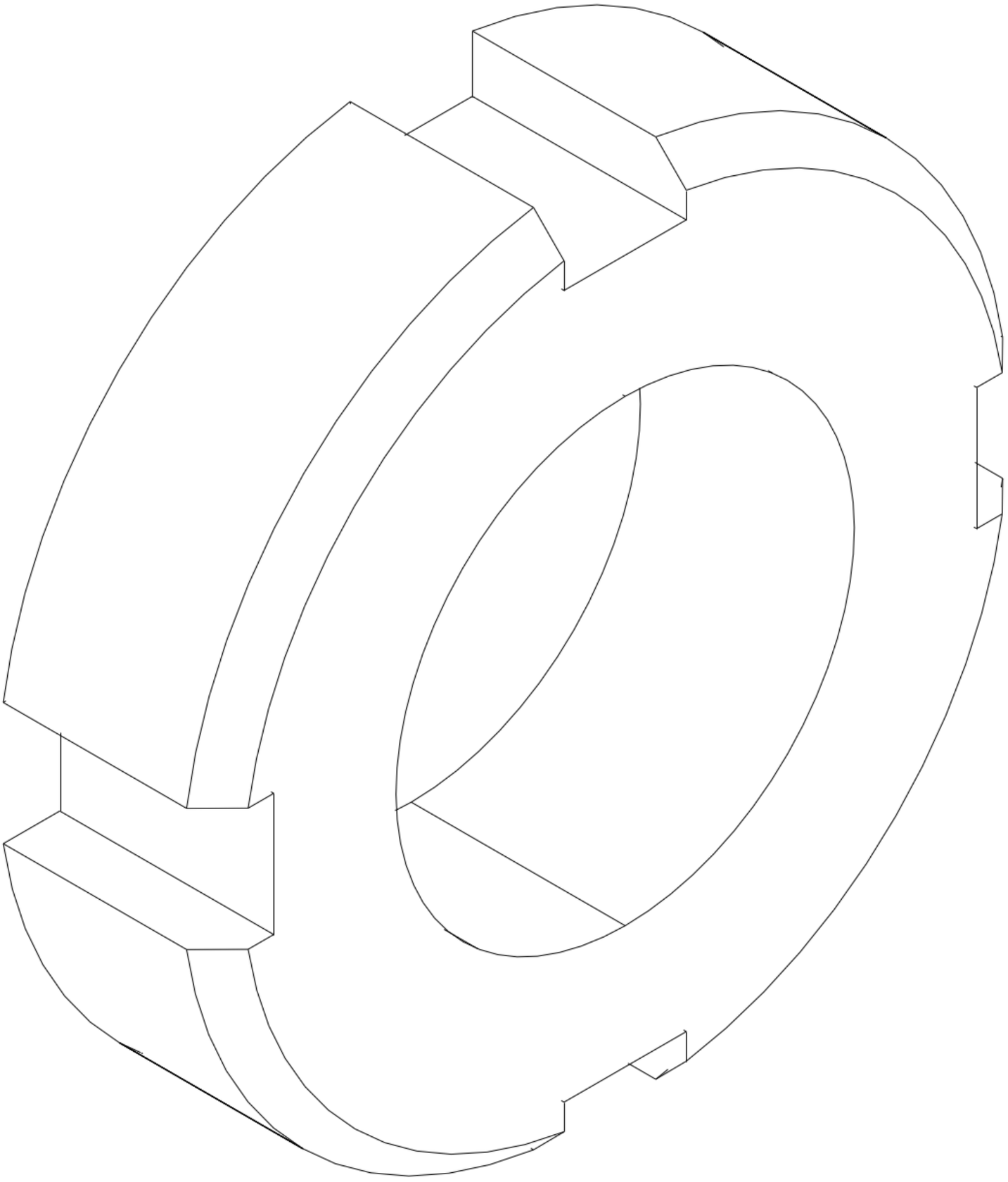
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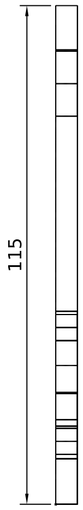
DRAWING NO.	REV	SHEET
MKV-1777CCC0-04	**0**	**4 OF 12**



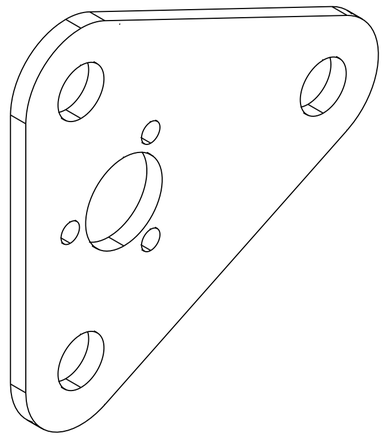
DETAIL 1 · VIEW 1 · SHEET ZONES F8-J11



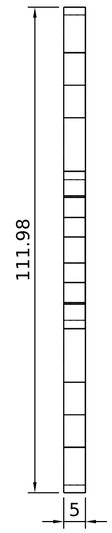
ISOMETRIC VIEW



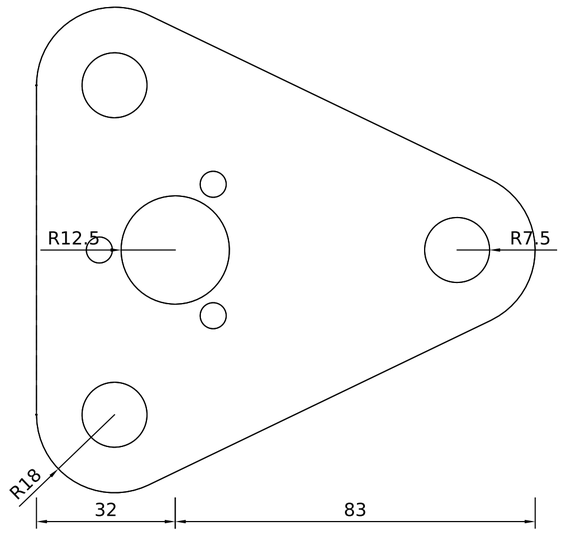
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



