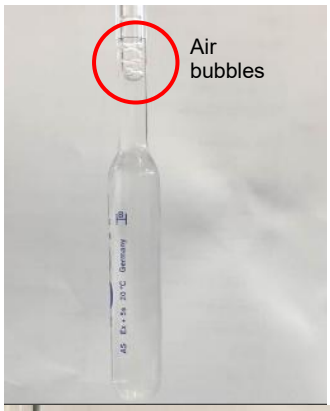
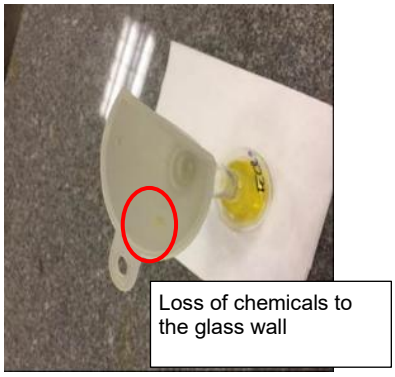
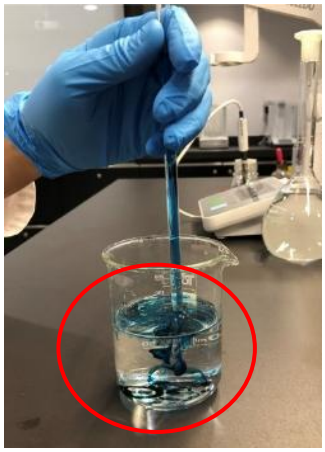
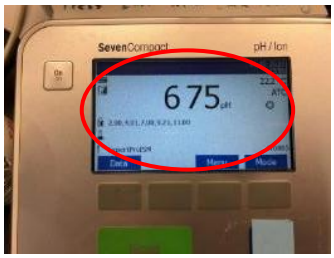
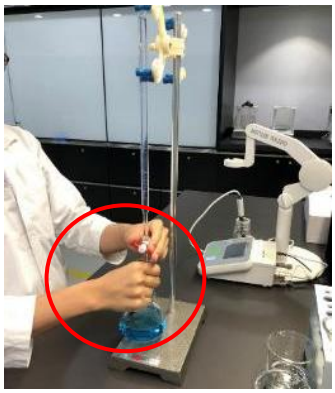
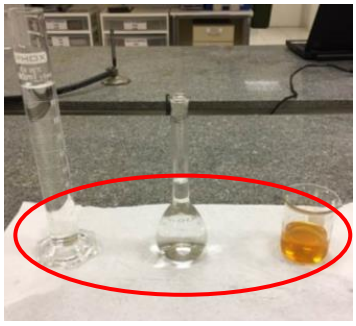
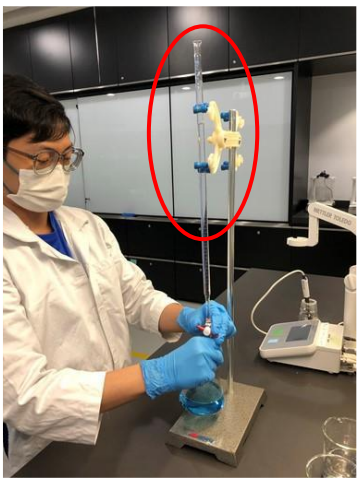
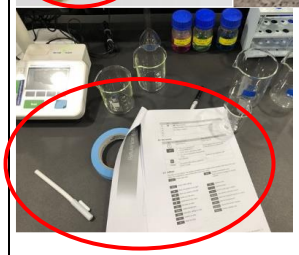
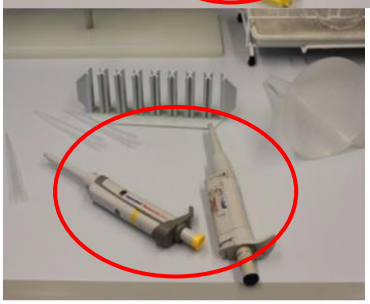
Module - Laboratory work		
Points	Description	Note
0	**(1) The air bubble in the burette must be removed from the solution in the burette.** The air bubble must be removed either from the top meniscus or from the burette valve. Failure to carry out these steps constitutes an error.	 
	(2) The meniscus height in a glass vessel must be adjusted to eye level. The meniscus height must be adjusted with the head and chin held straight (not tilted up or down). If the participant wishes to adjust the meniscus with the glass vessel above the table, the same principle applies. Furthermore, the air bubble must be removed before adjusting the meniscus, which must be adjusted to the lowest level of the glass mark (tangential contact with the glass mark). Failure to carry out these steps constitutes an error.	
	(3) Glassware must be rinsed to prevent the loss of chemicals to the glass walls. Glassware must be rinsed when transferring the reactant/solution from one glass vessel to another, or when diluting or preparing a solution. A funnel must be used when transferring to a measuring flask/cylinder with a volume of less than 150 ml or to a burette. Failure to carry out these steps constitutes an error.	

