Model a flanged water control ball valve assembly with eight parts

Software: CATIA V5

Task statement

Build a 3D model of a flanged ball-type water control valve as a product assembly. Work in millimetres. Model each component as its own part, then assemble the parts in a top-level product named water_control_valve_assembly. Overall arrangement and views are on diagram_01.png. Part dimensions are on diagram_01_sheet2.png (ball valve), diagram_01_sheet3.png (inlet housing) and diagram_01_sheet4.png (cap screw), with their detail images.

Name the eight parts exactly: INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT.

INLET_HOUSING:

- Ø152.4 end flange with four Ø19.1 bolt holes.
- Ø50.8 through bore.
- Ø127 mating flange at the opposite end with four Ø12.7 holes.
- Flanges 16.5 thick, with 102.9 between the flange faces.
- 69.9 tapered body section.
- 9.7 thick top mounting pad with a central Ø25.4 hole and two side holes, outlined by R24.15, R12.7 and R50.8 arcs.

BALL_VALVE_SUB:

- Ø52.8 ball with a Ø38.1 through bore, trimmed to flats 34.92 apart and 39.6 tall.
- Ø25.4 stem, 61.56 long.
- 20.9 × 20.9 square tang, 31 long, with 14.43 across the tang.
- 115.7 from the ball centre to the stem top.

CAP_SCREW:

- 41.4 overall length.
- Ø9.7 shank, with 29.5 from the collar underside to the shank end.
- Ø17.3 collar, 2.3 thick.
- Ø11.7 head with a hexagonal socket 6.06 across.
- 1 × 45° chamfer on the head and 1.16 × 45° chamfer on the shank end.

HEXAGONAL_BOLT:

- 40.89 overall length.
- Ø12.70 shank, 28.19 long under the flange, ending in a 1.16 × 45° chamfer.
- Ø24.64 flange, 3.30 thick.
- Hexagon head on an R11.05 corner circle.

HANDLE:

- Flat lever 246 long overall and 20 wide, with an R10 tip.
- R22 hub, 22 tall, with a 21 square socket for the tang.
- Arm cranked through R51 bends at 135° and 137°.

- Ø4 stop pin, 10 long.

OUTLET_HOUSING, THERMOSTAT_FLANGE and LOCK_LEVER:

- Proportion these parts to the assembly views and to their mating features.
- OUTLET_HOUSING has a Ø127 mating flange matching the inlet's four Ø12.7 holes, a Ø50.8 bore and a Ø152.4 end flange.
- THERMOSTAT_FLANGE sits on the top pad, passes the Ø25.4 stem and takes four Ø9.7 cap screws.
- LOCK_LEVER is a plate on the stem.

Assembly:

- Inlet and outlet housings coaxial along the flow axis.
- Ball seated in the body with the stem vertical.
- Thermostat flange on the top pad, held by four cap screws.
- Lock lever on the stem, with two hexagonal bolts at the housing joint.
- Handle on the square tang, extending sideways.

The product contains 12 instances of 8 parts: 4 × CAP_SCREW, 2 × HEXAGONAL_BOLT and one each of the other six.

Rubrics

- **R1:** The model shall include an INLET_HOUSING part with a Ø152.4 end flange carrying four Ø19.1 holes.
- **R2:** The INLET_HOUSING shall have a Ø50.8 through bore along the flow axis.
- **R3:** The INLET_HOUSING shall have a Ø127 mating flange with four Ø12.7 holes at the opposite end from the Ø152.4 flange.
- **R4:** The INLET_HOUSING shall have flanges 16.5 thick and a 102.9 dimension between its flange faces.
- **R5:** The INLET_HOUSING shall carry a 9.7 thick top mounting pad with a central Ø25.4 hole.
- **R6:** The BALL_VALVE_SUB part shall have a Ø52.8 spherical ball with a Ø38.1 through bore.
- **R7:** The BALL_VALVE_SUB ball shall be trimmed to parallel flats 34.92 apart.
- **R8:** The BALL_VALVE_SUB shall have a Ø25.4 stem 61.56 long ending in a 20.9 × 20.9 square tang 31 long.
- **R9:** The BALL_VALVE_SUB shall measure 115.7 from the ball centre to the top of the stem.
- **R10:** The CAP_SCREW part shall be 41.4 long overall with a Ø9.7 shank and a Ø17.3 collar 2.3 thick.
- **R11:** The CAP_SCREW shall have a Ø11.7 head with a hexagonal socket 6.06 across.
- **R12:** The CAP_SCREW shall have a 1 × 45° chamfer on the head and a 1.16 × 45° chamfer on the shank end.
- **R13:** The HEXAGONAL_BOLT part shall be 40.89 long overall with a Ø12.70 shank and a Ø24.64 flange.
- **R14:** The model shall be built in millimetre units.
- **R15:** The model shall be organised as a product named water_control_valve_assembly referencing separate parts INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE and HEXAGONAL_BOLT.
- **R16:** The product shall contain 12 component instances: 4 CAP_SCREW, 2 HEXAGONAL_BOLT and one each of the other six parts.
- **R17:** The assembly shall position the inlet and outlet housings coaxially along the flow axis.
- **R18:** The assembly shall position the ball valve stem vertically, with the handle fitted on its square tang.

Input files

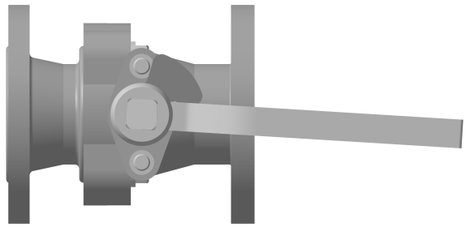
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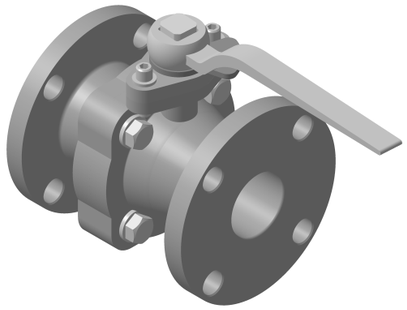
Deliverables

- **.catproduct:** output_files/project_files/water_control_valve_assembly.CATProduct: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/INLET_HOUSING.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/OUTLET_HOUSING.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/BALL_VALVE_SUB.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/CAP_SCREW.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/THERMOSTAT_FLANGE.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.

- **.catpart:** output_files/project_files/LOCK_LEVER.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/HANDLE.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.
- **.catpart:** output_files/project_files/HEXAGONAL_BOLT.CATPart: A CATIA V5 product, water_control_valve_assembly.CATProduct, referencing eight CATPart files (INLET_HOUSING, OUTLET_HOUSING, BALL_VALVE_SUB, CAP_SCREW, THERMOSTAT_FLANGE, LOCK_LEVER, HANDLE, HEXAGONAL_BOLT) assembled as 12 instances.



Top view
Scale: 1:2



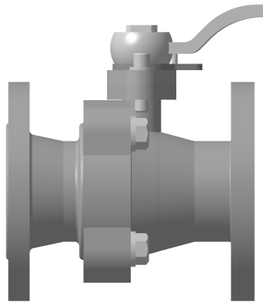
Isometric view
Scale: 1:2

Bill of Material: Product1

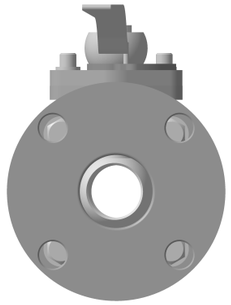
Quantity	Part Number	Type
1	Part2	Inlet Housing
1	Part1	Outlet Housing
4	Part6	Cap Screw
1	Part4	Ball Valve
1	Part3	Thermostat Flange
1	Part5	Lock Lever
2	Part7	Hexagonal Bolt
1	part8	Handle

Recapitulation of: Product1
Different parts: 8
Total parts: 12

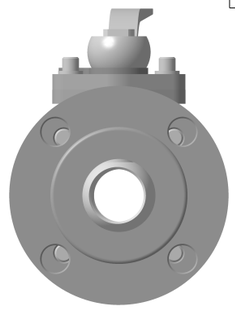
Quantity	Part Number
1	Part2
1	Part1
4	Part6
1	Part4
1	Part3
1	Part5
2	Part7
1	part8



Front view
Scale: 1:2



Right view
Scale: 1:2



Left view
Scale: 1:2

DESIGNED BY: chara	ASSEMBLY		I –
DATE: 02-09-2026			H –
CHECKED BY: XXX			G –
DATE: XXX			F –
SIZE: A2	DASSAULT SYSTEMES		E –
			D –
			C –
SCALE: 1:1	WEIGHT (kg): XXX	DRAWING NUMBER: WATER CONTROL VALVE	SHEET: 1/1
			B –
			A –