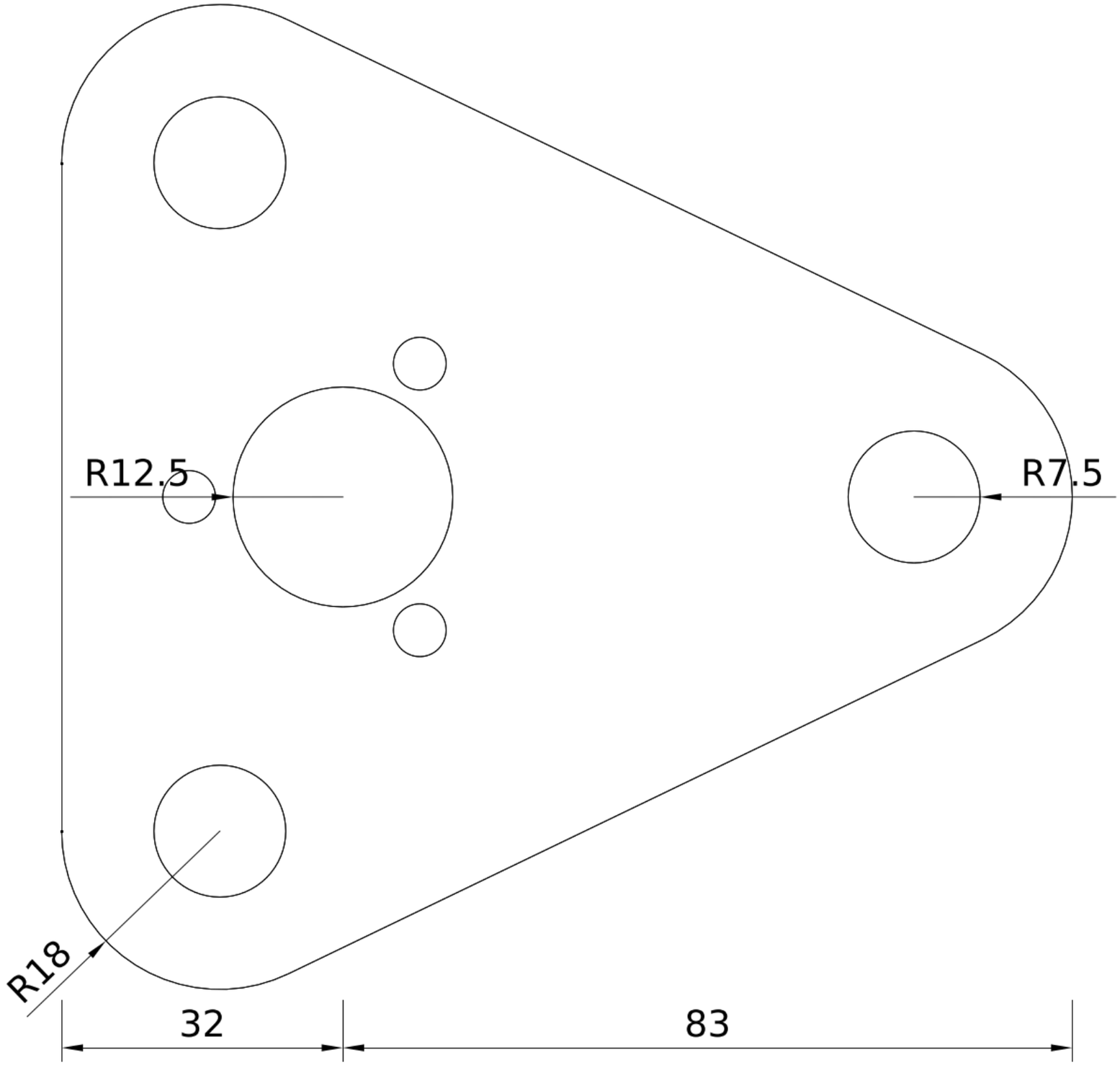
RIGHT SIDE VIEW

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

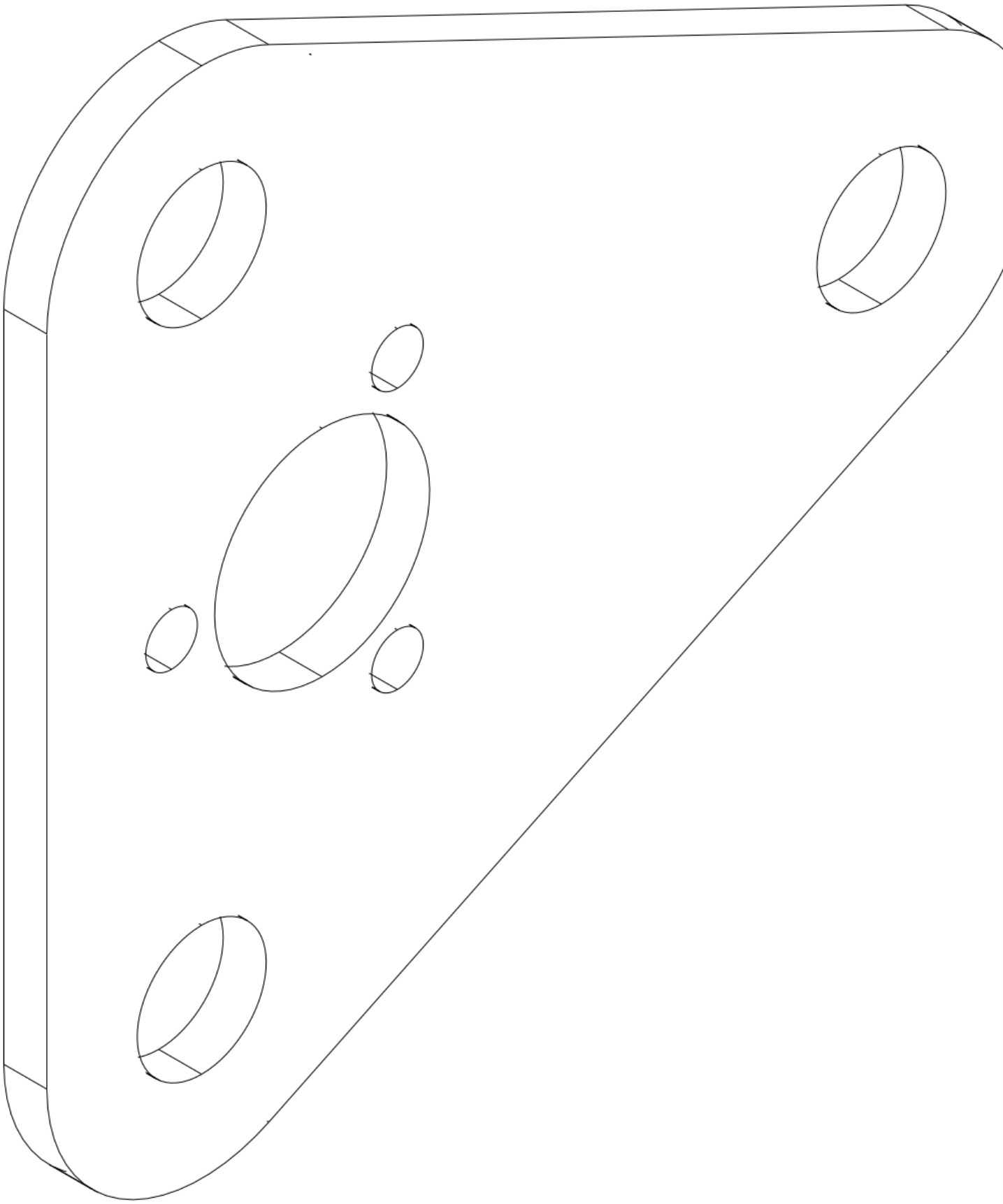
UNITS	SCALE	PROJECTION
MILLIMETRES	**1:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A2**

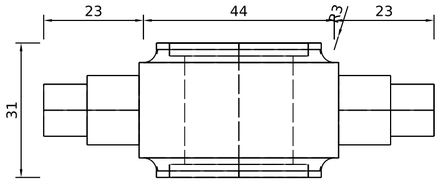
DRAWING NO.	REV	SHEET
MKV-1777CCC0-05	**0**	**5 OF 12**



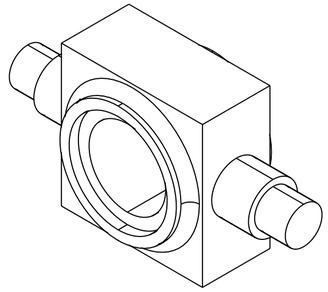
RIGHT SIDE VIEW



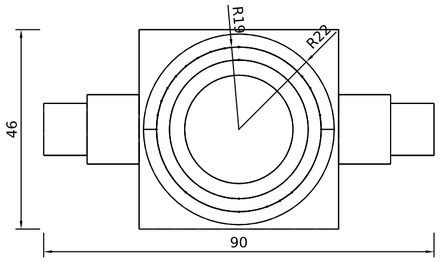
ISOMETRIC VIEW



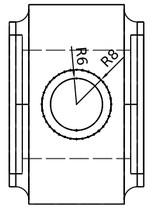
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



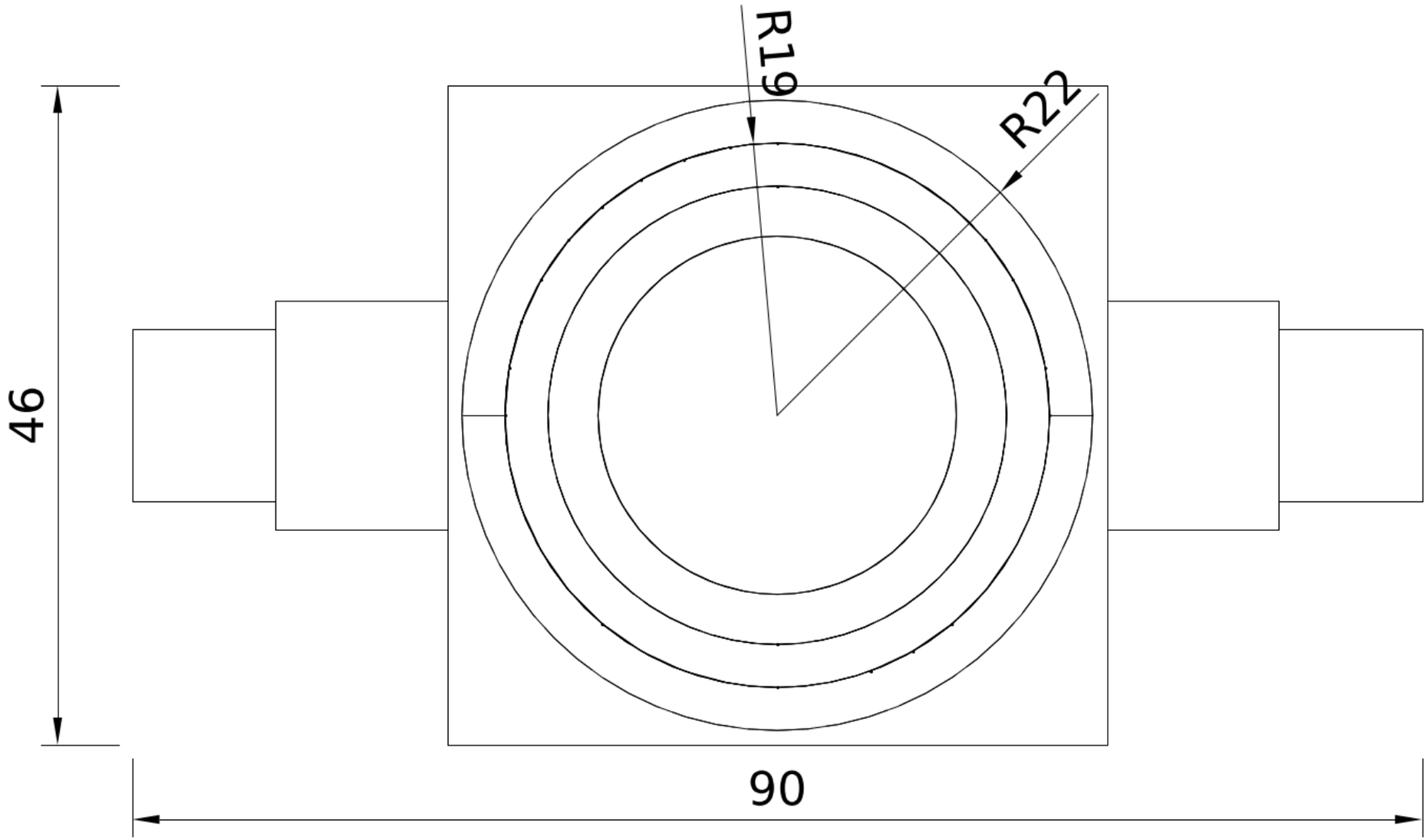
RIGHT SIDE VIEW

NOTES
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2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