	(4) Laboratory equipment must be handled correctly in accordance with safety regulations and/or the manufacturer's instructions. Pipettes and pH probes should always be handled with the tip pointing downwards to prevent liquid from flowing into the interior of the device. Any improper use of a device is considered an error.	 
	(5) Breakage of glassware or other laboratory equipment. The breaking of glassware or other laboratory equipment, even if it belongs to the participant, is considered a fault.	
	(6) Before removing the sample from the bottle or after the solution has been prepared, it must be mixed thoroughly. Failure to carry out these steps constitutes a fault.	

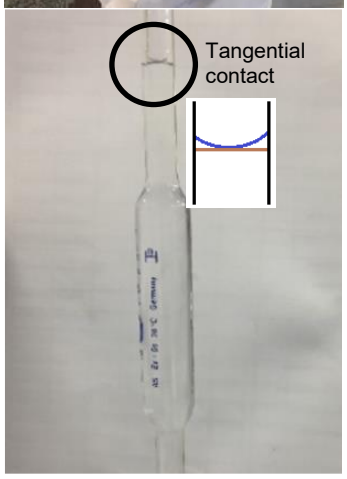
	(7) Incorrect acid dilution. When diluting acids, a few millilitres of water must be added to the glassware before adding the acid. This prevents gas formation and dangerous reactions. Failure to carry out these steps constitutes an error.	
	(8) Record data from the measuring instrument after stabilisation. When reading measuring instruments or meters, the reading cannot be recorded until the device has stabilised its value. If the participant does not wait for the device to stabilise, this is an error.	
	(9) Wear the correct personal protective equipment (PPE). A lab coat, disposable gloves and safety goggles are mandatory. Long hair must be tied back. If a participant disregard one or more of the points described above, this is a fault. If a participant begins working with chemicals or laboratory equipment without PPE, this is also a fault, even if the participant remembers to put on the missing PPE during the course of the competition. However, if the participant is only reading the printed document and taking notes, the safety regulations do not apply.	
1	**(1) Glassware must be labelled.** If one or more glassware items are not labelled, this is considered a minor error.	

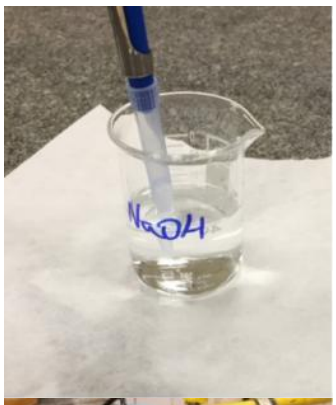
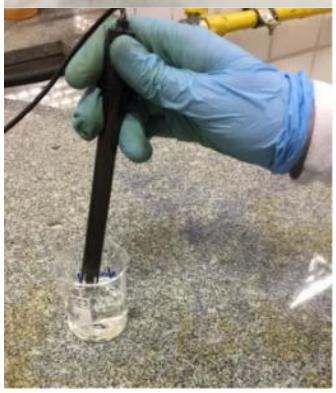
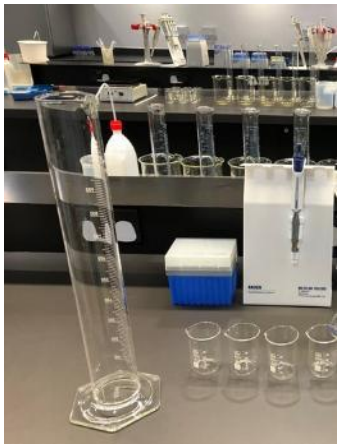
	(2) High-precision glassware such as burettes must be rinsed with the titration solution before use. If the participant does not rinse the burette before use, this is considered a minor error.	
	(3) The participant should not run in the competition area during the competition. This prevents potential tripping and falling.	
2	**(1) The workstation must be kept clean, and items must be placed neatly**. If the workstation is not clean or tidy, or if it is not clean or tidy after the participant has completed the task, points will be deducted. A chemical solution is spilled onto the table surface and not immediately cleaned up by the participant, or glassware, equipment and measuring instruments are not properly placed on the table.	  

