

Hemodynamic Simulator II (P09026)

Specifications (Quantifiable)

Engr. Spec. #	Importance	Source	Specification (description)	Unit of Measure	Ideal Value	Comments/Status
Fluid (Water)						
ES1	1	http://www.thermexcel.com/english/tables/eau_atm.htm	Volume	liters	5	Water will be used according to customer request
ES2	1	http://www.thermexcel.com/english/tables/eau_atm.htm	Viscosity	kg/m.s	0.001003	Room Temperature, T = 20°C
ES3	1	http://www.thermexcel.com/english/tables/eau_atm.htm	Density	kg/m3	998.29	Room Temperature, T = 20°C
Heart Chamber						
ES4	1	http://www.fi.edu/learn/heart/development/development.html	Normal Heart Rate	Beats per minute	120 - Infant 70 - Adult	Values used as reference on generating Pressure Curve
ES5	1	http://www.bbc.co.uk/science/humanbody/body/factfiles/heart/heartbeat.shtml	Max. Heart Rate	Beats per minute	220	With variation of +/-5% - Values used as reference on generating Pressure Curve
ES6	1	http://gaps.anest.ufl.edu/palm/files/formulas/13.html	Systemic Vascular Resistance	MPa·s/m3	90-120	Normal - Values used as reference on generating Pressure Curve
Physical Dimensions						
ES7	1		Cart Size	inches	21.5 x 38.5	
ES8	1		Height	inches	72	Maximum Height
ES9	1		Location of the heart	feet	5	w.r.t the floor (eye level)
Overall System and Safety						
ES10	1	http://www.dangerousdecibels.org/faq.cfm#16	Noise Level	dB	60	Normal conversation level
ES11	1		Emergency Stop Button Response	sec	3	Actuator motion stops
ES12	2	http://www.grow.arizona.edu/Grow-GrowResources.php?ResourceId=188	Drainage Time	min	5	
ES13	1		Functioning Time	hours	8	
ES14	1		A/C Voltage supply	volls	120	Available in most classrooms

Specifications (Non-Quantifiable)

Engr. Spec. #	Importance	Source	Specification (description)	Desired Result	Comments/Status
ES15	1		Control Software	Lab VIEW	
ES16	1		Aesthetic	Benchmarked by previous project and customer feedback	Aesthetically Pleasing - Polished, clean, enclosed, stainless steel (low maintenance), only thing exposed will be the circulatory system and the heart chamber
ES17	1		Safety	Ground Default System	Like the ones in a bathroom

Reference Parameters

Fluid (BLOOD)						
ES18	1	Cutnell, John & Johnson, Kenneth. <i>Physics, Fourth Edition</i> . Wiley, 1998: 308.	Viscosity	N-s/m ²	0.0027	At 37°C
ES19	1	Cutnell, John & Johnson, Kenneth. <i>Physics, Fourth Edition</i> . Wiley, 1998: 308.	Density	kg/m ³	1060	At 37°C
ES20	1	Taggart, Starr and Cecie Starr. <i>Biology: The Unity and Diversity of Life</i> . California: Wadsworth, 1989: 398.	Volume	liter	5	With variation of +/-20%
ES21	1					
ES22	1	http://www.eie.polyu.edu.hk/~ensmall/eie448/EIE448/Notes_files/topic2.pdf	Circulatory System total length	meters	10 ⁶	
Propagation Velocities of Blood in Human Body						
ES23	1	http://www.eie.polyu.edu.hk/~ensmall/eie448/EIE448/Notes_files/topic2.pdf	Atria	m/s	1	
ES24	1	http://www.eie.polyu.edu.hk/~ensmall/eie448/EIE448/Notes_files/topic2.pdf	AV Node	m/s	0.05	
ES25	1	http://www.eie.polyu.edu.hk/~ensmall/eie448/EIE448/Notes_files/topic2.pdf	Purkinje Fibres	m/s	3	
ES26	1	http://www.eie.polyu.edu.hk/~ensmall/eie448/EIE448/Notes_files/topic2.pdf	Ventricles	m/s	0.5	

Importance Level 1=High 2=medium 3=low	Revision # 3	Author Liliane Pereira	Comments
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