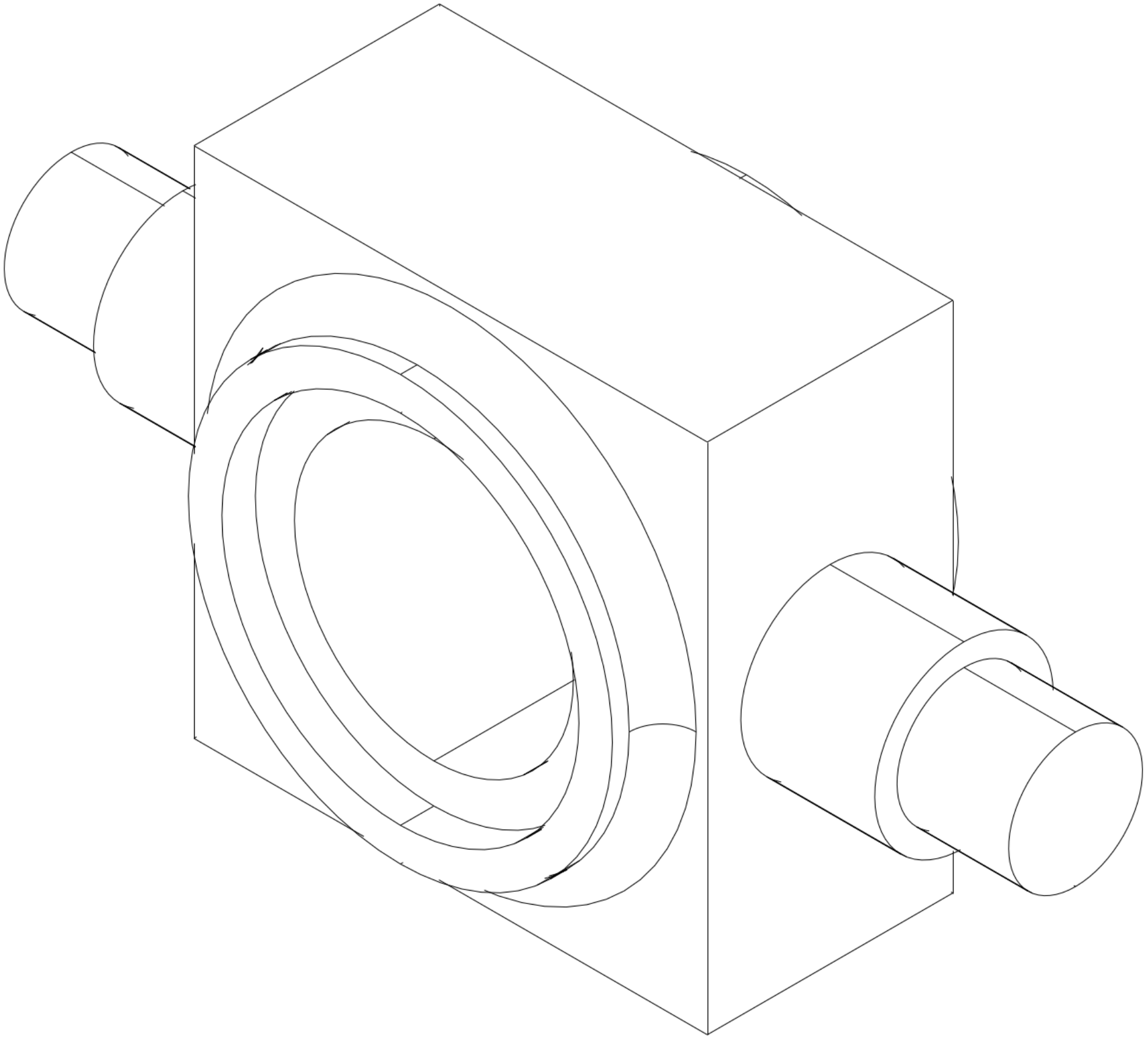
UNITS	SCALE	PROJECTION
MILLIMETRES	**1:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A2**

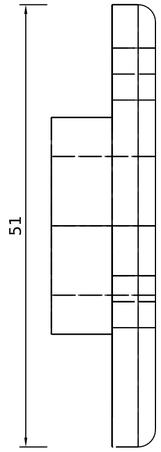
DRAWING NO.	REV	SHEET
MKV-1777CCC0-06	**0**	**6 OF 12**



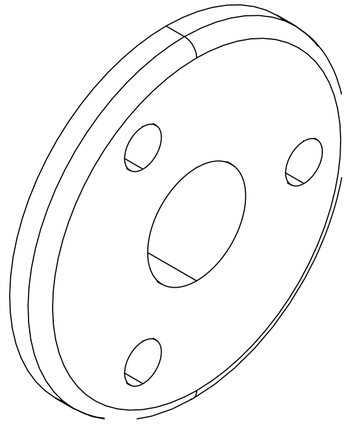
FRONT VIEW



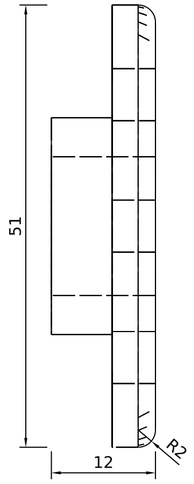
ISOMETRIC VIEW



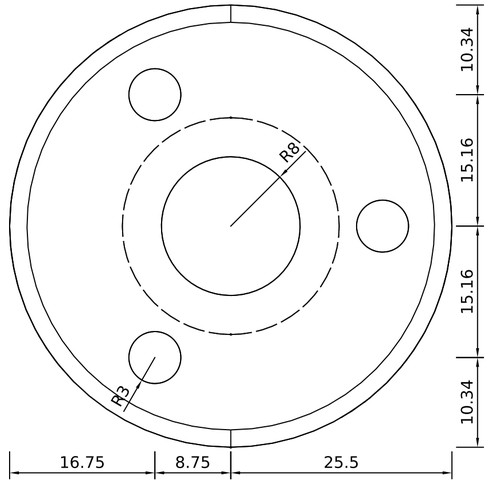
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