	(2) The equipment must be switched off and cleaned after use to prevent damage or corrosion. If the participant completes the task (even if the time has elapsed) and leaves the workstation with one or more devices switched on or uncleaned, this is considered improper procedure and will be marked as a minor error.	 
	(3) The pipette and test tube are correctly placed in the rack. If the pipette, pipette tip, cuvette or test tube is not collected and stowed away correctly, or if the pipette, pipette tip, cuvette or test tube is not collected and stowed away correctly after the participant has completed the task (even if the time has run out), this will be counted as a minor error.	 
3	**(1) The workstation must be kept clean, and items must be placed neatly**. Ensure that there are no samples or solutions on the table surface. If a participant spills anything on the table, they must wipe it up immediately. Glassware, equipment and measuring instruments must be placed neatly on the table.	  

	(2) Equipment must be switched off and cleaned after use to prevent damage or corrosion. The participant must switch off and clean the equipment after use to prevent damage or corrosion. If the participant finishes the task (even if the time has run out) and leaves the workstation with one or more pieces of equipment switched on or unclean, this will be counted as a minor error.	 
	(3) Pipette and test tube in the rack. Used pipette tips must be collected in a beaker or container. Cuvettes or test tubes must also be placed in the correct rack.	 
	(4) Glassware must be labelled. Glassware must be labelled, even if it contains deionised water or items to be disposed of.	

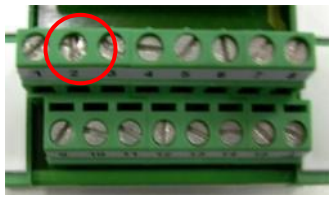
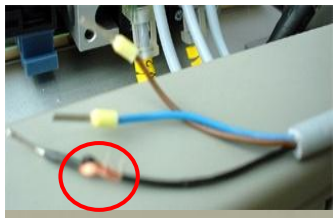
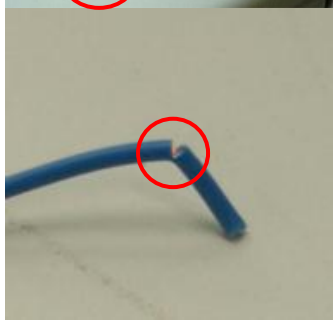
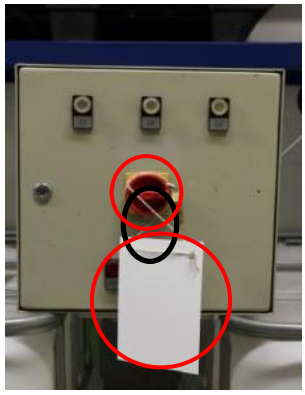
	(5) High-precision glassware such as burettes must be rinsed with the titration solution before use.	
	(6) The air bubble in the burette must be removed from the solution, and the meniscus in the glass must be visually adjusted. The air bubble in the burette filled with solution must be removed either from the upper meniscus or the burette valve.	

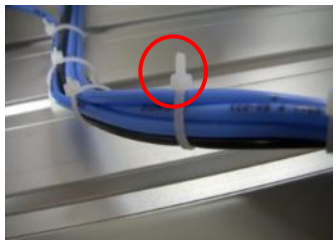
	(7) The meniscus level in a glass vessel must be adjusted to eye level. The meniscus height must be adjusted with the head and chin held straight (not tilted up or down). If the participant wishes to adjust the meniscus with the glass vessel above the table, the same principle applies. Furthermore, the air bubble must be removed before adjusting the meniscus, which must be adjusted to the lowest level of the glass mark (tangential contact with the glass mark).	 
	(8) Glassware must be rinsed to prevent the loss of chemicals to the glass walls. Glassware must be rinsed when transferring the reactant/solution from one glass vessel to another, or when diluting or preparing a solution. A funnel must be used when transferring to a measuring flask/cylinder with a volume of less than 150 ml or to a burette.	