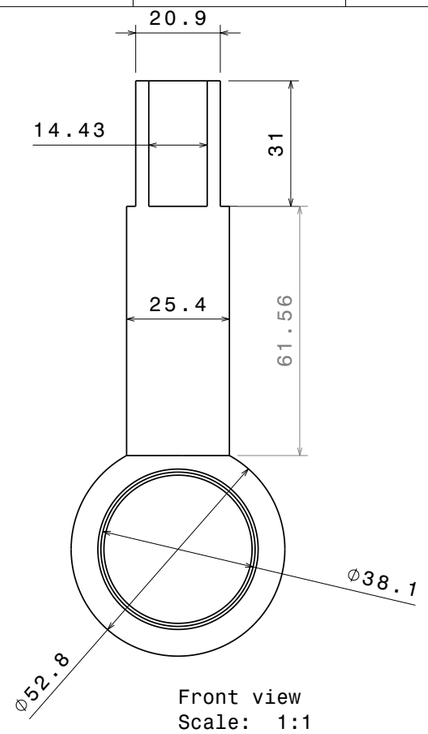
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NOTES
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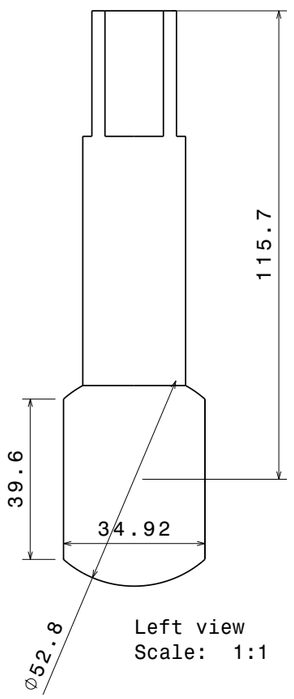
UNITS	SCALE	PROJECTION
AS SHOWN	**AS SHOWN**	

TITLE	SIZE
FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS	**A3**

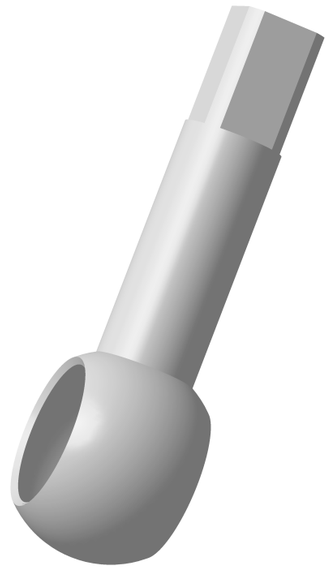
DRAWING NO.	REV	SHEET
MKV-9A9C5580-01	**0**	**1 OF 6**



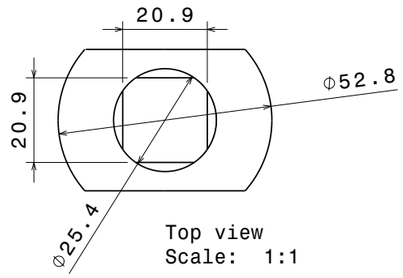
Front view
Scale: 1:1



Left view
Scale: 1:1



Isometric view
Scale: 1:1



Top view
Scale: 1:1

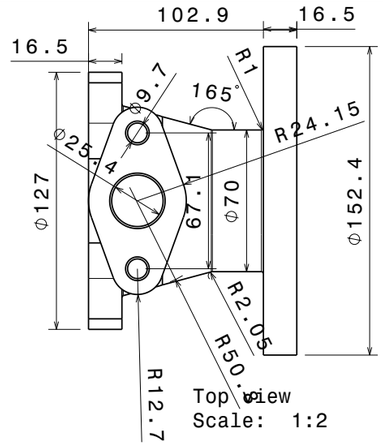
DESIGNED BY: charan	water control valve
DATE: 02-09-2026	
CHECKED BY: XXX	
DATE: XXX	
SIZE A3	DASSAULT SYSTEMES
SCALE 1:1 / WEIGHT (kg) XXX / DRAWING NUMBER 4.Ball valve / SHEET 1/4	

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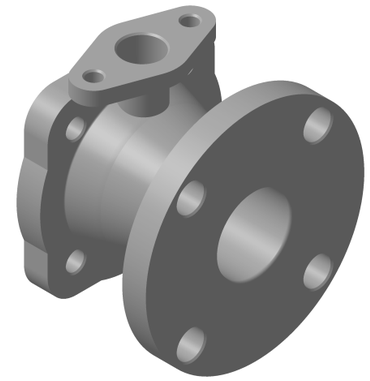
I	_
H	_
G	_
F	_
E	_
D	_
C	_
B	_
A	_

NOTES
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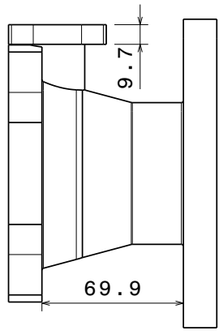
UNITS: AS SHOWN	SCALE: **AS SHOWN**	PROJECTION:
TITLE: **FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS**		SIZE: **A3**
DRAWING NO.: **MKV-9A9C5580-02**	REV: **0**	SHEET: **2 OF 6**



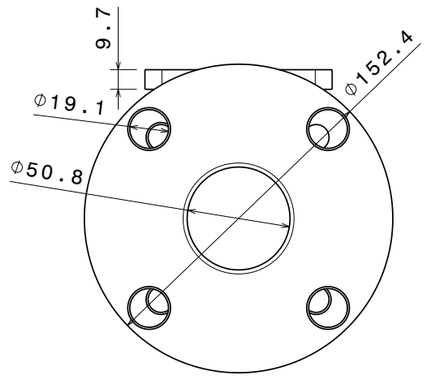
Top view
Scale: 1:2



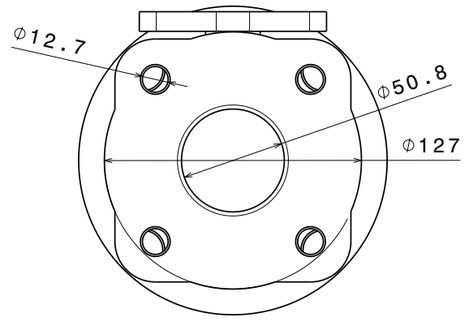
Isometric view
Scale: 1:2



Front view
Scale: 1:2



Right view
Scale: 1:2



Left view
Scale: 1:2

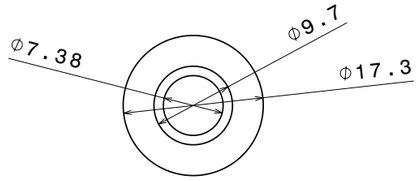
DESIGNED BY: charan	water control valve
DATE: 02-09-2026	
CHECKED BY: XXX	
DATE: XXX	
SIZE A3	DASSAULT SYSTEMES
SCALE 1:2 / WEIGHT (kg) XXX / DRAWING NUMBER 2.Inlet Housing / SHEET 1/2	

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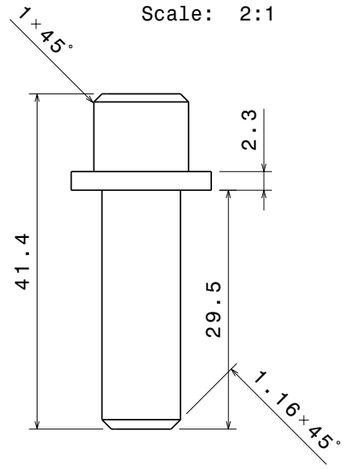
I	_
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NOTES
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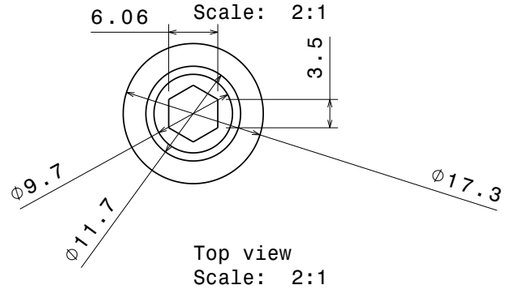
UNITS: AS SHOWN	SCALE: **AS SHOWN**	PROJECTION:
TITLE: **FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS**		SIZE: **A3**
DRAWING NO.: **MKV-9A9C5580-03**	REV: **0**	SHEET: **3 OF 6**