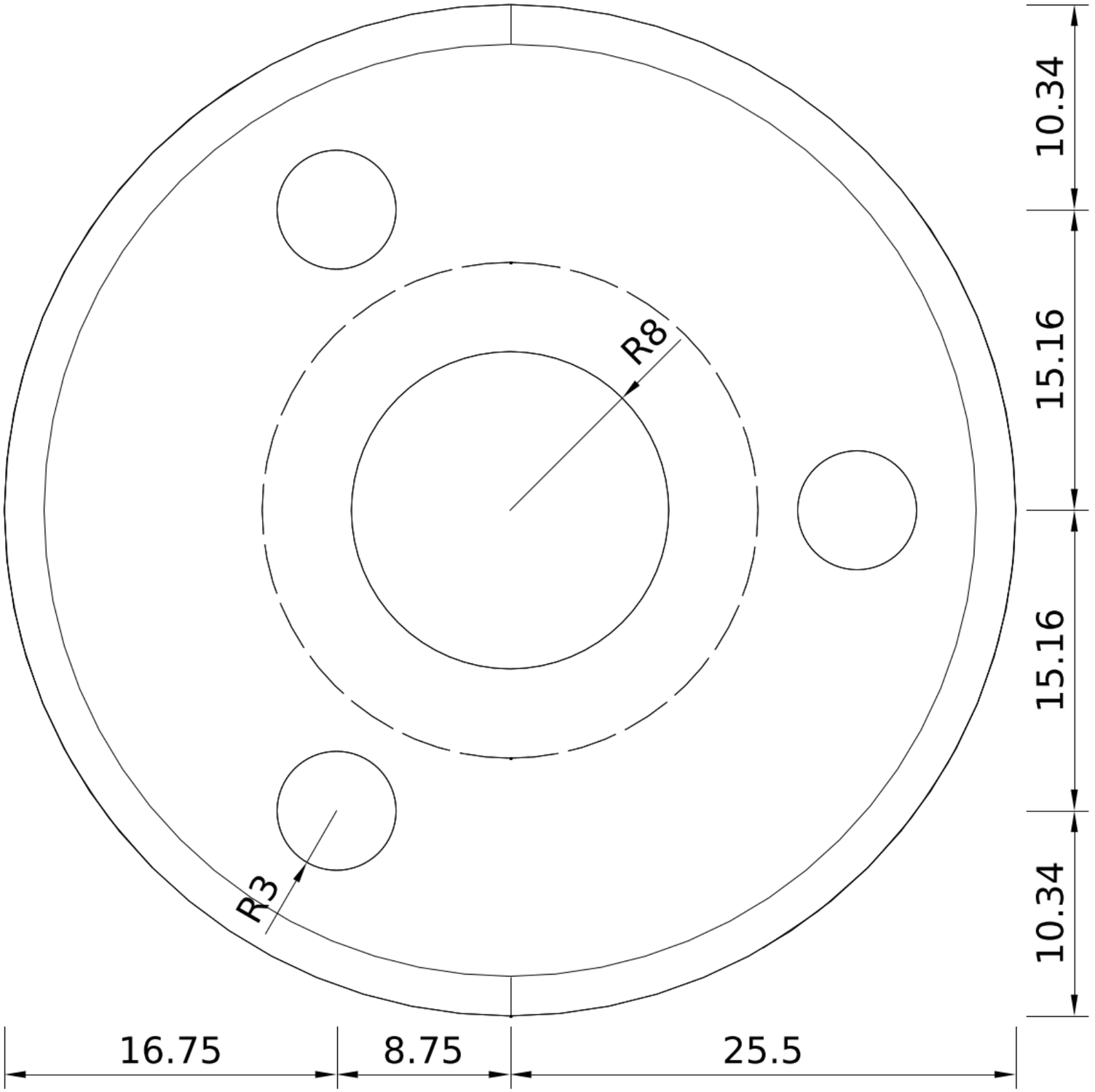
RIGHT SIDE VIEW

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

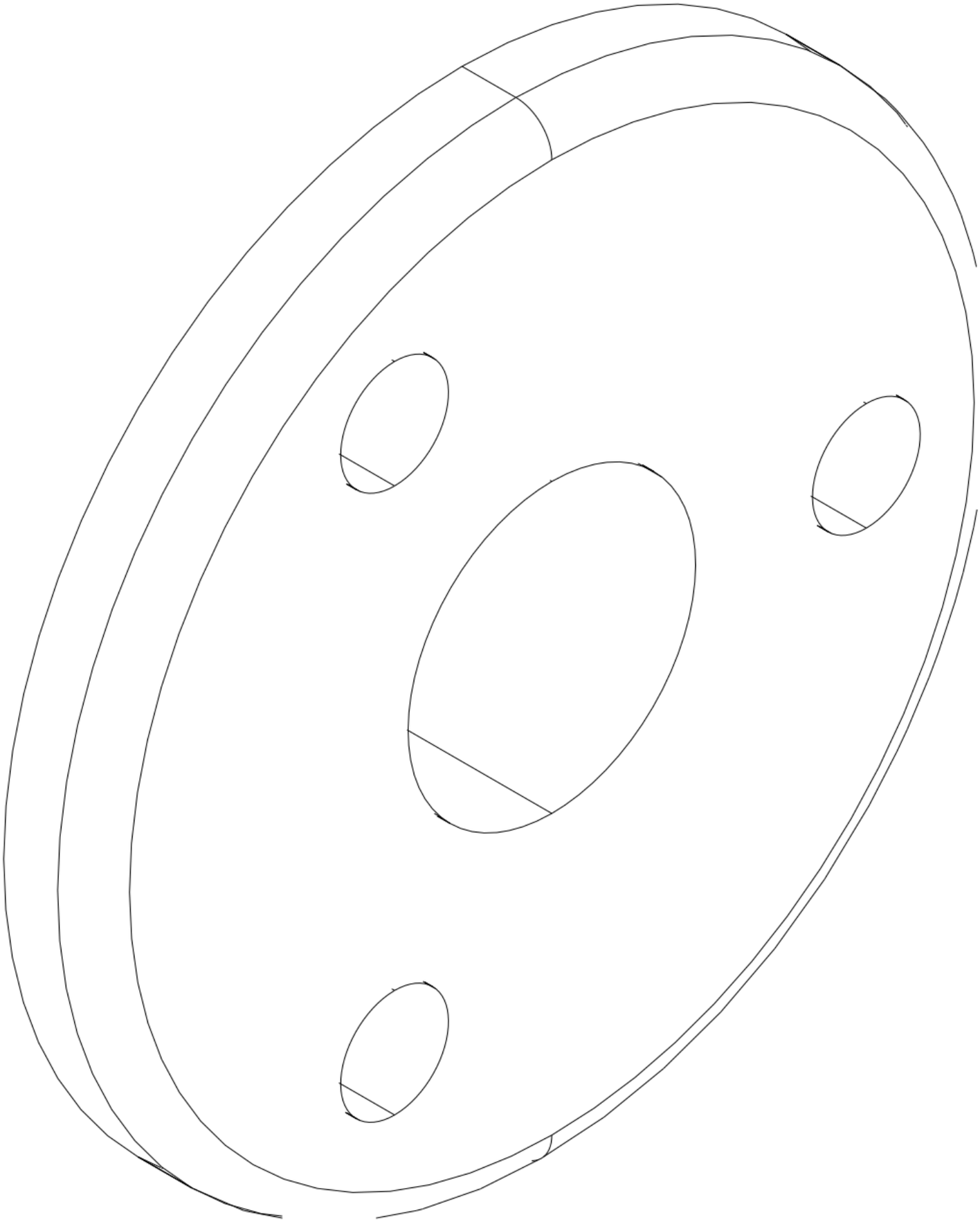
UNITS	SCALE	PROJECTION
MILLIMETRES	**2:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A2**

DRAWING NO.	REV	SHEET
MKV-1777CCC0-07	**0**	**7 OF 12**



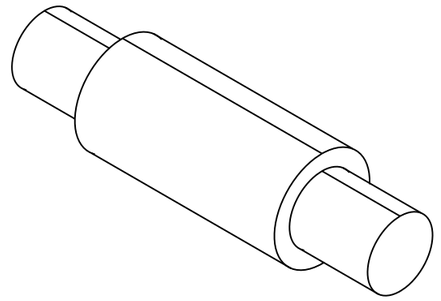
RIGHT SIDE VIEW



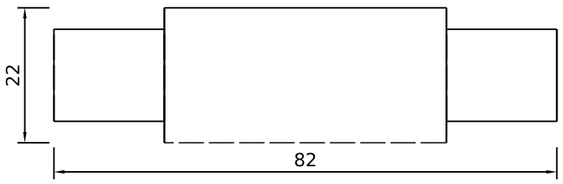
ISOMETRIC VIEW



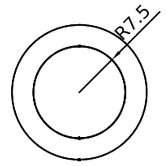
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



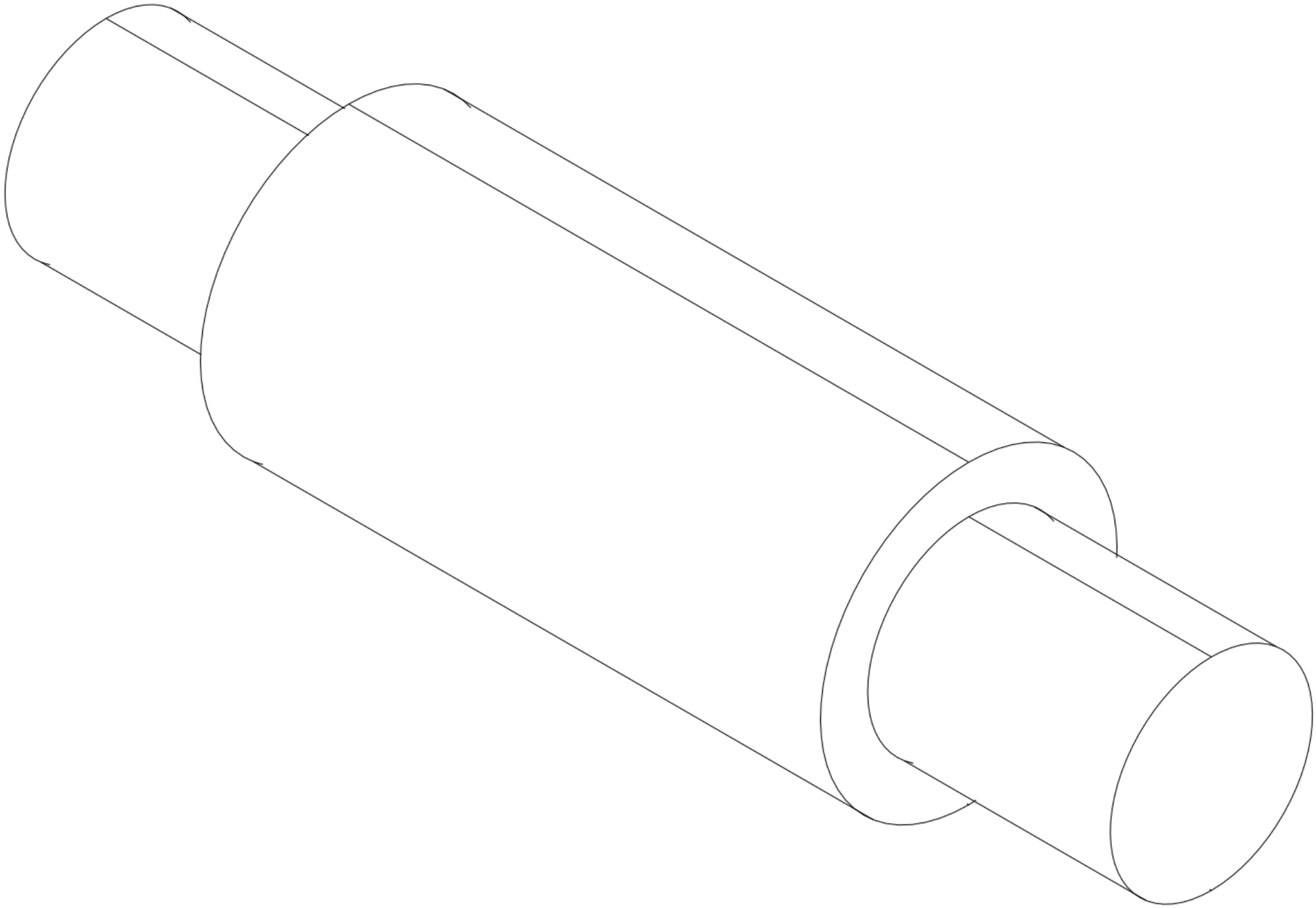
RIGHT SIDE VIEW

NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.
3. VIEWS IN THIRD ANGLE PROJECTION.

