

Technical specification: AngioVision Standard: Virtual Simulator for Practical Skills in Endovascular Interventions		
Sl. no	Parameter / function	Compliance with the function and parameter value
1.	<p>The simulator is designed for use in the educational process in order to master practical skills in endovascular surgery. The use of the simulator contributes to the trainee's practical skills in handling endovascular instruments and the consolidation of theoretical knowledge in endovascular treatment methods.</p> <p>Learning objectives:</p> <p>Simulator comprises training modules with different tasks and intervention types:</p> <ul style="list-style-type: none"> – Base Course; – Carotid Stenting; – Renal Stenting; – Coronary Interventions; – Advanced Coronary; – Iliac Stenting; – Cerebral Stenting; – Coil Embolization on Intracranial Aneurysms; – Ischemic Stroke; – Uterine Artery (Fibroid) Embolization; – Abdominal Aortic Repair (EVAR); – Thoracic Aortic Repair (TEVAR); – Femoral Stenting; – Below the Knee. 	Compliant
2.	User manual and other documentation	Compliant
3.	Equipment installation	Compliant
4.	Guarantee service. Warranty period from the moment of start-up operation, NOT LESS THAN	12 months
5.	Equipment service and use training	Compliant
6.	Overall dimensions	-
7.	Length, NOT GREATER THAN	1600 mm
8.	Width, NOT GREATER THAN	900 mm
9.	Height, NOT GREATER THAN	1900 mm
10.	A.c. power supply	110-240 V, 50-60 Hz
11.	Electrical energy consumption, NOT GREATER THAN	1 kW
12.	Simulator for angiography body: Characteristics and components:	-
13.	Wheels for the simulator transportation	Compliant
14.	<p>Interference block providing a preliminary check and the subsequent data transfer to the simulators' software from the following systems of the simulator:</p> <ol style="list-style-type: none"> 1. Endovascular instruments imitators tracking system; 2. Syringe imitator for radiographic pigment release system; 3. Indeflator imitation system; 4. Virtual angiography system control console; 	1 pc

	5. Pedal for virtual angiography system modes control (X-RAY and CINE modes)	
15.	Endovascular instruments imitators tracking system System characteristics:	1 pc
16.	The system is built-in into the simulator body	Compliant
17.	Tracking of longitudinal motion of catheter, guidewire, balloon catheter imitators, inserted to the access point imitator simultaneously and separately, in real time	Compliant
18.	Tracking of rotational motion of catheter, guidewire, balloon catheter imitators, inserted to the access point imitator simultaneously and separately, in real time	Compliant
19.	Endovascular instrument imitators are inserted coaxially to the system via one opening	Compliant
20.	Haptic feedback while handling the instruments: - imitation of the instruments friction against the artery wall, depending on the instrument type and set rigidity parameters; - imitation of the instrument hard running in some positions, such as the complicated insertion of the graft along the guidewire winding path; - imitation of the stent graft surface friction against the inner wall of the artery during the stent graft opening	Compliant
21.	Virtual angiography system control console Designed to control the virtual angiographic system in the software. Characteristics and components:	1 pc
22.	Is built-in into the simulator body	Compliant
23.	Joystick to control a virtual C-arm orbital and axial rotation in the software	Compliant
24.	Joystick to control a virtual operating table in the software	Compliant
25.	Buttons to control the zoom function of the virtual angiograph. Zoom in/out functions	Compliant
26.	Buttons for simulated radiography recorded series. Recorded series rewind, pause playback and frame playback functions.	Compliant
27.	Button for successive switching the image mode: positive, negative and 3D display of vessels	Compliant
28.	Button for DSA mode control (Roadmap)	Compliant
29.	Simulator for angiography PC Technical characteristics:	1 pc
30.	Built into the simulator body	300 GB
31.	HDD, NOT LESS THAN	4 GB
32.	Short term memory, NOT LESS THAN	3000 MHz
33.	CPU, NOT LESS THAN	3 GB
34.	Videomemory, NOT LESS THAN	Compliant
35.	Endovascular instrument imitators set includes:	-
36.	Guiding catheter (7Fr) imitator, quantity	2 pc
37.	Guidewire imitator, quantity	1 pc
38.	Guidewire rotation device imitator, quantity	1 pc
39.	Diagnostic catheter (5 Fr) imitator, quantity	2 pc
40.	Syringe imitator for radiographic pigment release system	-
41.	Imitates syringe outwardly	Compliant
42.	Has a movable rod	Compliant
43.	Rod motion is tracked by sensors	Compliant
44.	Indeflator imitation system	-
45.	Imitates medical indeflator outwardly	Compliant
46.	Has a movable rod	Compliant
47.	Rod thread-motion mode	Compliant
48.	Rod motion without thread mode	Compliant