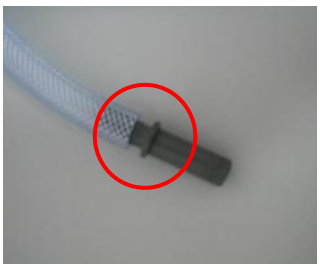
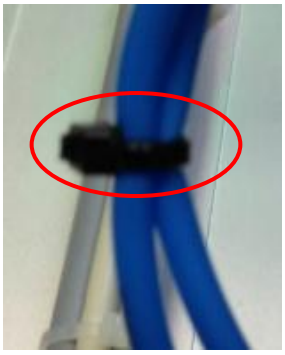
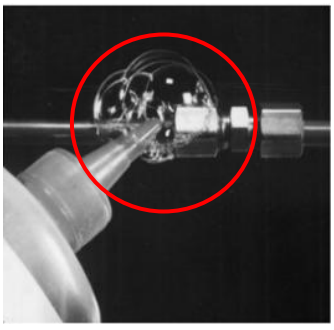
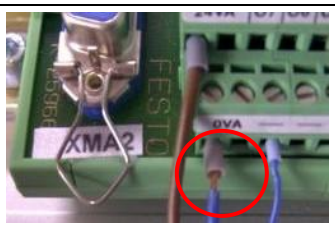
	(9) Laboratory equipment must be handled correctly in accordance with safety regulations and/or the manufacturer's instructions. Pipettes and pH probes should always be handled with the tip pointing downwards to prevent liquid from flowing into the interior of the device.	 
	(10) Breakage of glassware or other laboratory equipment. Glassware and other laboratory equipment must be handled with care. The participant must not break any glassware or laboratory equipment, even if it belongs to them. If the participant damages anything, this should be considered a serious error.	
	(11) Before taking a subsample or after preparing a solution or a dilution, the flask must be shaken vigorously. Failure to carry out these steps is to be regarded as a serious error.	

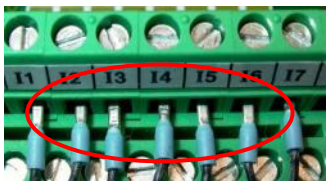
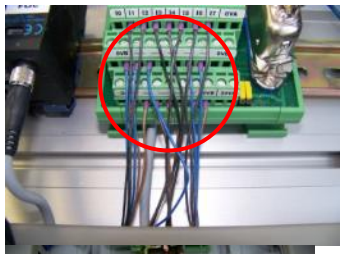
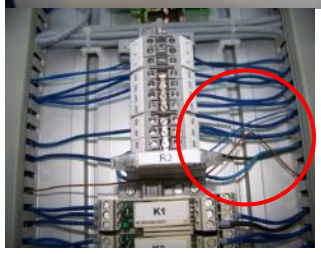
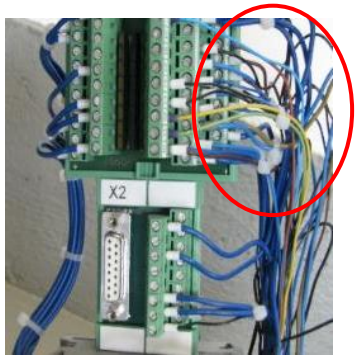
	(12) Acid dilution is carried out correctly. When diluting acids, a few millilitres of water must be added to the glass vessel before the acid is added. This prevents gas formation and dangerous reactions. If these steps are not carried out, this is to be regarded as a serious error.	
	(13) Record data from the measuring instrument after stabilisation. When reading measuring instruments or meters, the reading cannot be recorded until the instrument has stabilised. If the participant does not wait for the device to stabilise, this is to be regarded as a serious error.	
	(14) Wear the correct personal protective equipment (PPE). Lab coats, disposable gloves and safety goggles are mandatory. Long hair must be tied back. If a participant disregard one or more of the points described above, this is to be regarded as a serious error. If a participant begins working with chemicals or laboratory equipment without PPE, this is to be regarded as a serious error, even if the participant subsequently decides to put on the missing PPE during the competition. However, if the participant is merely reading the printed document and taking notes, the safety regulations do not apply.	

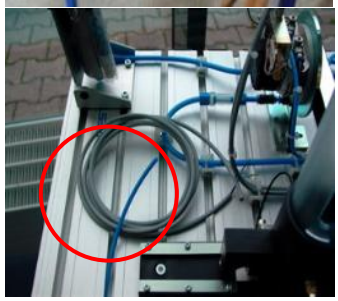
	(15) Do not run in the competition area. The participant should not run in the competition area during the competition.	

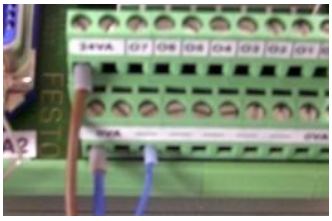
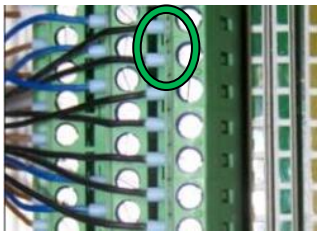
Aspect – Electrical Engineering and Automation		
Points	Description	Note
0	**(1) Damaged screw heads or fragments of broken tools in the screws.**	
	(2) Wire damaged during stripping. Parts or components of the device damaged or lost (including cables, wires, etc.)	 
	(3) Padlock not fitted and locked, or missing tags (locked and logged) with information filled in.	