UNITS	SCALE	PROJECTION
MILLIMETRES	**1:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A3**

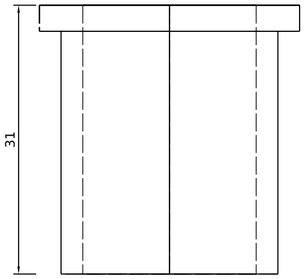
DRAWING NO.	REV	SHEET
MKV-1777CCC0-08	**0**	**8 OF 12**



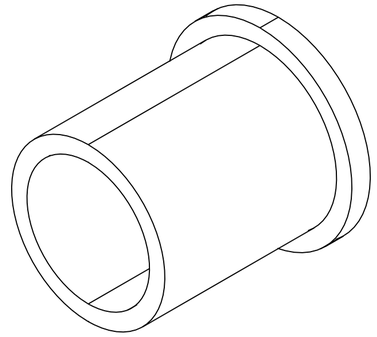
ISOMETRIC VIEW



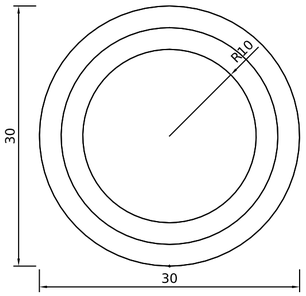
DETAIL 2 · VIEW 2 · SHEET ZONES B3-B4



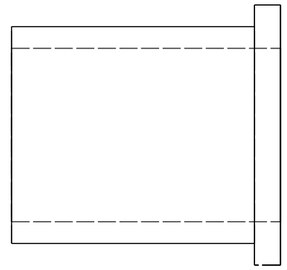
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



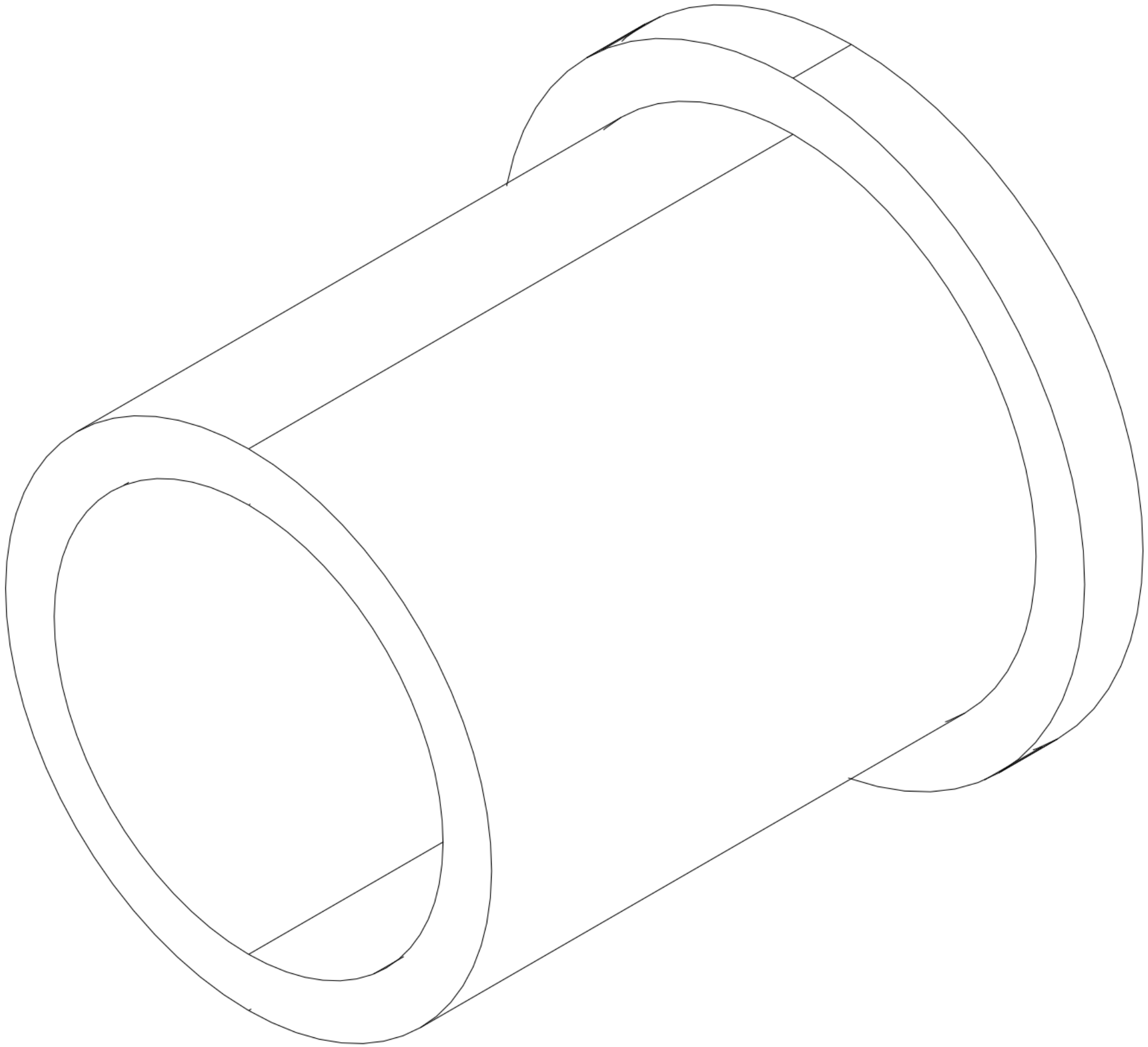
RIGHT SIDE VIEW

NOTES
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3. VIEWS IN THIRD ANGLE PROJECTION.

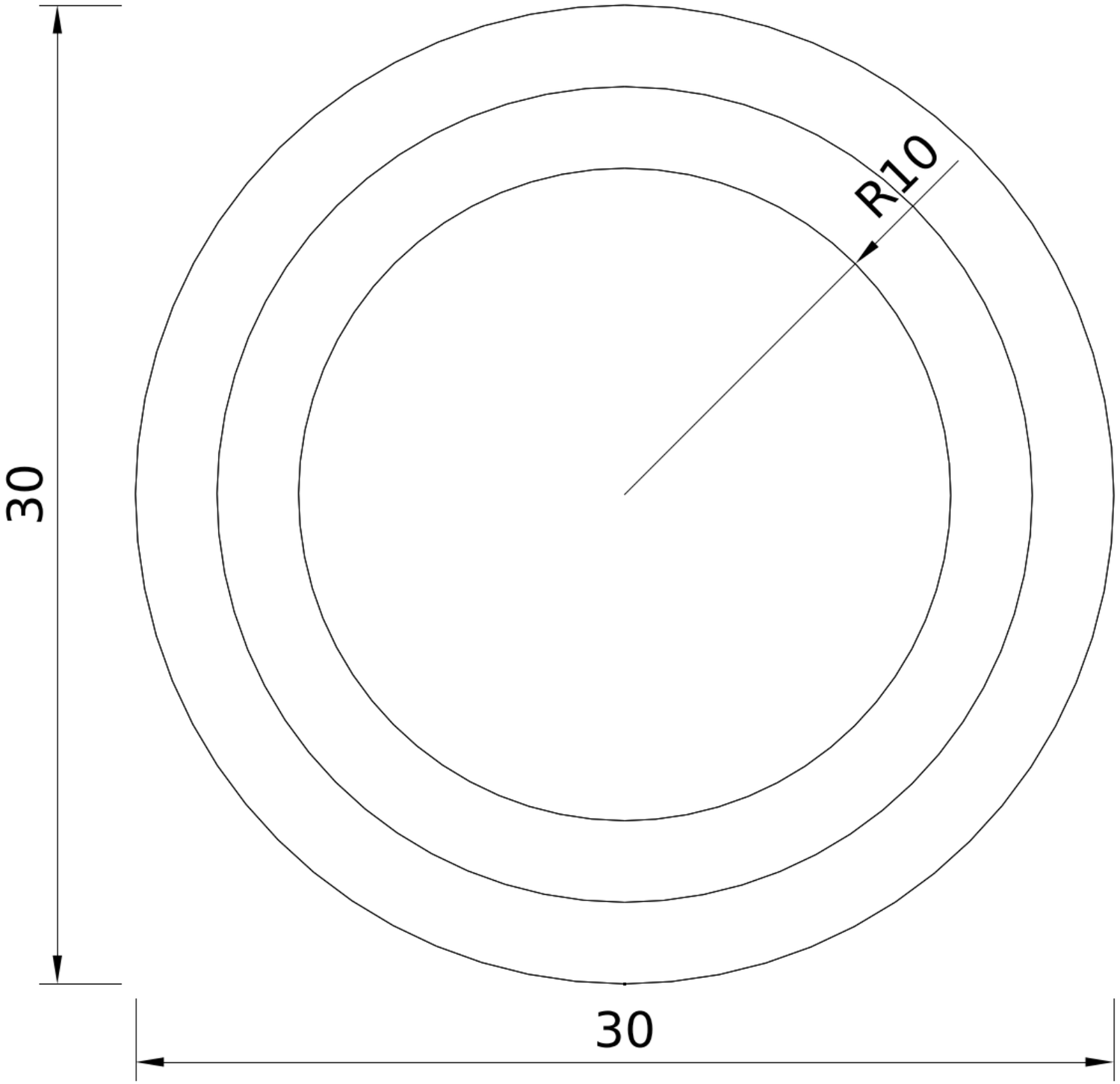
UNITS	SCALE	PROJECTION
MILLIMETRES	**2:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A2**

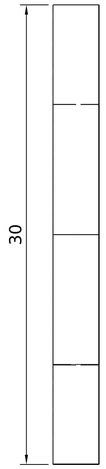
DRAWING NO.	REV	SHEET
MKV-1777CCC0-09	**0**	**9 OF 12**