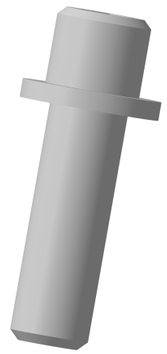
Bottom view
Scale: 2:1



Front view
Scale: 2:1



Top view
Scale: 2:1



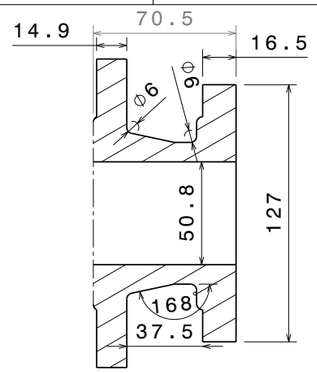
Isometric view
Scale: 2:1

DESIGNED BY: charan	water control valve		I _
DATE: 02-09-2026			H _
CHECKED BY: XXX			G _
DATE: XXX			F _
SIZE A3	DASSAULT SYSTEMES		E _
			D _
			C _
SCALE 2:1 / WEIGHT (kg) XXX / DRAWING NUMBER 6.Cap screw / SHEET 1/6			B _
			A _

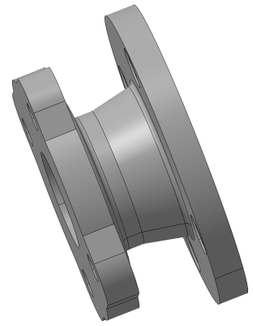
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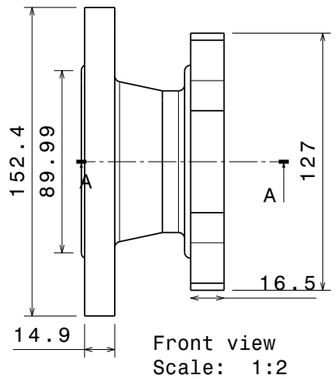
UNITS: AS SHOWN	SCALE: **AS SHOWN**	PROJECTION:
TITLE: **FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS**		SIZE: **A3**
DRAWING NO.: **MKV-9A9C5580-04**	REV: **0**	SHEET: **4 OF 6**



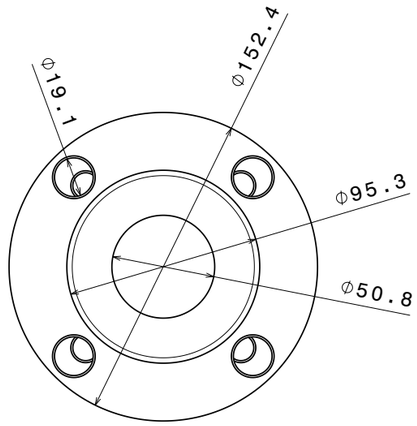
Section view A-A
Scale: 1:2



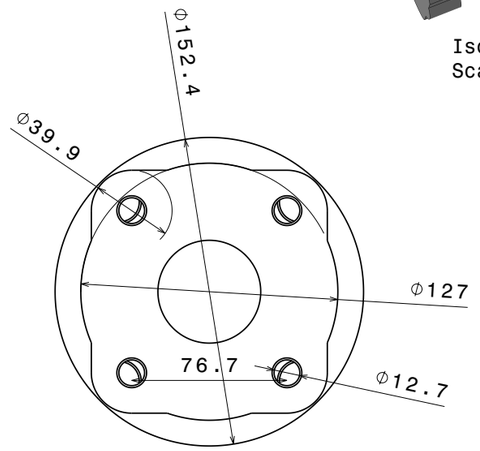
Isometric view
Scale: 1:2



Front view
Scale: 1:2



Left view
Scale: 1:2



Right view
Scale: 1:2

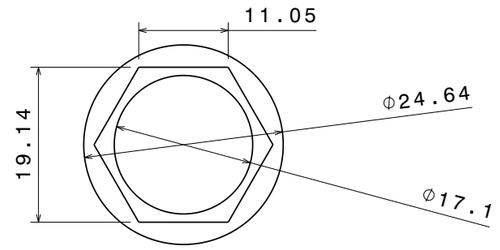
NOTE: 1.All dimensions are in mm

2.All chamfer values are 1X45°

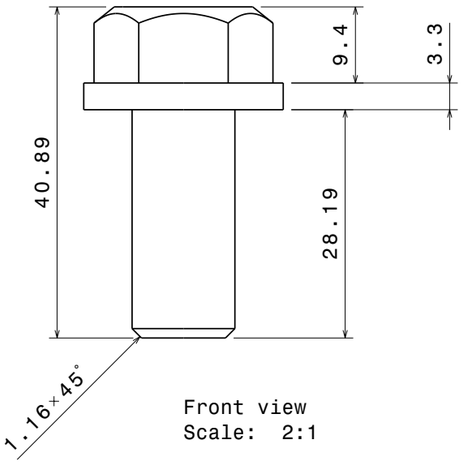
DESIGNED BY: charan	water control valve		I _
DATE: 02-09-2026			H _
CHECKED BY: XXX			G _
DATE: XXX			F _
SIZE A3	DASSAULT SYSTEMES		E _
			D _
			C _
SCALE 1:2	WEIGHT (kg) XXX	DRAWING NUMBER 01.outlet Housing	SHEET 1/1 B _
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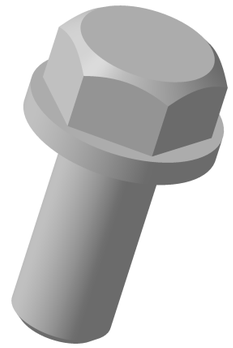
UNITS AS SHOWN	SCALE **AS SHOWN**	PROJECTION
TITLE **FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS**		SIZE **A3**
DRAWING NO. **MKV-9A9C5580-05**	REV **0**	SHEET **5 OF 6**



Top view
Scale: 2:1



Front view
Scale: 2:1



Isometric view
Scale: 2:1

DESIGNED BY: charan	water control valve
DATE: 02-09-2026	
CHECKED BY: XXX	
DATE: XXX	
SIZE A3	DASSAULT SYSTEMES
SCALE 2:1 / WEIGHT (kg) XXX / DRAWING NUMBER 7.Hexagonal Bolt / SHEET 1/7	

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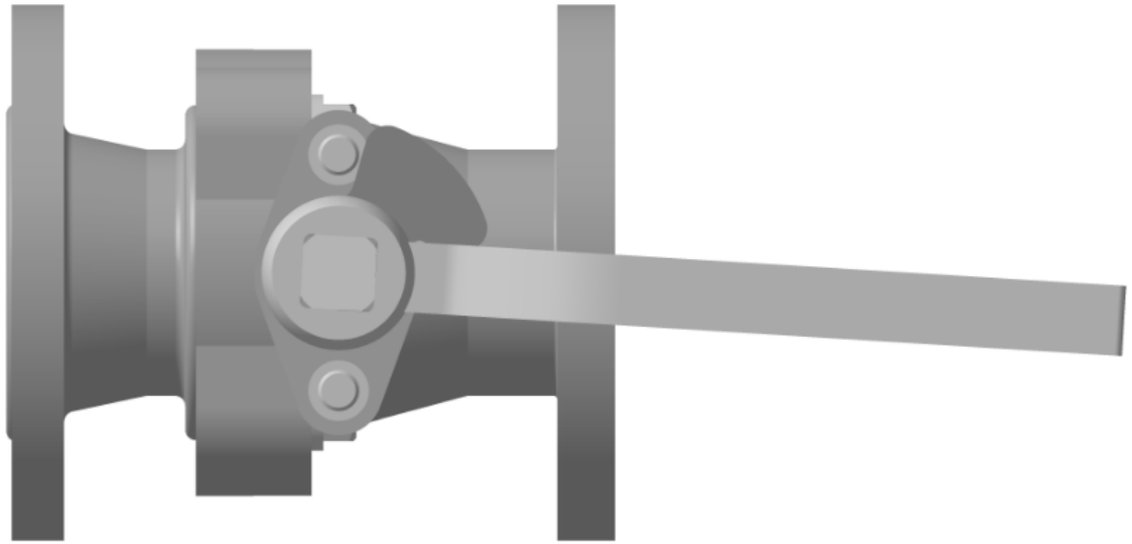
I	_
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NOTES
1. DO NOT SCALE THE DRAWING; USE THE FIGURED DIMENSIONS.