49.	Pedal for virtual angiography system modes control	-
50.	Pedal keys quantity, NOT LESS THAN	2 pc
51.	Pedal connection to the simulator	Compliant
52.	Simulator visualization system Components and characteristics:	-
53.	Stand for monitors	Compliant
54.	Monitors height can be adjusted	Compliant
55.	Minimal height from the floor, NO LESS THAN	1400 mm
56.	Maximum height from the floor, NO MORE THAN	1700 mm
57.	Number of monitors which can be hang on the stand, NO MORE THAN	2 pc
58.	Monitor stand mounting onto the simulator base	Compliant
59.	Additional bracket for interface monitor	Compliant, 1 pc
60.	The movements of the monitor fixed on the bracket along three axes, in the range along each axis, NOT LESS	200 mm.
61.	Touch screen monitor	1 pc
62.	Characteristics:	-
63.	Diagonal, NOT LESS THAN	19"
64.	Screen resolution, NOT LESS THAN	1920x1080
65.	Touch input	Compliant
66.	Monitor	2 pc
67.	Characteristics:	
68.	Diagonal, NOT LESS THAN	19"
69.	Screen resolution, NOT LESS THAN	1920x1080
70.	Simulator for practical skills in endovascular interventions software Functionality:	-
71.	Graphical user interface with user and administrator modes splitting, with the following features: 1. Authorized log-in with user selection; 2. Adding and deleting users in administrator mode; 3. Creation and deleting of user groups, associating users with groups in administrator mode; 4. Selection and initializing of certain exercises. Each exercise has a description, a medical history and videos for better understanding of the learning aims and objectivities; 5. Statistics for each user; 6. Creation, editing and deleting of the learning courses	Compliant
72.	Endovascular interventions course imitation	Compliant
73.	The program displays informational messages during the exercise (errors and warnings)	Compliant
74.	Possibility to work with multiple percutaneous entry virtual points for certain exercises	Compliant
75.	Radioscopy virtual picture graphical display. The image meets the following requirements: 1. The similarity with the image, made by real intraoperative x-ray systems; 2. The image reflects a corresponding adjustment to the projection, in which the patient's X-ray scanning is performed in a virtual simulation; 3. Dynamical graphical display indicates manipulations conducted with endovascular instruments in the virtual operation, taking into account different radiopacity of instruments	Compliant
76.	Digital subtraction angiography in a virtual picture of radioscopy use imitation	Compliant
77.	Angiography imitation meets the following requirements: 1. Simulation of a radiopaque material spreading in the vessels in a virtual picture of radioscopy; 2. Radiopaque substance use log with syringe imitator for radiographic pigment release system;	Compliant

	<p>3. Radiopaque substance spreading in the vessels starts from the infuse point defined by a current catheter position in a virtual picture of radioscopy;</p> <p>4. Image saturation of the spread radiopaque substance in a depends on the administered substance amount, infusion speed, time elapsed from the infusion moment;</p> <p>5. Vascular flow resulting of the heartbeat and breathing affects the imaging angiography</p>	
78.	<p>Endovascular instruments use imitation meets the following requirement:</p> <p>1. Catheters and guidewires movement is coordinated with the movement and rotation of the physical endovascular instrument imitators and is performed on the basis of data from endovascular instruments motion tracking system sensors;</p> <p>2. Catheters and guidewires movement within the vascular system of the virtual patient is based on the current model of the patient's anatomical vessels in virtual operations, interacting with the vessel wall; the mobility of vessels due to the heart rate and breathing is taken into account;</p> <p>3. Imitation of the catheter tip bending straightening by rigid diagnostic guide;</p> <p>4. A variety of endovascular instruments in a virtual intervention is provided by an opportunity to associate the program with the given imitator using the graphical user interface during exercise</p>	Compliant
79.	Catheters of 5Fr and 7Fr in diameter work imitation	Compliant
80.	Diagnostic guidewire, microguidewire and super stiff guidewire use imitation	Compliant
81.	Vascular stenosis and occlusions imitation	Compliant
82.	Balloon catheters use imitation during the virtual intervention	Compliant
83.	Roberts multifunctional catheter use imitation	Compliant
84.	Thoracic and abdominal stent graft use imitation	Compliant
85.	Balloon expansion with use of inflater modeling	Compliant
86.	Balloon dilatation impact to the stenosis lumen width	Compliant
87.	Balloon-expandable stent use imitation during the virtual intervention	Compliant
88.	Self-expanding stent use imitation during the virtual intervention	Compliant
89.	Stent opening impact to the stenosis lumen width	Compliant
90.	Microguidewire use imitation	Compliant
91.	Embolization coils use imitation	Compliant
92.	Embolic protection device use imitation	Compliant
93.	Coated balloon-expandable stent use imitation	Compliant
94.	Base Course	Compliant
95.	Module requirements:	-
96.	Exercise for endovascular catheters handling skills mastering	Compliant
97.	Exercise for endovascular guidewires handling skills mastering	Compliant
98.	Exercise for embolization coils handling skills mastering	Compliant
99.	Exercise for angiography system control skills mastering	Compliant
100.	Carotid Stenting module	Compliant
101.	Module requirements:	-
102.	<p>Following stages imitation:</p> <p>1. Aortal arch angiography;</p> <p>2. Selective catheterization of general carotid and carotid angiography;</p> <p>3. Stenosis location identification and embolic protection device insertion beyond the stenosis area, embolic protection device opening;</p> <p>4. Stent positioning and opening;</p> <p>5. Postdilatation;</p> <p>6. Control angiography.</p> <p>The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage</p>	Compliant
103.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on carotid stenting. The number of catheters bending types in the training module, NOT LESS THAN	14 types