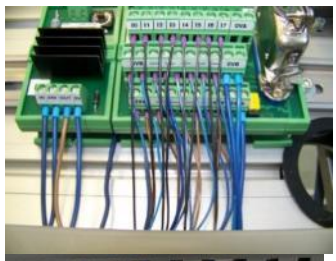
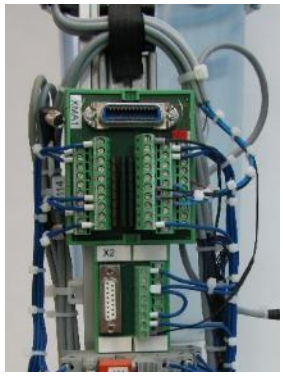
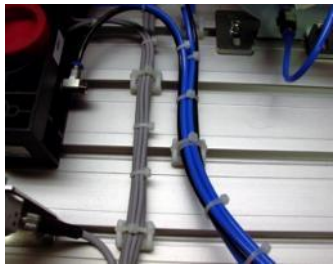
	(4) Filling with water whilst the appliance is switched on.	
1	**(1) Wire connections with insulated ferrules and securely connected.** All connections with suitable and insulated ferrules. All components, modules and electrical cables must be securely connected (no loose screws). Otherwise, a minor fault may be considered.	 
	(2) Do not leave cable ties too long, as this poses a risk of injury. These should be ≤ 1 mm; otherwise, a minor fault may be considered.	
	(3) Affix an information plate or sticker in a suitable location in the control cabinet; otherwise, a minor fault may be considered.	

	(4) Cut pipes/hoses to length with a straight edge. • The hose is pushed onto the barbed nipple as far as it will go and contacts it all the way round. • Hose clamp securely fastened.	
	(5) No water leakage at the pipe/hose connection; otherwise, a minor fault may be considered.	
	(6) No kinked hoses or cable ties that are too tight; otherwise, a minor fault may be considered.	
	(7) All pneumatic connections must be tight; otherwise, a minor fault may be considered.	
2	**(1) The workbench must be clean and tools must not be left on the bench or on the floor; otherwise, a minor fault may be considered.**	
	(2) No bare wire must be visible at the end ferrules; otherwise, a minor fault may be considered.	

	(3) The wire end sleeve must not be too long; otherwise, a minor fault should be considered.	
	(4) Insert the cable straight into the cable duct without crossing it, and connect it neatly and in a bundle. Otherwise, a minor fault should be considered. **Only 1 sensor/actuator connection is permitted per cable duct slot. Otherwise, a minor fault should be considered.**	  
	(5) Pipes, cables and hoses must be laid separately from one another on the profile plate. Otherwise, a minor fault should be considered.	

	(6) Materials and tools must be removed from the stations after use. The materials required for cabling and hose connection, as well as all other materials, must be removed from the stations. Otherwise, a minor fault should be considered.	 
	(7) Lay cables and cable holders correctly. • Fit the cable holders at regular intervals. • Route the cables neatly, securing them with a cable tie every 7.5 cm. • Leave a loop at the sensor connection. • Use a loop of the same size for capacitive sensors. • Cable ties must be tied twice and closed in the middle. Otherwise, a slight error should be taken into account.	  

	(8) The pipe must be laid straight. Otherwise, a minor fault should be considered.	
3	**(1) The workbench must be clean and tools must not be left on the table or on the floor.**	
	(2) No bare wire must be visible at the end sleeves.	
	(3) The end ferrule of the wire must not be too long.	
	(4) Screw heads must not be damaged and there must be no fragments of broken tools in the screws.	
	(5) Wire connections must be fitted with insulated ferrules and securely connected. All connections must have suitable and insulated ferrules.	

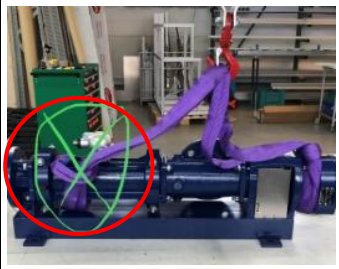
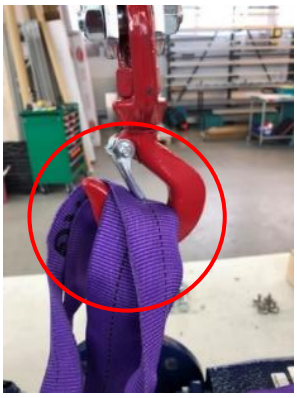
	All components, modules and electrical cables must be securely connected (no loose screws).	
	(6) Insert cables straight into the cable duct without crossing them and connect them neatly and in bundles. Only 1 sensor/actuator connection is permitted per cable duct slot.	  
	(7) Do not damage the wire when stripping the insulation. No damaged or missing components (including cables, wires, etc.)	
	(8) Pipes, cables and hoses must be laid separately from one another on the profile plate.	