UNITS	SCALE	PROJECTION
AS SHOWN	**AS SHOWN**	

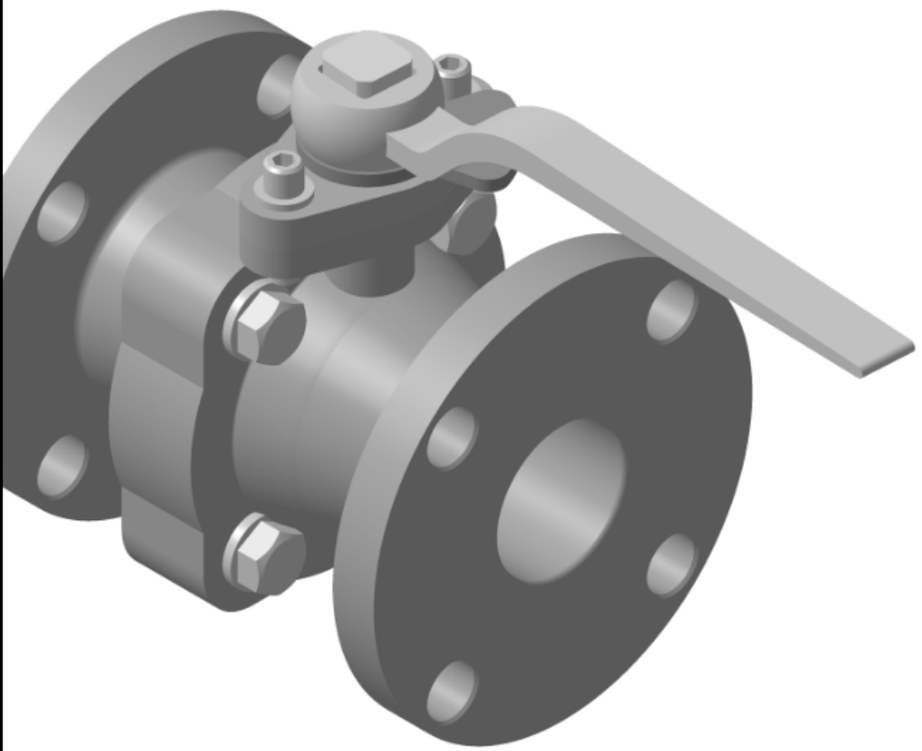
TITLE	SIZE
FLANGED WATER CONTROL BALL VALVE ASSEMBLY WITH EIGHT PARTS	**A3**

DRAWING NO.	REV	SHEET
MKV-9A9C5580-06	**0**	**6 OF 6**





Top view
Scale: 1:2



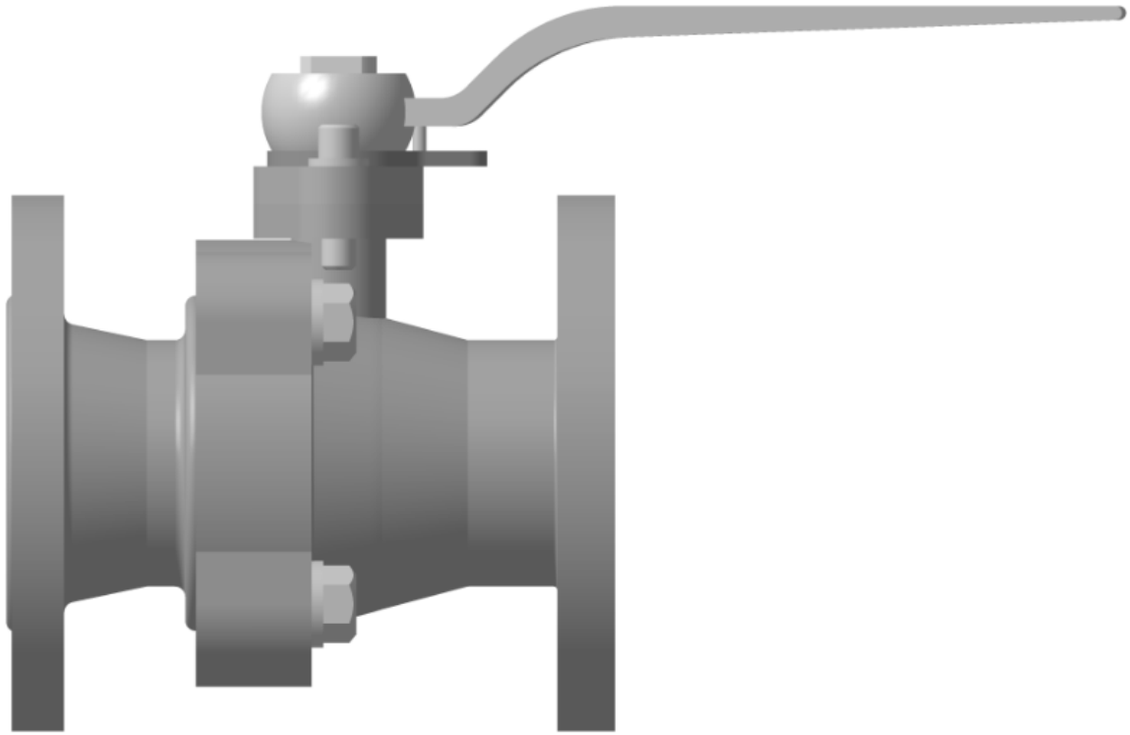
Isometric view
Scale: 1:2

Bill of Material: Product1

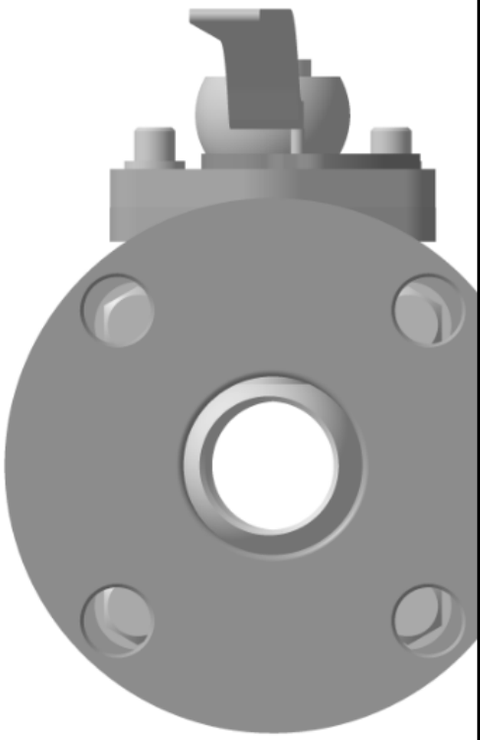
Quantity	Part Number	Type		
1	Part2	Inlet Housing		
1	Part1	Outlet Housing		
4	Part6	Cap Screw		
1	Part4	Ball Valve		
1	Part3	Thermostat Flange		
1	Part5	Lock Lever		
2	Part7	Hexagonal Bolt		
1	part8	Handle		

Recapitulation of: Product1
Different parts: 8
Total parts: 12

Quantity	Part Number
1	Part2
1	Part1
4	Part6
1	Part4
1	Part3
1	Part5
2	Part7
1	part8



Front view
Scale: 1:2

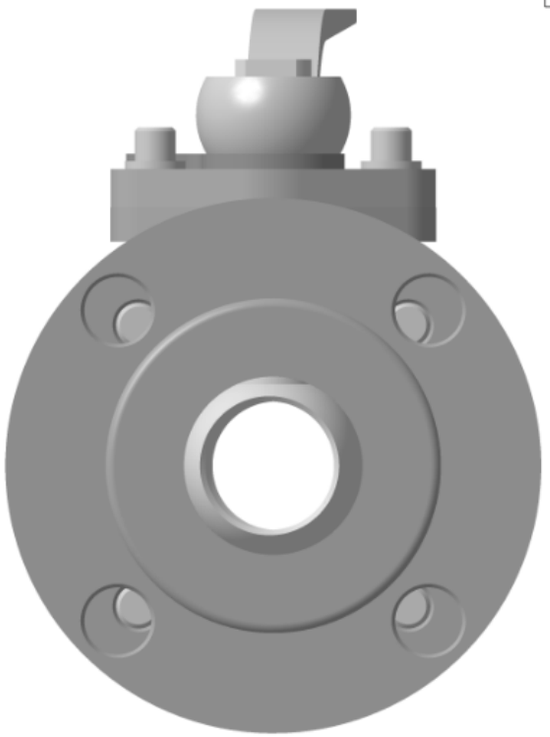


Right view
Scale: 1:

1	Part3
1	Part5
2	Part7
1	part8



Right view
Scale: 1:2



Left view
Scale: 1:2

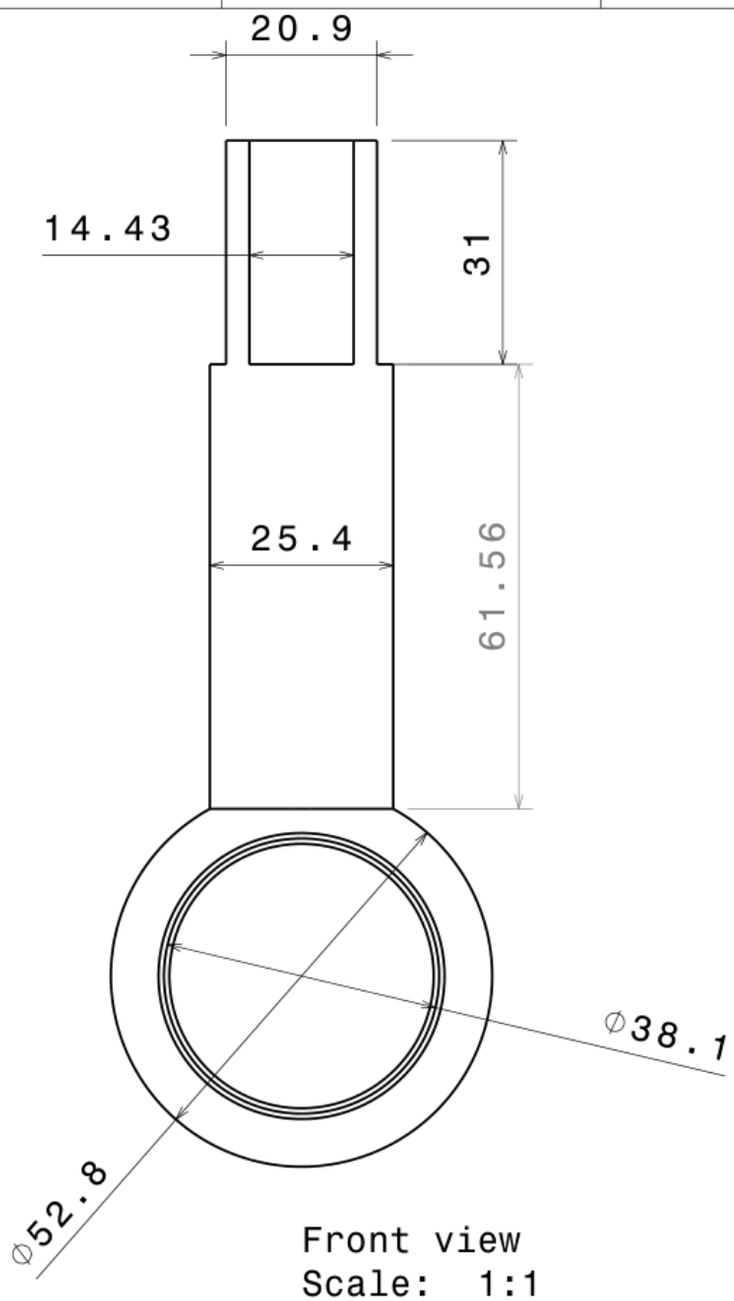
DESIGNED BY: chara DATE: 02-09-2026		# ASSEMBLY	
CHECKED BY: XXX DATE: XXX			
SIZE A2		DASSAULT SYSTEMES	
SCALE 1:1	WEIGHT (kg) XXX	DRAWING NUMBER WATER CONTROL VALVE	SHEET 1/1

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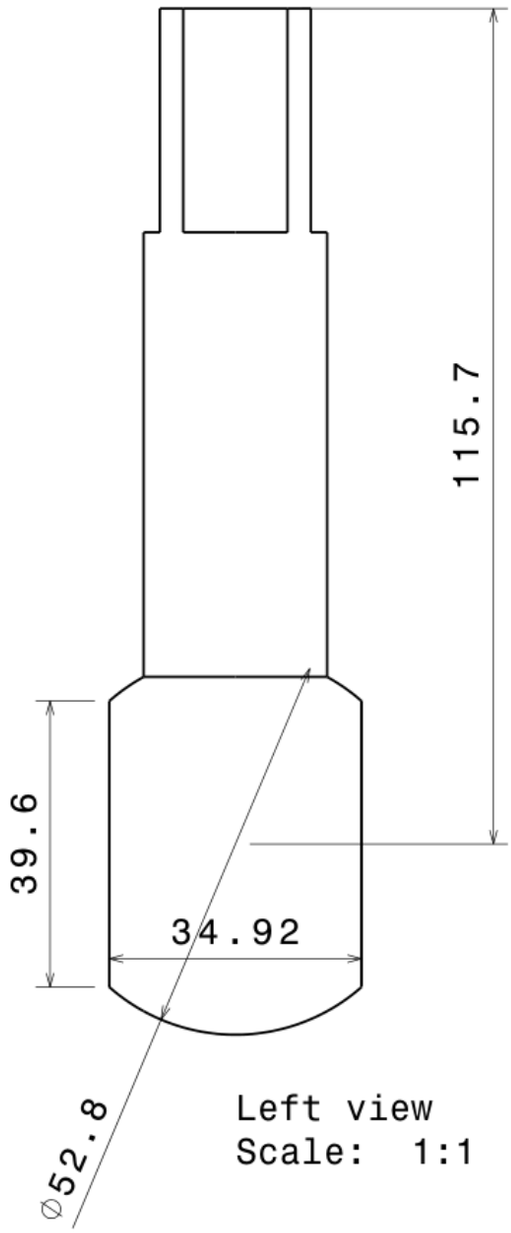
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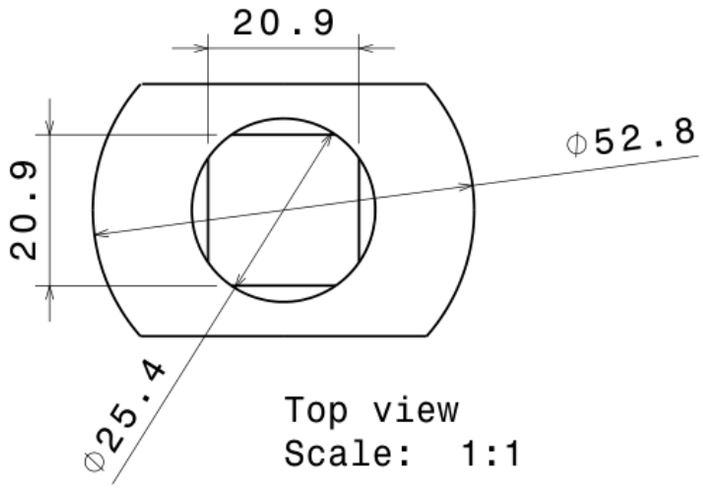
B A



Front view
Scale: 1:1



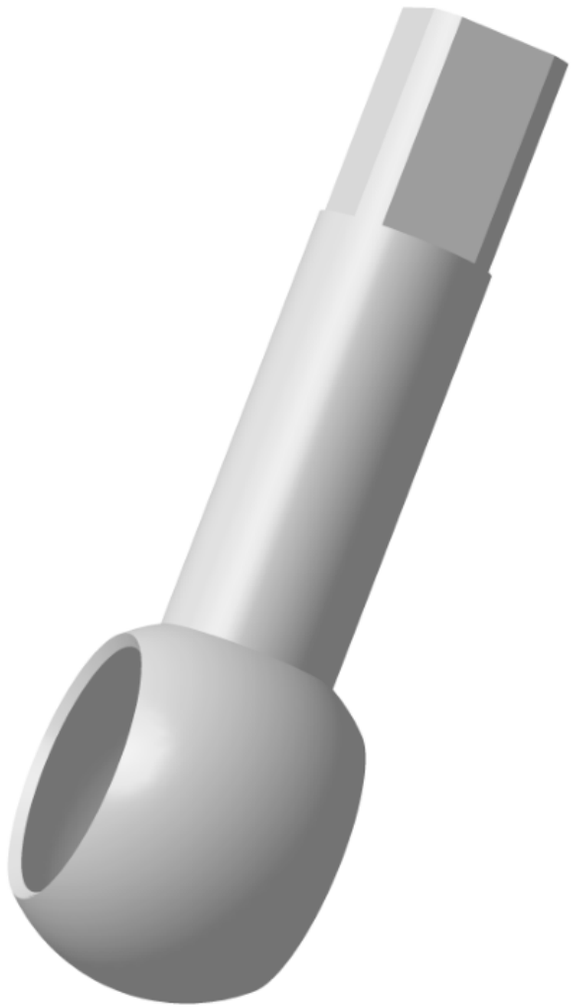
Left view
Scale: 1:1



Top view
Scale: 1:1

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1:
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115.7