104.	Clinical cases number, NOT LESS THAN	2 pc
105.	Renal Stenting module	Compliant
106.	Module requirements:	-
107.	Following stages imitation: 1. Abdominal aorta, renal arteries angiography; 2. Guiding catheter installation to the renal artery orifice; 3. Predilatation; 4. Balloon-expandable stent positioning and opening; 5. Control angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
108.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on renal stenting. The number of catheters bending types in the training module, NOT LESS THAN	15 types
109.	Clinical cases number, NOT LESS THAN	7 pc
110.	Coronary Interventions module	Compliant
111.	Module requirements:	-
112.	Following stages imitation: 1. Selective catheterization of the left coronary artery. Left coronary artery angiography; 2. Selective catheterization of the right coronary artery. Right coronary artery angiography; 3. Stenosis predilatation; 4. Stent positioning and opening; 5. Control angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
113.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on coronary stenting. The number of catheters bending types in the training module, NOT LESS THAN	19 types
114.	Clinical cases number, NOT LESS THAN	11 pc
115.	Iliac Stenting module	Compliant
116.	Module requirements:	-
117.	Following stages imitation: 1. Abdominal aorta, common iliac artery, internal and external iliac arteries angiography; 2. Stenosis predilatation; 3. Stent positioning and opening; 4. Control angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
118.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on iliac stenting. The number of catheters bending types in the training module, NOT LESS THAN	7 types
119.	Clinical cases number, NOT LESS THAN	7 pc
120.	Cerebral Stenting module	Compliant
121.	Module requirements:	-
122.	Following stages imitation: 1. Aortal arch angiography; 2. Selective catheterization of the internal carotid or vertebral artery (depending on the stenosis location) with cerebral angiography; 3. Predilatation; 4. Stent positioning and opening; 5. Control angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant

123.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on cerebral stenting. The number of catheters bending types in the training module, NOT LESS THAN	16 types
124.	Clinical cases number, NOT LESS THAN	2 pc
125.	Coil Embolization on Intracranial Aneurysms module	Compliant
126.	Module requirements:	-
127.	Following stages imitation: 1. Aortal arch angiography; 2. Selective angiography of cerebral vessels; 3. Selective catheterization of aneurism cavity; 4. Filling the aneurism cavity with coils; 5. Control cerebral angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
128.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on intracranial aneurism coil embolization. The number of catheters bending types in the training module, NOT LESS THAN	16 types
129.	Clinical cases number, NOT LESS THAN	4 pc
130.	Ischemic Stroke module	Compliant
131.	Module requirements:	-
132.	Following stages imitation: 1. Aortal arch angiography; 2. Selective angiography of cerebral vessels; 3. Selective catheterization of internal carotid artery from the thrombus localization; 4. Microguidewire insertion beyond the thrombus area; 5. Microcatheter insertion beyond the thrombus area; 6. Stent retriever insertion beyond the thrombus area; 7. Stent retriever opening; 8. Removal of the thrombus when the occlusive catheter is opened; 9. Control cerebral angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
133.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on acute ischemic stroke. The number of catheters bending types in the training module, NOT LESS THAN	12 types
134.	Clinical cases number, NOT LESS THAN	1 pc.
135.	Uterine Artery (Fibroid) Embolization module	Compliant
136.	Module requirements:	-
137.	Following stages imitation: 1. Guidewire positioning in the contralateral common femoral artery; 2. Multifunctional catheter positioning in the contralateral uterine artery; 3. Control angiography of uterine fibroids contralateral arteries; 4. Embolic drugs infusion to the uterine fibroids contralateral artery; 5. Saline infusion to the uterine fibroids contralateral artery for flush; 6. Positioning of the multifunctional catheter into the ipsilateral uterine artery; 7. Control angiography of uterine fibroids ipsilateral arteries; 8. Embolic drugs infusion to the uterine fibroids ipsilateral artery; 9. Saline infusion to the uterine fibroids ipsilateral artery for flush. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
138.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on uterine arteries embolization. The number of catheters bending types in the training module, NOT LESS THAN	3 types
139.	Catheter for superselective catheterization of uterine artery use imitation	Compliant
140.	Clinical cases number, NOT LESS THAN	3 pc