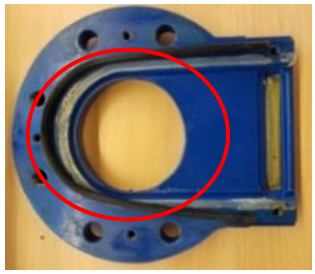
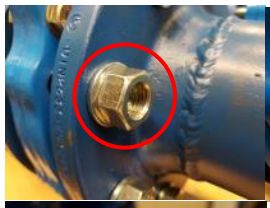
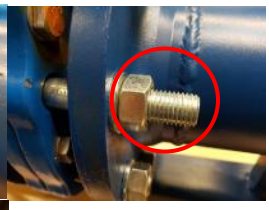
	(9) Do not leave cable ties too long, as this poses a risk of injury. They should be ≤ 1 mm.	
	(10) Materials and tools must be removed from the stations after use. The materials required for cabling and hose connections, as well as all other materials, must be removed from the stations.	
	(11) Lock the padlock and attach the signs (locked and logged) with the relevant information filled in.	
	(12) Affix the information label or sticker in a suitable location inside the control cabinet.	

	(13) Lay cables and cable holders correctly. • Fit the cable holders at regular intervals. • Route the cables neatly using a cable tie every 7.5 cm. • Leave a loop at the sensor connection. • Use a loop of the same size for capacitive sensors. • Cable ties must be tied twice and closed in the middle.	 
	(14) The pipe must be laid straight.	
	(15) Cut pipes/tubes with a straight edge to length. • The hose is pushed onto the barbed nipple as far as it will go and contacts it all the way round. • Secure the hose clamp firmly.	
	(16) Do not fill with water whilst the power supply is switched on.	

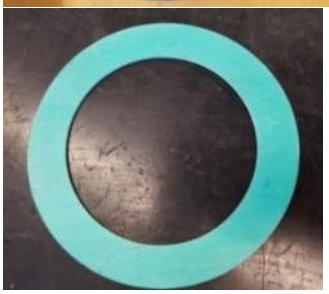
	(17) No water leakage at the pipe/hose connection.	
	(18)No kinked hoses or cable ties that are too tight.	
	(19)All pneumatic connections must be tight.	

Aspect – mechanical work		
Points	Description	Note
0	**(1) No damage to tools or materials; otherwise, a serious fault should be considered.**	
	(2) Screw not damaged. The screw used for mechanical fastening must not be damaged; otherwise, a serious fault should be considered.	

	(3) Secure the sling correctly to the appropriate point on the pump to avoid damaging other parts, e.g. the temperature sensor; otherwise, a serious fault should be considered.	
	(4) Secure the sling correctly to the hook and lock it with the safety catch; otherwise, a serious fault should be considered.	
	(5) The sling must be straight when lifting.	
1	**(1) When carrying out mechanical and electrical work, the participant must wear suitable gloves; otherwise, a minor error should be considered.**	

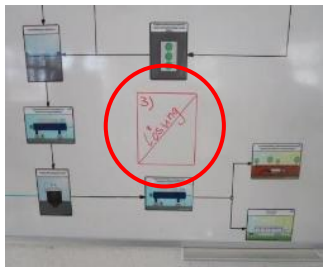
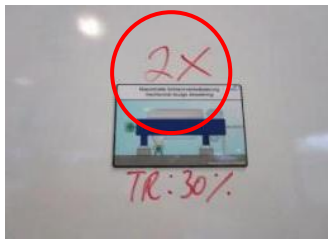
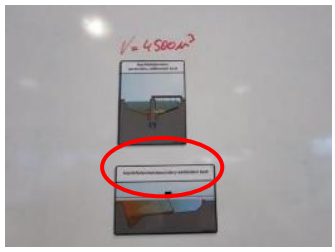
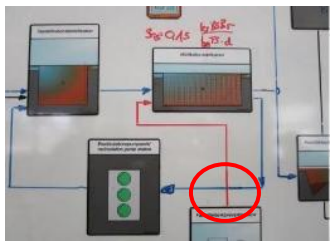
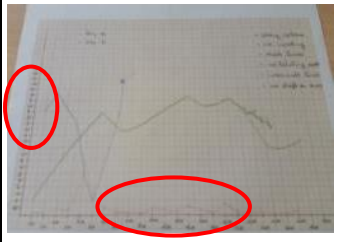
	(2) Careful and correct handling of tools and materials; otherwise, a minor error should be considered.	
	(3) The seals must be the correct size and cut cleanly; otherwise, a minor fault should be considered.	  
	(4) Screw and nut correctly fitted. The screw for mechanical fastening must be neither too short nor too long and must be fitted with a suitable washer; otherwise, a minor fault should be considered.	  
	(5) Support the pump casing or impeller during repair to prevent damage; otherwise, a minor fault should be considered.	
	(6) The pump must not be lifted at an angle; otherwise, a minor fault should be considered.	