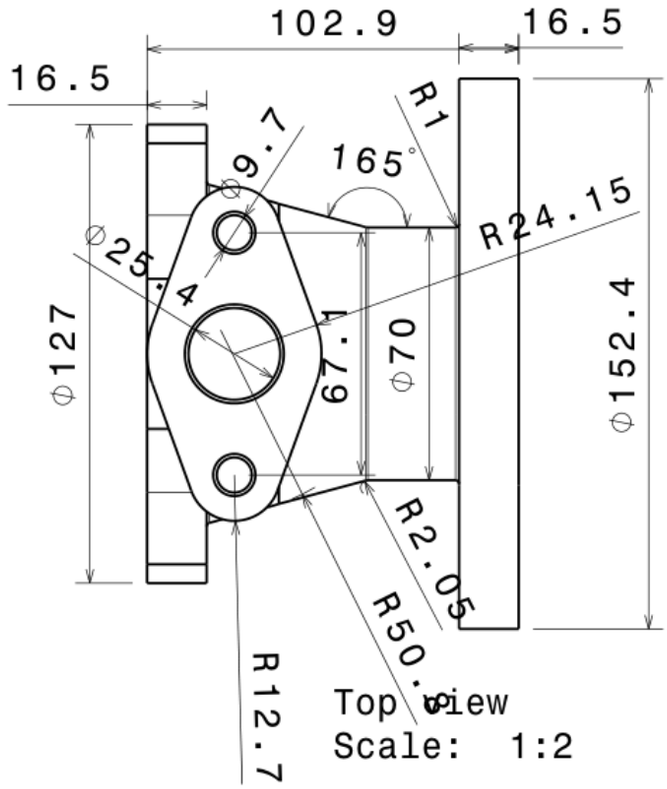


Isometric view
Scale: 1:1

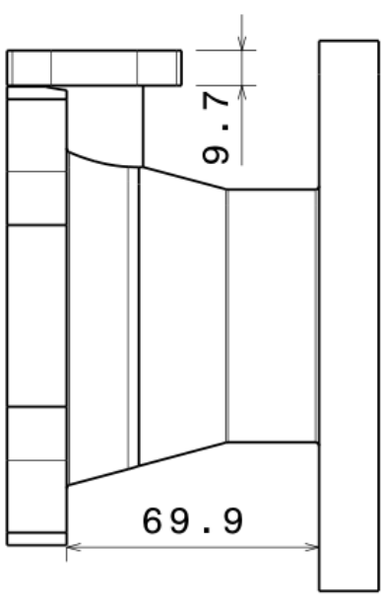
ew
1:1

DESIGNED BY: charan DATE: 02-09-2026	water control valve		I _ H _ G _ F _ E _ D _ C _ B _ A _
CHECKED BY: XXX DATE: XXX			
SIZE A3	DASSAULT SYSTEMES		
SCALE 1:1	WEIGHT (kg) XXX	DRAWING NUMBER 4.Ball valve	SHEET 1/4

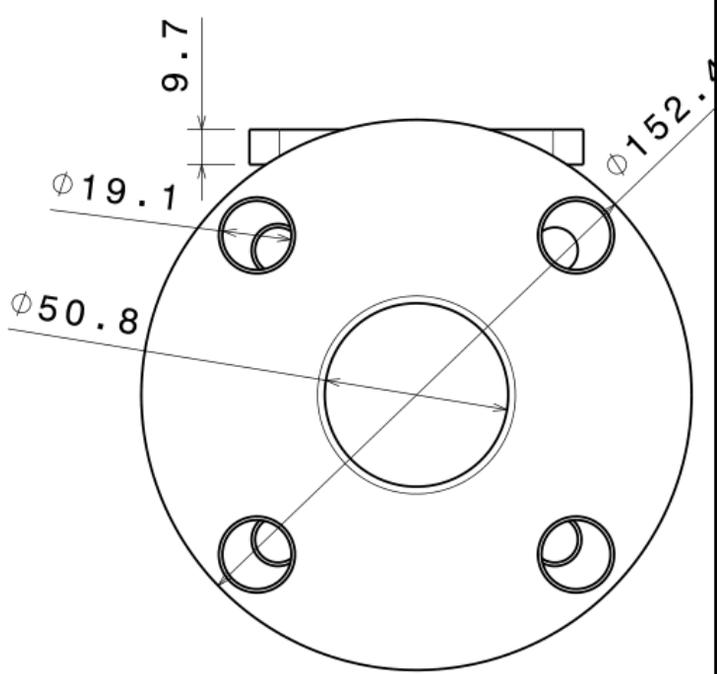
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Top view
Scale: 1:2

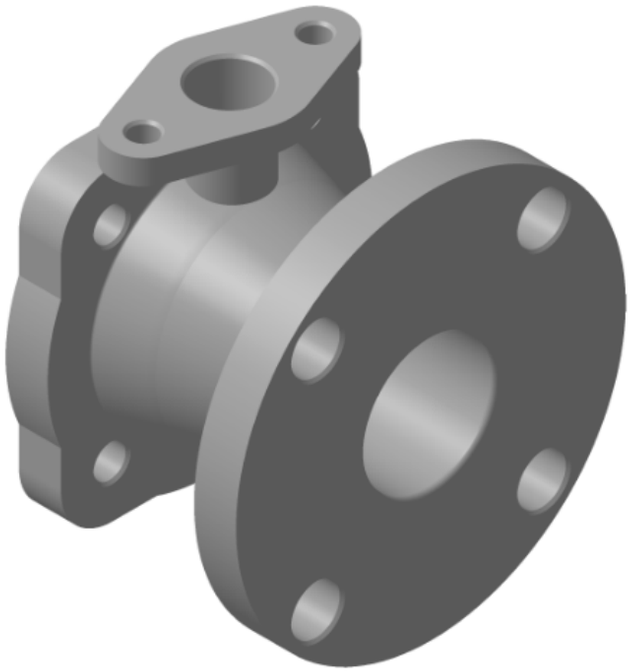


Front view
Scale: 1:2

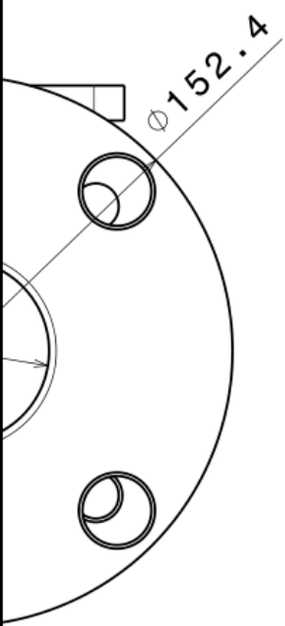


Right view
Scale: 1:2

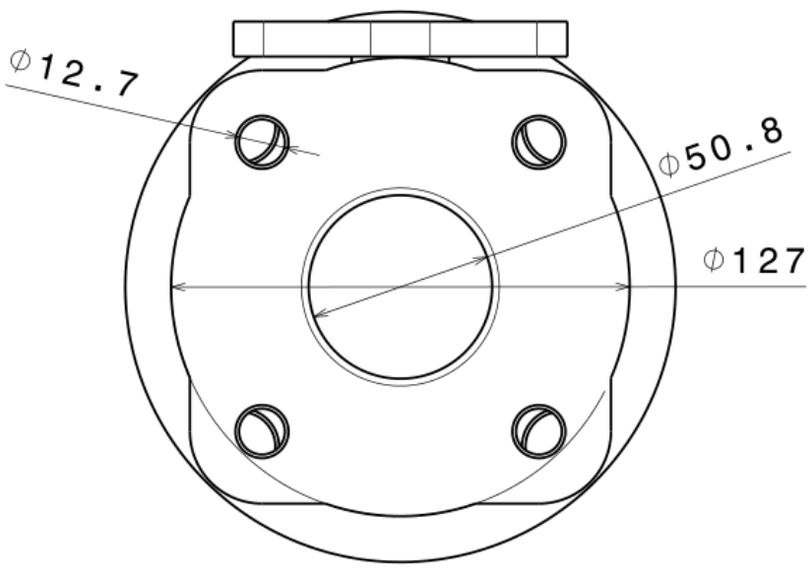
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Isometric view
Scale: 1:2