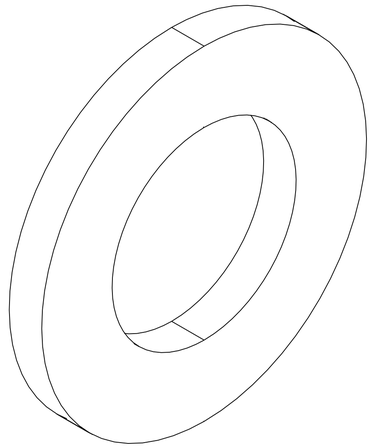
ISOMETRIC VIEW



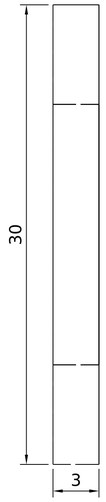
FRONT VIEW



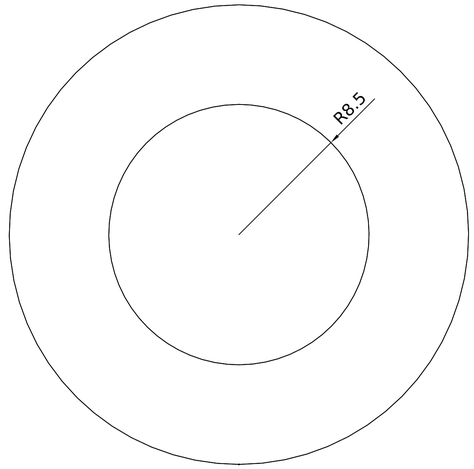
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



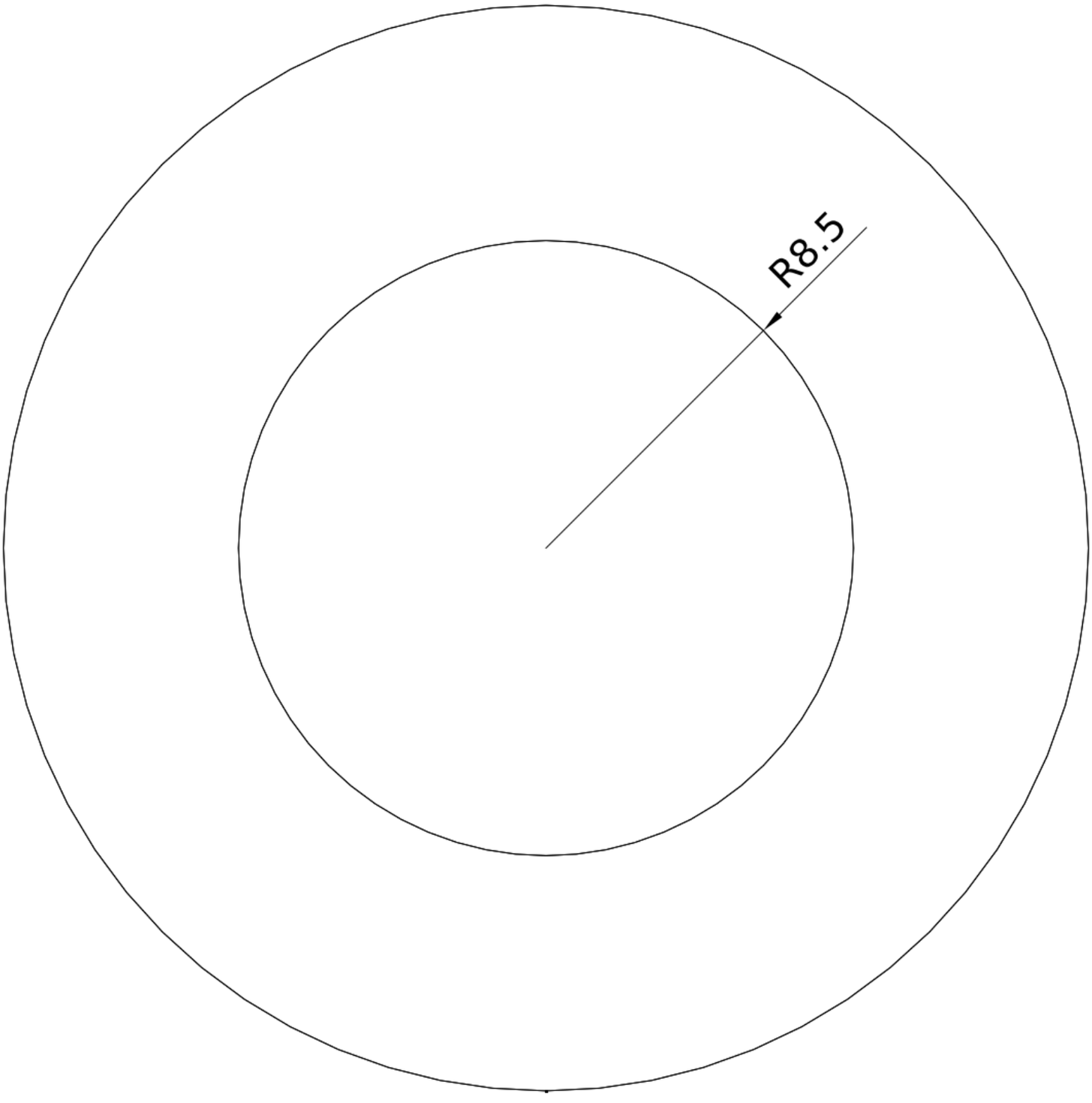
RIGHT SIDE VIEW

NOTES
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3. VIEWS IN THIRD ANGLE PROJECTION.

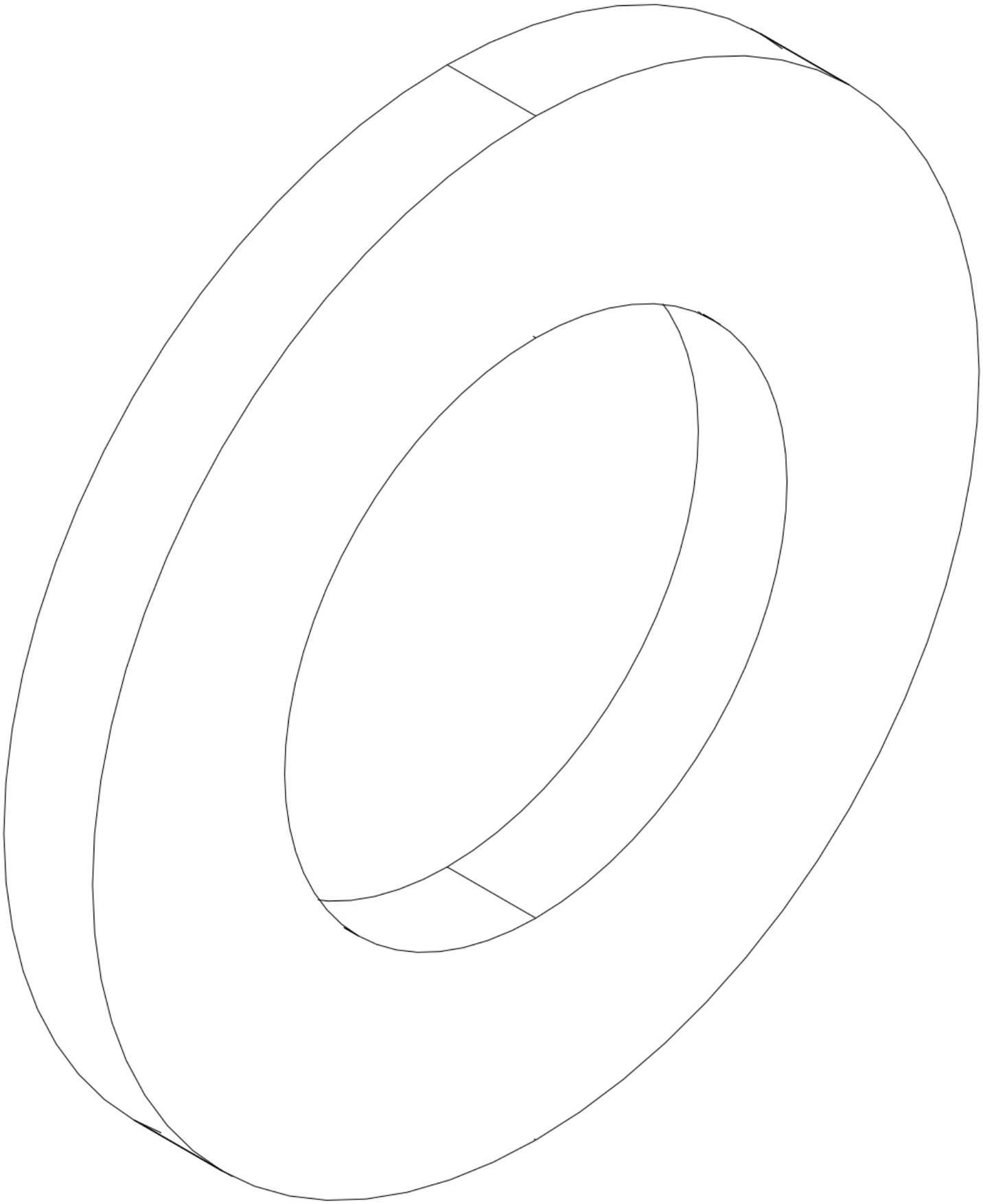
UNITS	SCALE	PROJECTION
MILLIMETRES	**5:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A1**

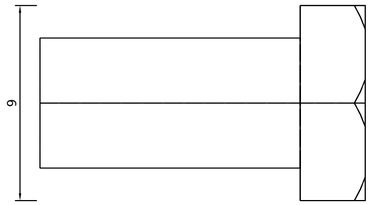
DRAWING NO.	REV	SHEET
MKV-1777CCC0-10	**0**	**10 OF 12**