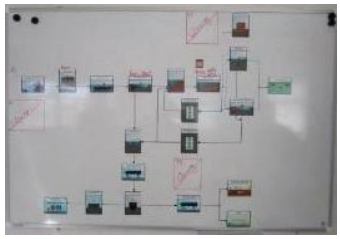
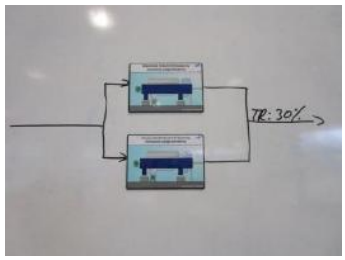
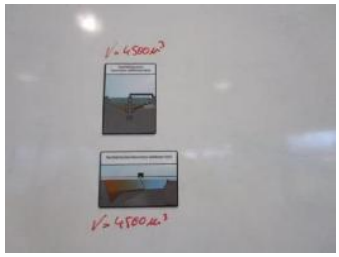
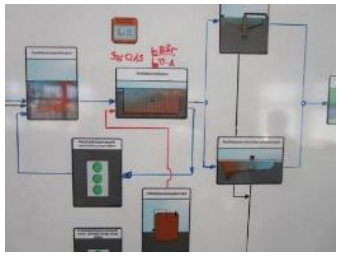
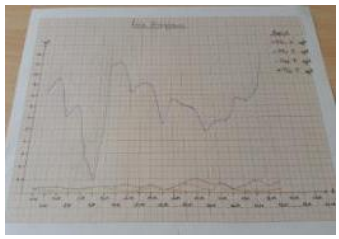
2	**(1) The work area must be clean.** The work area must be clean and free of debris; otherwise, a minor fault should be considered.	
	(2) Tools must be neatly stored and unused parts placed in a box. Tools and measuring instruments must be neatly stored. Unused parts must be stored in a box on the table or in the storage cupboard. Otherwise, a minor fault should be considered.	
3	**(1) The work area must be clean.** The work area must be clean and free of debris.	
	(2) Tools must be neatly stored and unused parts kept in a box. Tools and measuring instruments must be stored neatly. Unused parts must be stored in a box on the table or in the storage cupboard.	 

	(3) When carrying out mechanical and electrical work, the participant should wear suitable gloves.	
	(4) Careful and correct handling of tools and materials.	
	(5) No damage to tools and materials.	
	(6) The seals must be the correct size and cut smoothly.	 

	(7) Screw not damaged. The screw used for mechanical fastening must not be damaged. No damaged or missing components (including cables, wires, etc.)	
	(8) Pipes, cables and hoses must be laid separately on the profile plate.	
	(9) Support the pump casing or impeller during repair to prevent damage during the repair.	
	(10) Secure the crane sling correctly to the appropriate point on the pump to prevent damage to other parts, e.g. the temperature sensor.	
	(11) Attach the crane sling correctly to the hook and secure it with the safety latch.	

	(12) The sling must be straight when lifting.	
	(13) The pump must not be lifted at an angle.	