ght view
ale: 1:2

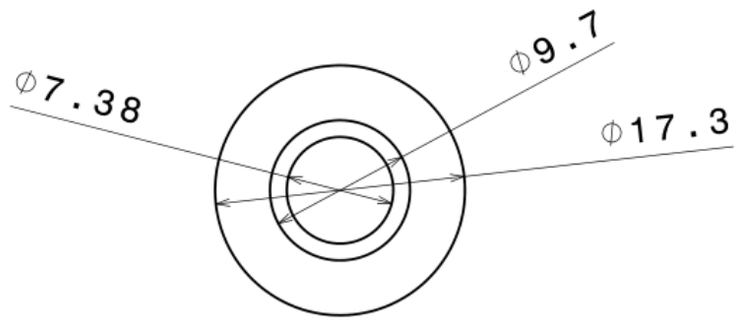


Left view
Scale: 1:2

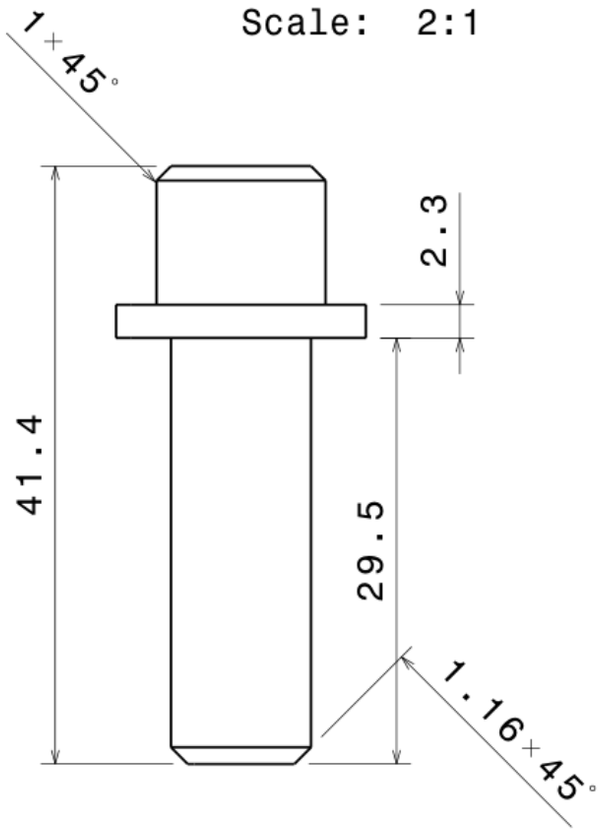
DESIGNED BY: charan DATE: 02-09-2026		water control valve	
CHECKED BY: XXX DATE: XXX			
SIZE A3		DASSAULT SYSTEMES	
SCALE 1:2	WEIGHT (kg) XXX	DRAWING NUMBER 2.Inlet Housing	SHEET 1/2

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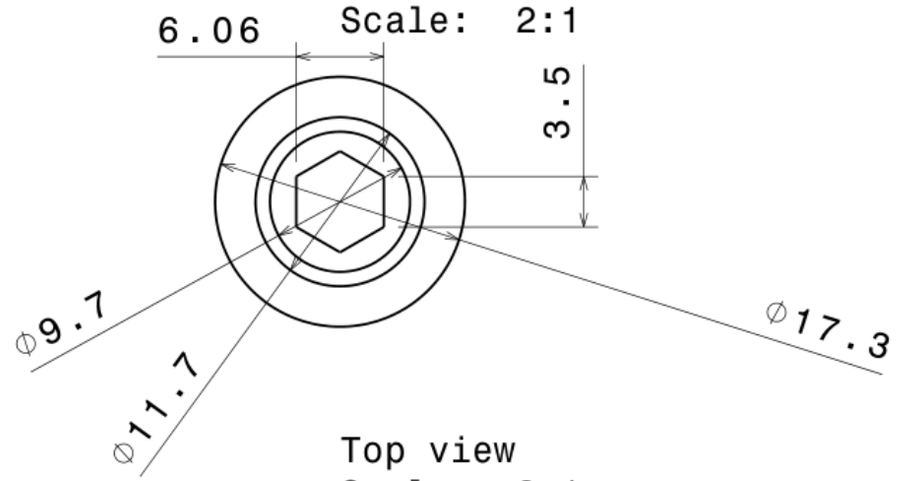
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Bottom view
Scale: 2:1

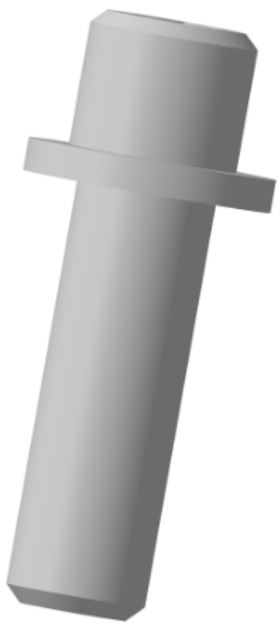


Front view
Scale: 2:1



Top view
Scale: 2:1

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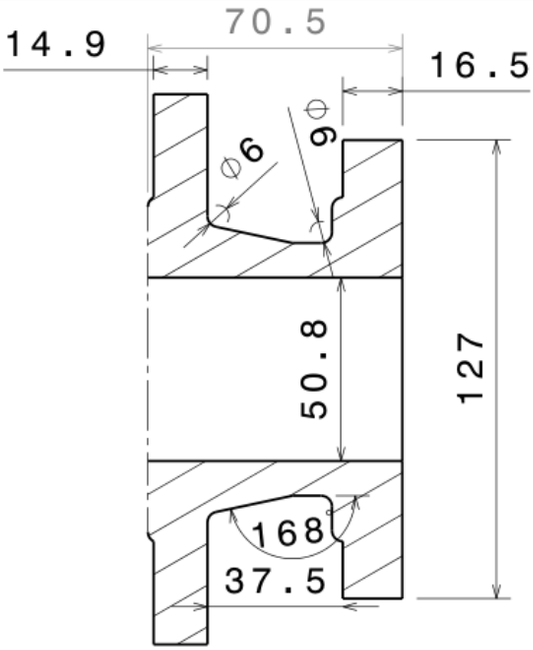


Isometric view
Scale: 2:1

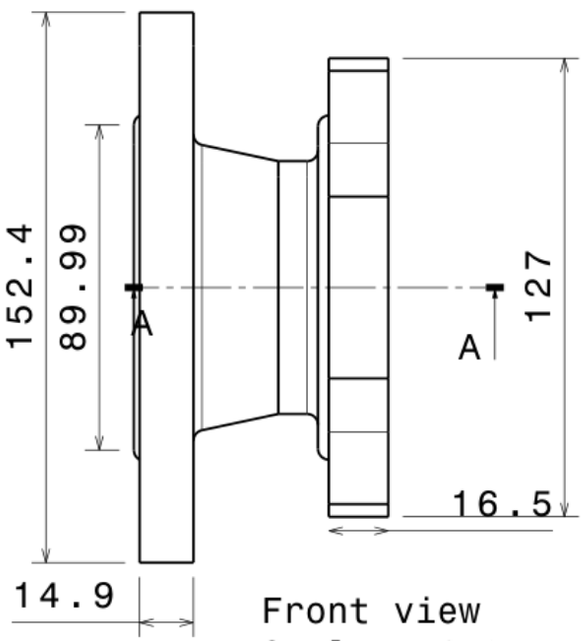
DESIGNED BY: charan DATE: 02-09-2026	water control valve		
CHECKED BY: XXX DATE: XXX			
SIZE A3	DASSAULT SYSTEMES		
SCALE 2:1	WEIGHT (kg) XXX	DRAWING NUMBER 6.Cap screw	SHEET 1/6

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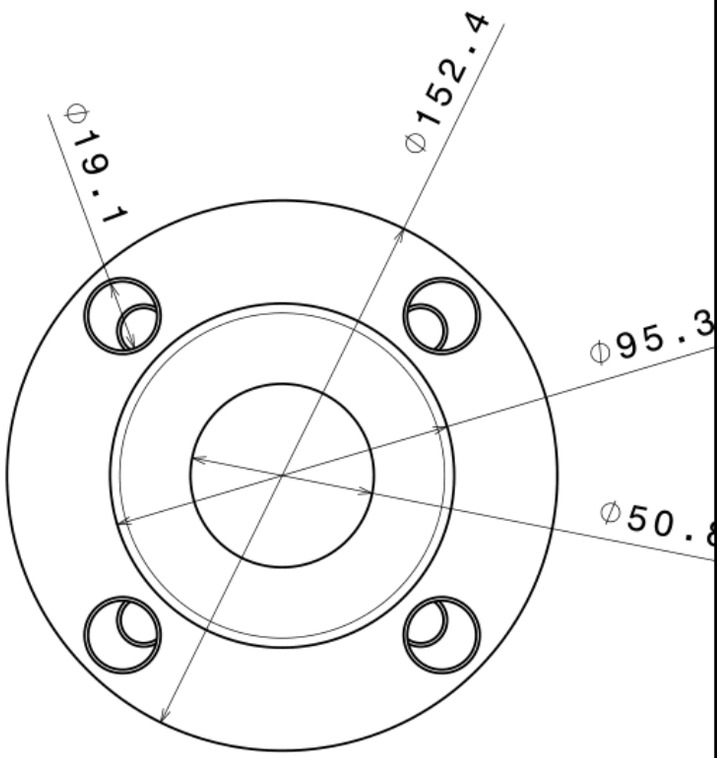
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D	_
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A	_



