

FSS 5, Attachment 3: Safety Checklist - Vessel Process Plants
 the minimum safety requirements to be met by equipment (powered devices, machines and facilities - not including industrial trucks) within Freudenberg



Date: 2009-03-30 - Revision: 01

I. Nature of the inspection

- First inspection Follow-up inspection

Job No.

II. System components:

_____ In-house system designation

	Designation	Type	Ser. No.	Year of construction	Manufacturer/Supplier	Site
1.	Vessel/stirrer					
2.	Drive					
3.	Controller					
4.	Secondary circuit					
5.						

III. Scope of the inspection:

The facilities of the vessel process plant that affect safety must be inspected with reference to this checklist.

NOTE: Where additional plant components are used in conjunction with the vessel process plant, these components must undergo a safety inspection with reference to the general machine safety checklist.

IV. Inspection results

- The plant meets the requirements of the current FSS 5 Checklist for Vessel Process Plants
- The plant does not meet every requirement of the FSS 5 checklist for Vessel Process Plants. However, the plant may be used as the functions concerned are not critical in terms of safety.
- The plant **does not** meet the requirements of the current FSS 5 Checklist for Vessel Process Plants
 - The plant will be upgraded.
Initial cost estimate: _____ Deadline: _____
Follow-up inspection required!
 - Until this time, technical and / or organizational measures have been implemented to ensure safe operation, as laid down in the attachment.
- Date of next regular inspection: _____

V. Distribution list

Office responsible for corrections and improvements:

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Office responsible for documentation and filing:

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VI. Inspection performance:

	Mechanical part	Electrical part	Operating company	Other
Name				
Date				
Signature				

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Check		Irrelevant	OK	Not OK	Notes	Remarks
Plant designation:						
1	<u>Documentation</u>					
1.1	Is a rating plate/nameplate attached? (details of manufacturer, type, year of construction, operating pressure, filling quantities etc.)				For the plant and/or individual components	
1.2	Is documentation available in the language of the country in which the machine is to be used?				List of a complete set of documents → refer to the documents	
1.2.1	Is an operating manual available and does it reflect the latest status?				From the manufacturer as a rule	
1.2.2	Does the manual contain details of any residual hazards associated with the plant?					
1.2.3	Are operating instructions available for the plant / process?				From the operating company	
1.2.4	Do the operating instructions contain all of the necessary information relating to safety for operation and maintenance? Does this include details of any residual hazards?				From the operating company	
1.2.5	Has a hazard assessment been carried out in accordance with FSS 10?					
1.2.6	Is a circuit plan available and does it reflect the latest status?					
1.2.7	Is a hydraulic layout plan available and does it reflect the latest status?					
1.2.8	Is a pneumatic layout plan available and does it reflect the latest status?					
1.3	Are the necessary safety and warning signs attached to the plant?					
1.4	Is the maximum sound level below 80 dB? Additional measures must be taken where a sound level under 80 dB cannot be achieved (PPE, enclosure, etc.).				EN / ISO 11200 - 11205 EN / ISO 11957	
1.5	Where parts / components that affect safety are to be checked, does the maintenance schedule contain information describing the way in which these are to be checked and maintained?					
1.6	Does the maintenance schedule take the operating conditions into consideration? (3 shifts etc.)					
1.7	For PLANTS that are used within Europe and were put on the market after 1995: Are EEC manufacturer's declarations available for the individual components, such as drive, stirrer, attachment parts etc.?				Machinery Directive 98/37 No CE declaration required for the plant as a whole	
1.8	Is the plant used in a potentially explosive atmosphere?				If so, refer to 21	

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Plant designation:						
2	Intended purpose of the plant Visual inspection with reference to the pertinent manufacturer's instructions.					
2.1	Is the plant exclusively used for the process for which it was designed and built by the manufacturer? (materials used, pressure, temperature, speed)					
2.2	Is the plant exclusively operated under the environmental conditions specified by the manufacturer? (temperature, humidity, altitude, etc.)					
2.3	Is the plant connected up to the energy levels specified by the component manufacturers? (maximum pressure, ratings of the electrical fuses, voltage, nominal frequency, etc.)					
2.4	Are the environmental conditions in accordance with those specified by the component manufacturers?				e.g. temperature, humidity	
3	Lighting Visual inspection				Safe conditions must be achieved, which comply with the statutory requirements on site	
3.1	Are the <u>working zones</u> adequately illuminated for the work performed in them?					
3.2	Are the <u>maintenance and service zones</u> adequately illuminated for the work performed in them?					
4	Anchorage Visual inspection with reference to the pertinent manufacturer's instructions.					
4.1	Has the plant been anchored in accordance with the manufacturer's requirements and do the anchoring facilities allow for any additional loads that may arise during operation?					
4.1.1	Is the stability of the plant (e.g. vessel, floor-mounted stirrer) assured?				e.g. secured to withstand lift-off forces against the supports	
4.2	Have all plant components, guards and safety devices been installed properly and securely?				Also refer to 9: "Locking screws"	
5	Alarm facilities Visual inspection and function test					
5.1	Can the operator see into the hazardous zone from the location of the operator control facilities?					
5.2	If the operator cannot see into the hazardous zone(s): Have adequate measures been taken to secure the hazardous zone(s)?					