141.	Abdominal Aortic Repair EVAR module	Compliant
142.	Module requirements:	-
143.	Following stages imitation: 1. Abdominal aorta area angiography; 2. Positioning of the main segment of the bifurcation stent graft in the infrarenal aorta segment; 3. Main segment of the bifurcation stent graft installation; 4. Positioning of the contralateral iliac stent graft; 5. Installation of the contralateral iliac stent graft; 6. Control angiography of the abdominal aorta. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
144.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on EVAR. The number of catheters bending types in the training module, NOT LESS THAN	3 types
145.	Stent-graft use imitation in the framework of exercise on EVAR	Compliant
146.	Clinical cases number, NOT LESS THAN	2 pc
147.	Thoracic Aortic Repair TEVAR module	Compliant
148.	Module requirements:	-
149.	Following stages imitation: 1. Thoracic aorta area angiography; 2. Positioning of the stent graft in the thoracic aorta descending segment; 3. Installation of the stent graft in the thoracic aorta descending segment; 4. Control thoracic aorta area angiography. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
150.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on TEVAR. The number of catheters bending types in the training module, NOT LESS THAN	1 type
151.	Stent-graft use imitation in the framework of exercise on TEVAR	Compliant
152.	Clinical cases number, NOT LESS THAN	2 pc
153.	Advanced Coronary module	Compliant
154.	Module requirements:	-
155.	Following stages imitation: 1. Selective catheterization of the left coronary artery. Left coronary artery angiography; 2. Selective catheterization of the right coronary artery. Right coronary artery angiography; 3. Stenosis or occlusion predilatation; 4. Stent positioning and opening. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
156.	Imitation of diagnostic and guiding catheter with a different bending form use in the framework of exercise on advanced coronary stenting. Clinical cases are designed using the real patients' data, with ECG, medical history and individual logics of each case. The number of catheters bending types in the training module, NOT LESS THAN	19 types
157.	Clinical cases number, NOT LESS THAN	9 pc
158.	Femoral Stenting module	
159.	Following stages imitation: 1. Guidewire insertion further than the stenosis or occlusion localization place; 2. Stenosis or occlusion dilatation; 3. Control opacification. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant

160.	Imitation of diagnostic catheters and guidewires, microguidewires with a different bending form, balloons and stents of different length and diameter, Re-Entry catheters use imitation	Compliant
161.	Clinical cases number, NOT LESS THAN	7 pc
162.	Below the Knee module	
163.	Following stages imitation: 1. Guidewire insertion further than the stenosis or occlusion localization place; 2. Re-Entry catheter insertion and positioning if any subintimal occlusion presents; 3. Stenosis or occlusion dilatation; 4. Control opacification. The program estimates stages completion automatically, without teacher participation and estimates trainee's work performance on each stage	Compliant
164.	Imitation of diagnostic catheters and guidewires, microguidewires with a different bending form, balloons and stents of different length and diameter, Re-Entry catheters use imitation	Compliant
165.	Clinical cases number, NOT LESS THAN	7 pc
166.	Package requirement	
167.	Simulator body	1 pc
168.	Simulator PC built-in to the simulator base	1 pc
169.	Monitor	1 pc
170.	Touch screen monitor	1 pc
171.	Syringe imitator for radiographic pigment release system	1 pc
172.	Deflator imitation system	1 pc
173.	Pedal for virtual angiography system modes control	1 pc
174.	Guiding catheter imitator (7 Fr., cut)	2 pc
175.	Diagnostic catheter imitator (5 Fr., cut)	2 pc
176.	Guidewire imitator (Guidewire of 0,035 in diameter, 2.6 m length)	1 pc
177.	Calibrating guidewire imitator, 1.8 m length	1 pc
178.	Data sheet	1 pc
179.	User manual	1 pc