Section view A-A
Scale: 1:2



Front view
Scale: 1:2

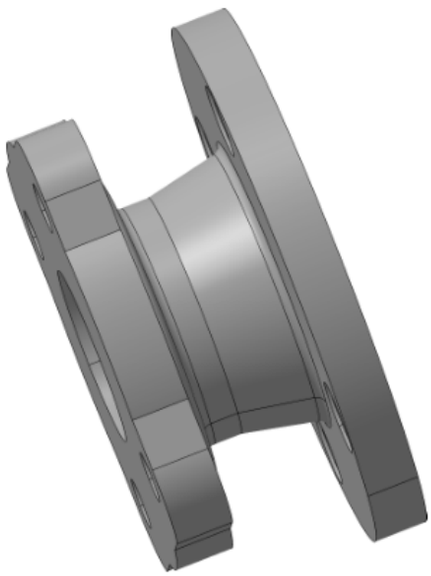


Left view
Scale: 1:2

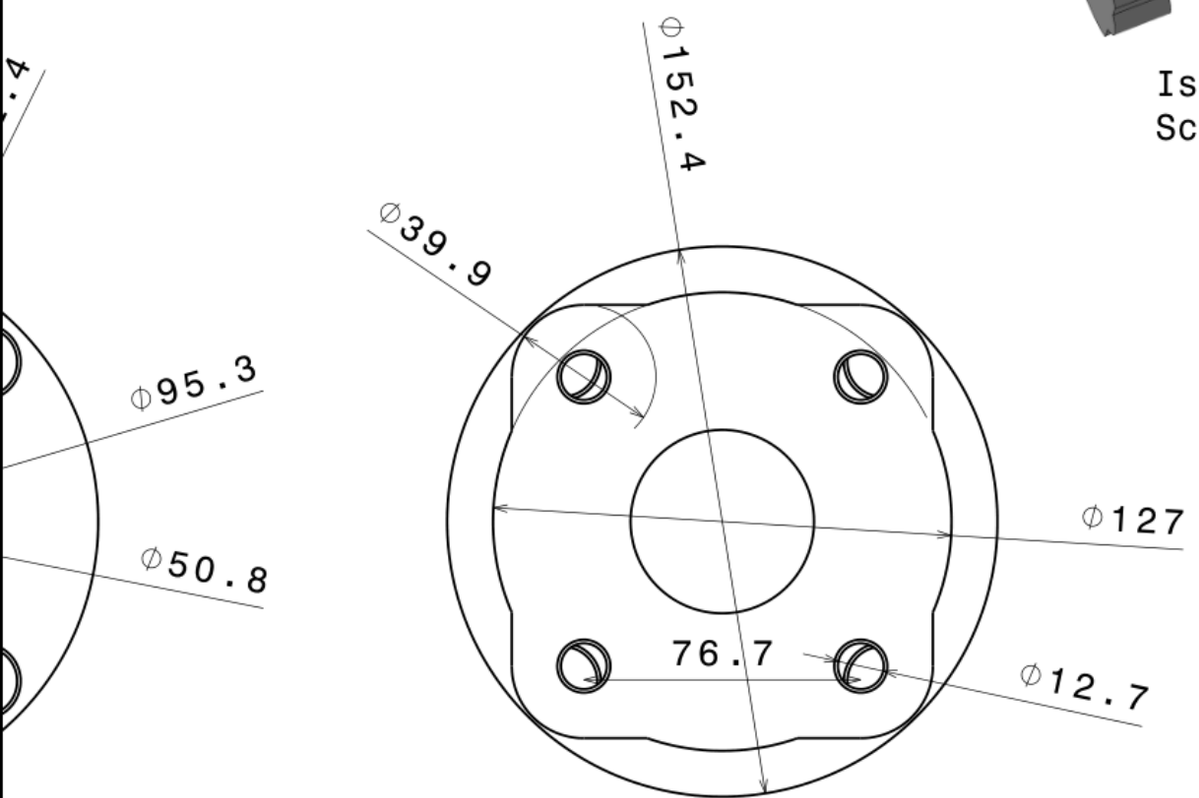
NOTE: 1.All dimensions are in mm

2.All chamfer values are 1X45°

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Isometric view
Scale: 1:2

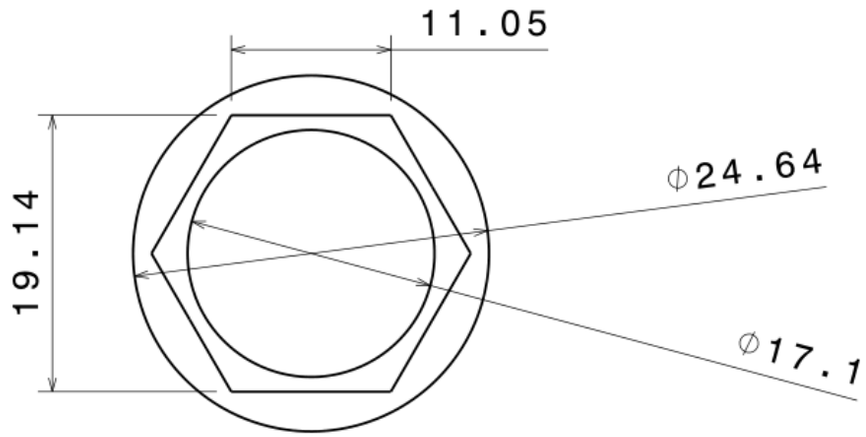


Right view
Scale: 1:2

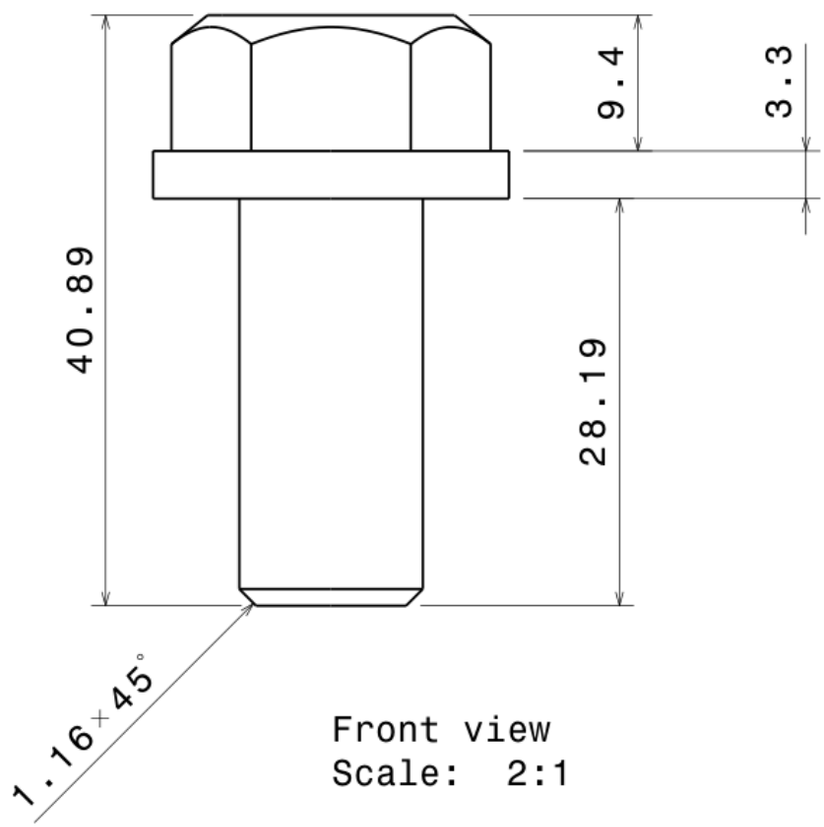
DESIGNED BY: charan DATE: 02-09-2026	water control valve		
CHECKED BY: XXX DATE: XXX			
SIZE A3	DASSAULT SYSTEMES		
SCALE 1:2	WEIGHT (kg) XXX	DRAWING NUMBER 01.outlet Housing	SHEET 1/1

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I	_
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Top view
Scale: 2:1



Front view
Scale: 2:1

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SIZE	A
SCALE	2:
This	



Isometric view
Scale: 2:1

DESIGNED BY: charan DATE: 02-09-2026	water control valve		
CHECKED BY: XXX DATE: XXX			
SIZE A3	DASSAULT SYSTEMES		
SCALE 2:1	WEIGHT (kg) XXX	DRAWING NUMBER 7.Hexagonal Bolt	SHEET 1/7

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