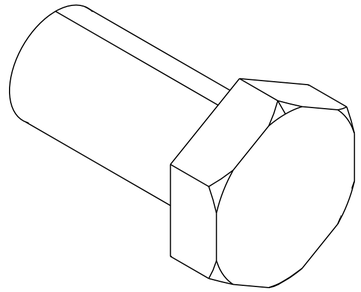
RIGHT SIDE VIEW



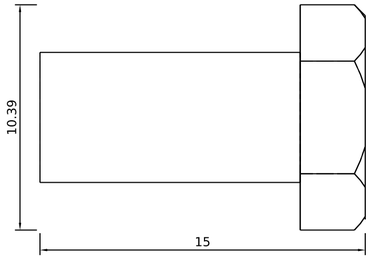
ISOMETRIC VIEW



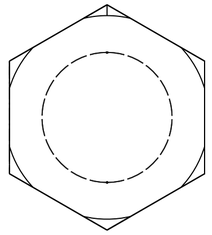
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



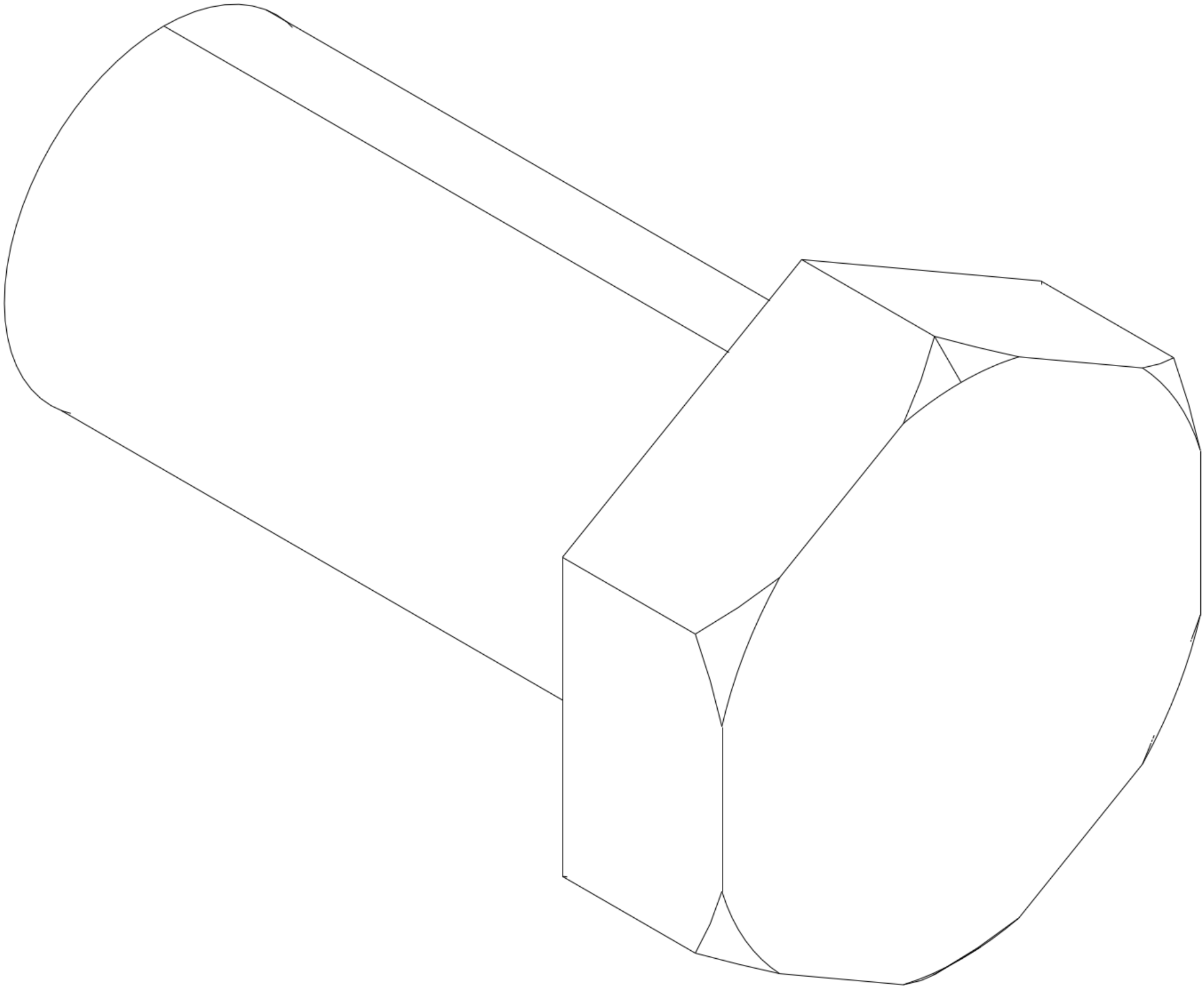
RIGHT SIDE VIEW

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3. VIEWS IN THIRD ANGLE PROJECTION.

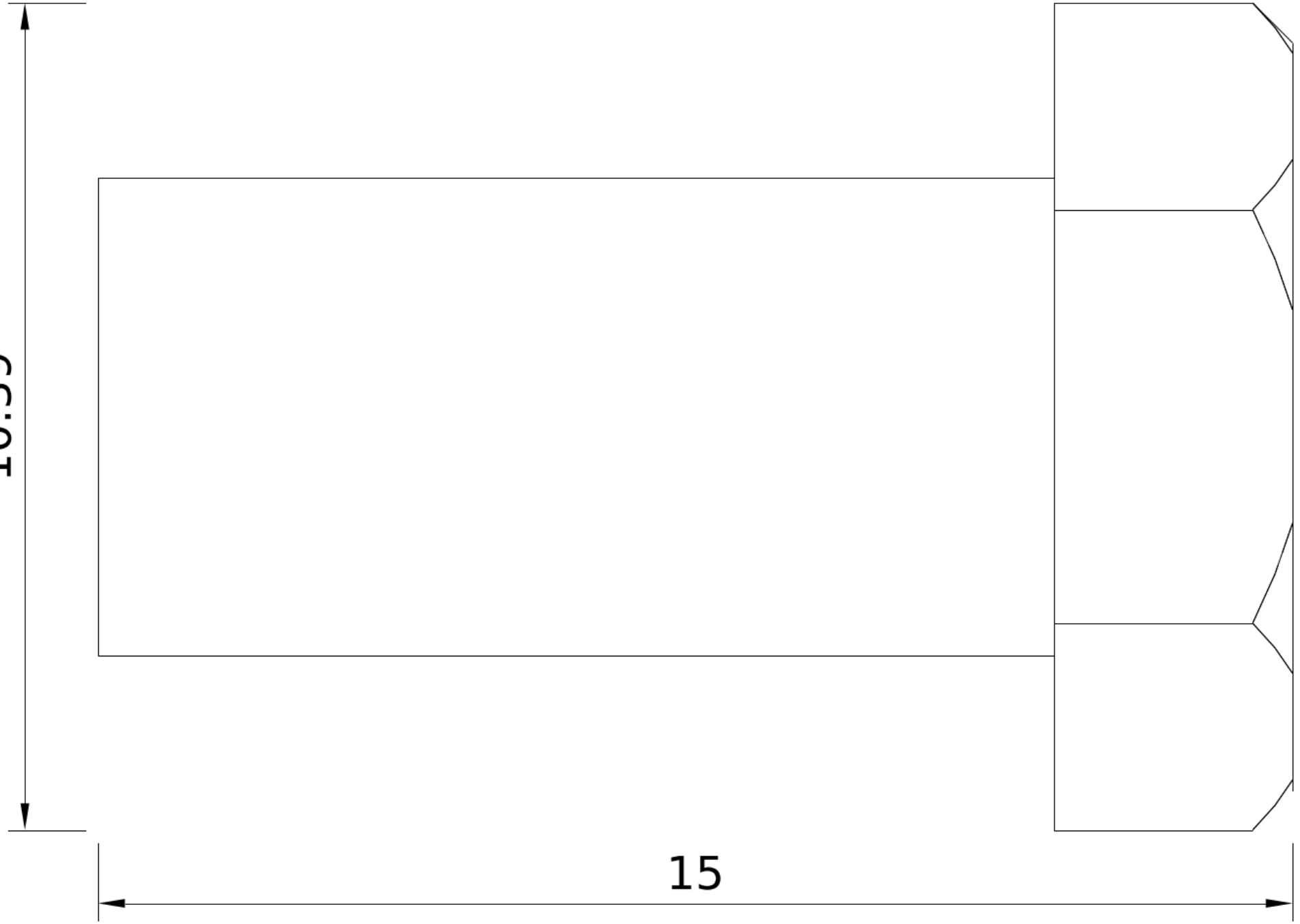
UNITS	SCALE	PROJECTION
MILLIMETRES	**5:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A2**

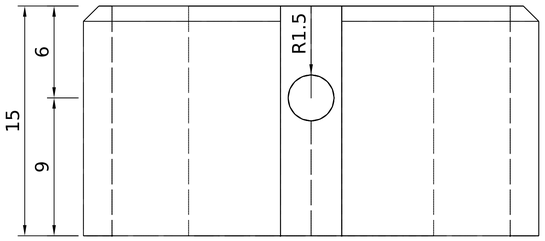
DRAWING NO.	REV	SHEET
MKV-1777CCC0-11	**0**	**11 OF 12**