Aspect – Writing reports and other matters		
Points	Description	Note
2	**(1) Flowchart with correct representation, e.g. correct positions of the process units; otherwise, a minor error would be considered.**	
	(2) Pictogram with correct text description. If the description of the pictogram is missing, this would be considered a minor error.	
	(3) Two pictograms must be positioned correctly. Incorrect positioning would be considered a minor error.	
	(4) Information must be entered into each pictogram; otherwise, a minor error would be considered.	
	(5) The point where the process lines intersect must be drawn correctly; otherwise, a minor error should be considered.	
	(6) The graph must be drawn correctly. • Lines in the correct colours on graph paper or other drawings. • Appropriate title, legend and axis labels. • Arrows on the axis	

	Otherwise, a minor error would be considered.	
3	**(1) Flowchart with correct representation.** Correct positions of the process units.	
	(2) Pictogram with a correct description from the text. The description of the pictogram should not be missing.	
	(3) Two pictograms must be placed correctly.	
	(4) Information must be entered into each pictogram.	
	(5) The point where the two lines intersect must be drawn correctly.	
	(6) The graph must be drawn correctly. • Lines in the correct colours on graph paper or other drawings. • Appropriate title, legend and axis labels. • Arrows on the axis.	

Water Skills
IFAT 2026 Munich
Standards and Assessment Guidelines

Assessment criteria: Repair of piping systems

<table>
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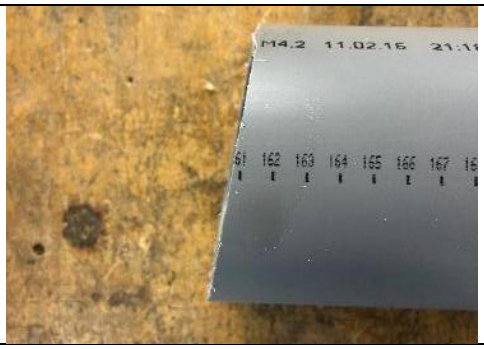
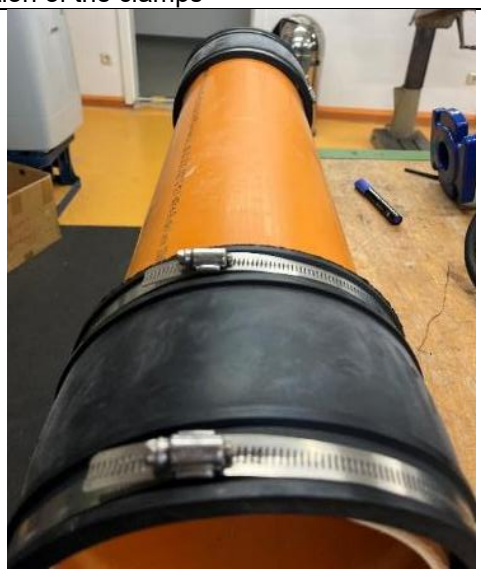
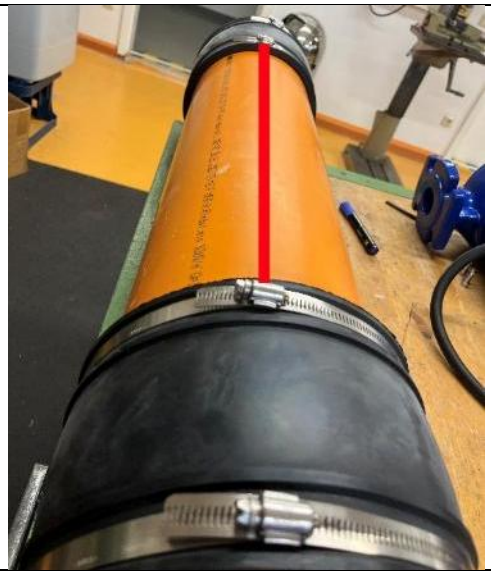
<tr><td>  </td><td>  </td></tr>
<tr><td>X Angled cut</td><td>√ Straight cut</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>X outside the valid measurement range, as soon as the spirit level passes more than halfway over the mark</td><td>  </td></tr>
</table>

	
	√ within the valid measurement range
Deburring	
	
X Saw edge not deburred	√ Saw edge deburred
Position and marking of the sleeves	
	
X Cuff too far from the mark	√ Sleeve pushed up to the centre rib

	
X Cuff pushed too far past the mark or no mark present	√ Position of the sleeve marked
Position of the clamps	
	
X Clamps not aligned in a straight line (position on the pipe is not crucial)	√ Clamps aligned in a straight line (position on the pipe is not important)
Alignment of the clamps	

	
X Clamps not aligned in one direction (position on the pipe is not important)	√ Clamps aligned in one direction (position on the pipe is not important)
Position of the bladder	
	
X Bladder inserted too far	√ Correct positioning of the bladder
Test kit connections	
	
√ All connections on the test case are correct	
Test pressure	
X Test pressure set below 100 mbar	√ Test pressure between 100 mbar and 150 mbar
X Test pressure set above 150 mbar	
X Test pressure not maintained, system leaking	√ Test pressure maintained, system leak-free