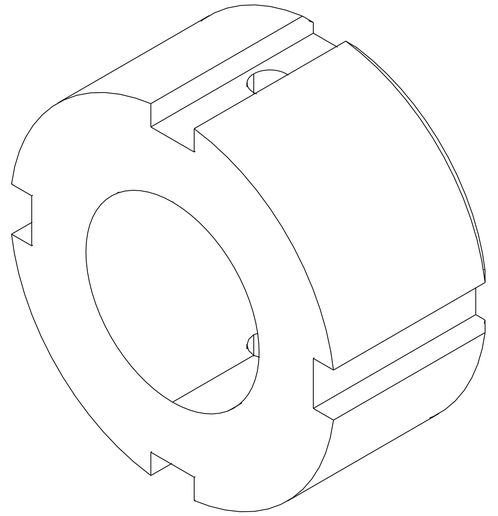
ISOMETRIC VIEW



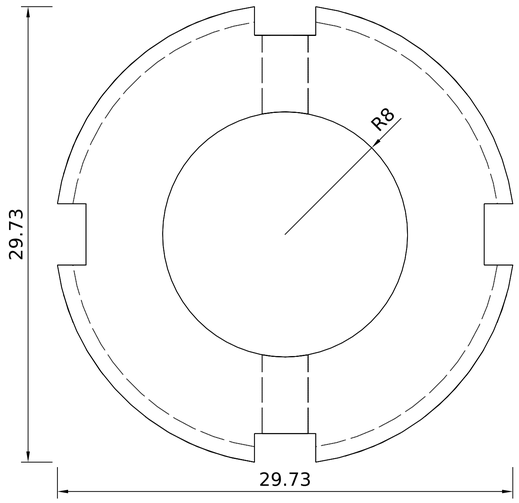
FRONT VIEW



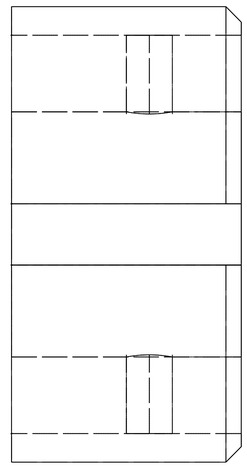
TOP VIEW



ISOMETRIC VIEW



FRONT VIEW



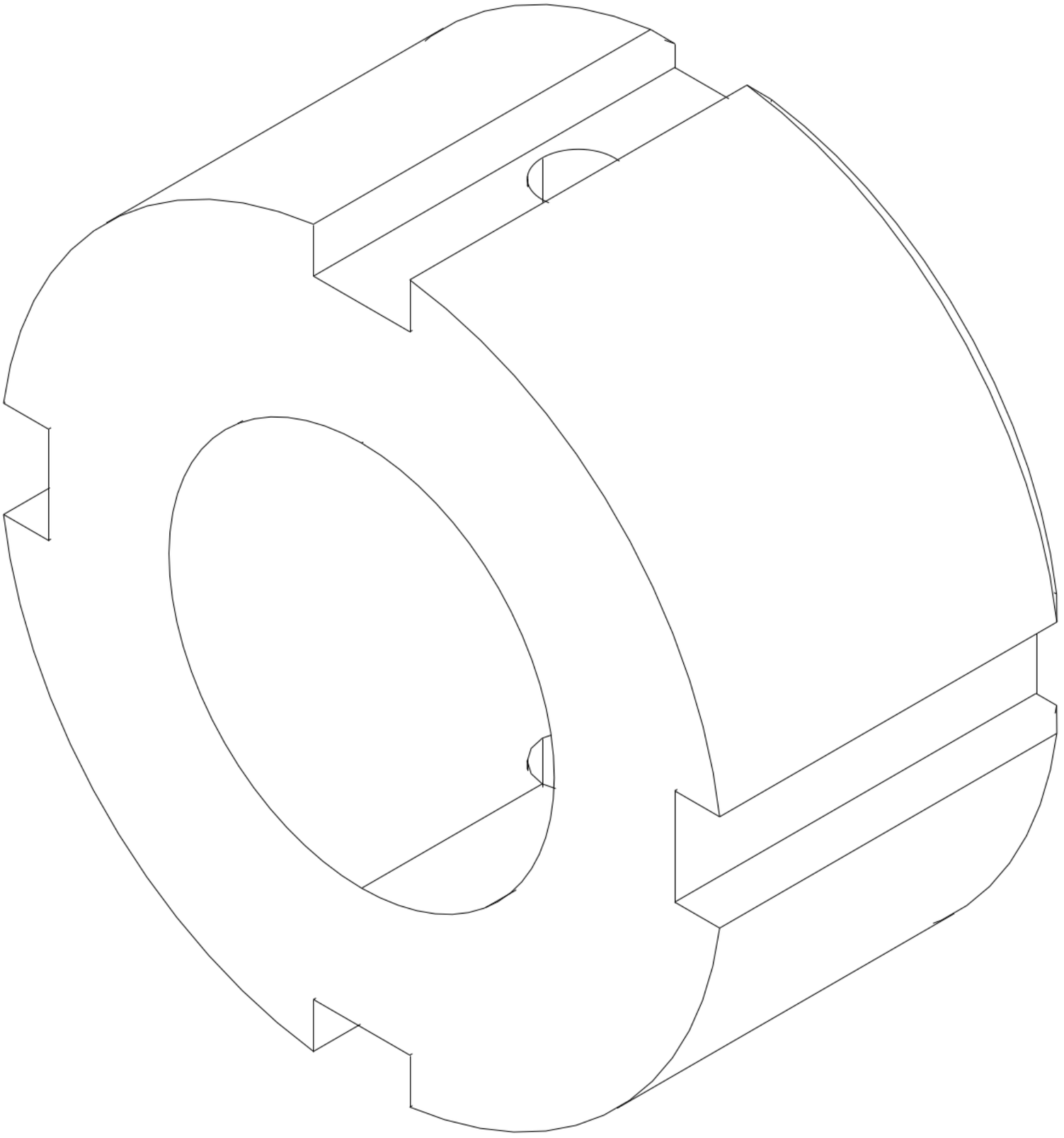
RIGHT SIDE VIEW

NOTES
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3. VIEWS IN THIRD ANGLE PROJECTION.

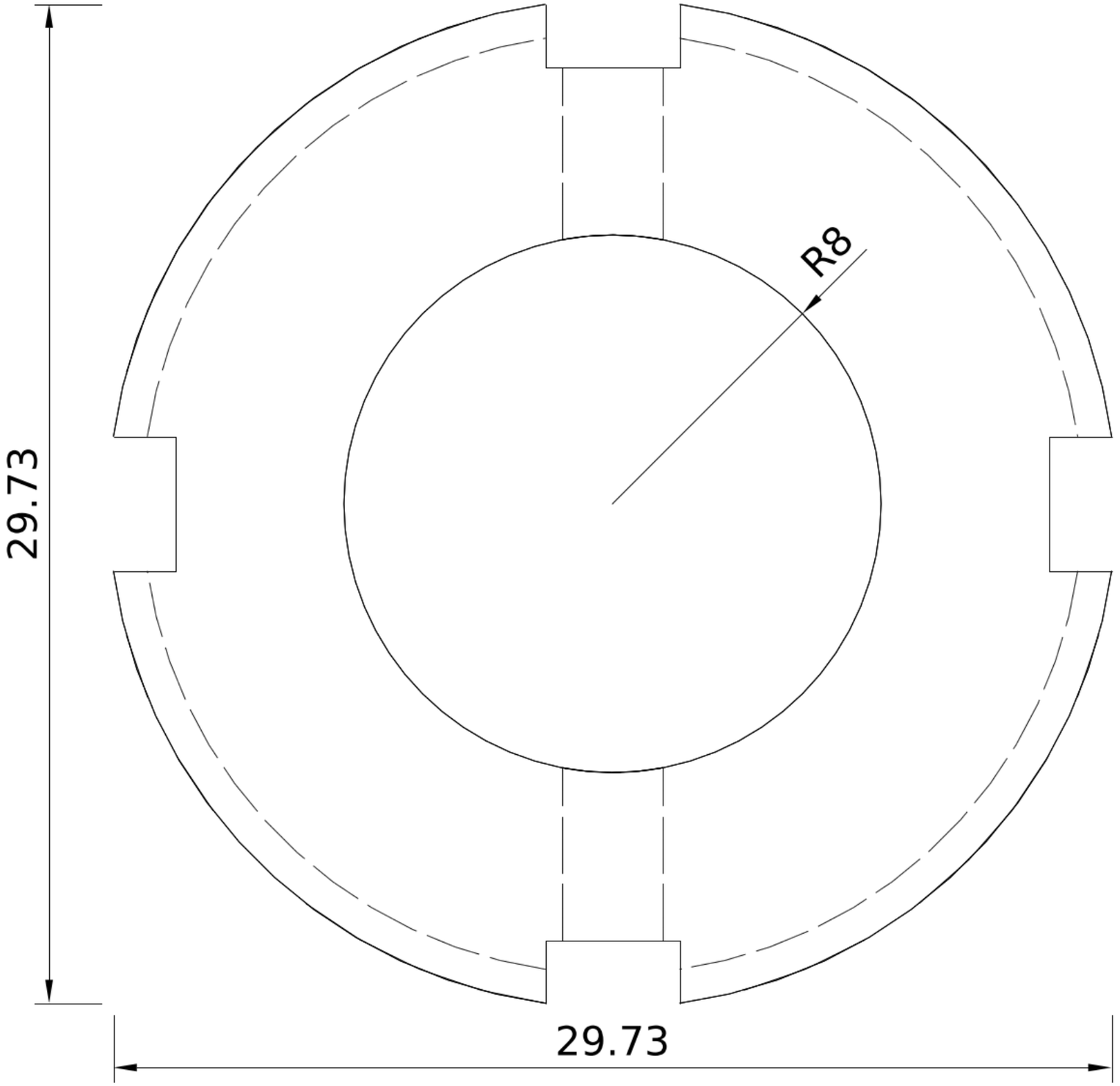
UNITS	SCALE	PROJECTION
MILLIMETRES	**5:1**	

TITLE	SIZE
CRANE HOOK ASSEMBLY	**A1**

DRAWING NO.	REV	SHEET
MKV-1777CCC0-12	**0**	**12 OF 12**



ISOMETRIC VIEW



FRONT VIEW