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Plant designation:						
5.3	Are the <u>visual</u> alarm signals easily seen and distinguishable from other alarm signals?					
5.4	Are the <u>acoustic</u> alarm signals easily seen and distinguishable from other alarm signals?					
5.5	Do personnel have sufficient time to leave the hazardous zone before start-up?				The time must be calculated in such a way as to ensure that the worker can reach the next OFF / emergency stop switch	
6	Command facilities					
6.1	Are the command facilities clearly recognizable as such and are their functions easily distinguishable? e.g.: - Emergency stop button - Control console switches etc. - Master switch					
6.2	Have the command facilities been labeled clearly and indelibly in the local language?					
6.3	Can the command facilities be operated inadvertently?					
6.4	If the plant can be operated from several operator control locations: Has a preselection facility been installed for the operator control location?					
6.5	Are the command facilities fitted outside the hazardous zone(s) and can they be operated safely?					
6.6	Have measures been taken to prevent damage to the command facilities?					
6.7	Is the emergency stop button easily accessible and is it marked in RED against a YELLOW background?					
7	Control facilities (electrical, pneumatic and hydraulic)					
7.1	Starting the plant Function test in accordance with the operating instructions.					
7.1.1	Are the elements used to START the machine/plant (e.g. pushbutton) protected in such a way as to prevent them being operated inadvertently?					

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Plant designation:						
7.1.1.2	Have measures been taken to prevent the supply and drain valves being operated inadvertently?					
7.1.1.3	Are the "open / closed" positions easily recognizable?					
7.1.2	Is it only possible put the plant in a critical state by deliberately operating the command facilities provided for this purpose?				For example: The plant does not start up when an alarm or emergency stop button is reset!	
7.1.3	Are the safeguards for the drive component adequately dimensioned for the anticipated loads?				Torque or current limiting	
7.1.3.1	Have measures been taken to ensure that no overloading can occur during start-up / operation of the stirrer?				e.g. damaging overload during unsupervised start-up with viscous products that are cold or when the inversion method is applied	
7.2	Shutting the plant down Function test in accordance with the operating manual.					
7.2.1	Is there a master switch to turn the complete machine off?					
7.2.2	Must the master switch be secured to prevent unauthorized or inadvertent operation?					
7.2.3	Are command facilities to turn off potentially hazardous movements provided at every workplace?					
7.2.4	Does shutdown result in the complete plant assuming a safe state?					
7.2.5	Is the command to SHUT the machine DOWN given precedence over the command to START the machine?					
7.2.6	Are easily accessible and clearly recognizable facilities provided to disconnect the machine from every single energy source?					
7.2.6.1	Is it possible to disconnect the supply of electrical energy?					
7.2.6.2	Is it possible to disconnect the supply of pneumatic energy?					
7.2.6.3	Is it possible to disconnect the supply of hydraulic energy?					
7.2.6.4	Is it possible to disconnect the supply of steam energy?					

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Plant designation:						
7.2.6.5	Is it possible to disconnect the supply of heat transfer medium energy?					
7.2.7	After disconnecting a source of energy, do no further hazards exist, e.g. movements triggered by stored energy or letting go of lifted loads.				Lifting facility for the upper section of the vessel, for example Refer to FSS 1	
8	<u>Guards and safety devices</u> (electrical pneumatic and hydraulic)				Refer to EN 954 / ISO EN 13849 / ISO EN 60204	
8.1	Have all cables / hoses / pipes been fitted properly and are they protected against damage?					
8.2	Do the safety devices and emergency stop facilities operate reliably? A safety device failure must lead to the plant coming to a standstill and the process assuming a safe state! It must not give rise to any potentially hazardous movements or process states.				e.g. vessel contents overheating	
8.3	Are the fitted safety functions in accordance with the hazard-specific and risk-specific safety level (category)?				Interpretation in accordance with EN 954	
8.4	Have the emergency stop facilities been designed as pushbuttons? Emergency stop actuating components may also take the form of bars at waist height, cable-operated switches etc. as and when necessary. Have the emergency stop facilities been designed as red palm-size pushbuttons or mushroom-head pushbuttons with a yellow background? Do the emergency stop facilities enable a local reset? Have the emergency stop actuating elements been designed as latching components (it must not be possible to reset by simply removing the load from the actuating component).				EN 418	
8.5	Does the emergency stop facility transpose potentially hazardous movements or processes into a safe state as quickly as possible?					
8.6	After an emergency stop or safety stop, can the plant only be restarted by a command from the operator?					

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Plant designation:						
9	Risk of mechanical contact with moving plant components Visual inspection and function test in accordance with the operating manual.					
9.1	Are safety devices and guards or safeguards in place that prevent access to hazardous zones or bring potentially hazardous movements to a standstill before personnel reach the hazardous zone?				Interlocking switches for vessel grille, cover or manhole cover, for example	
9.2	Are all guards and safety devices in the right places and are they in good working order?					
9.3	Are the isolating safety devices robust?					
9.4	Do the safety devices or safeguards not give rise to any additional hazards?					
9.5	Are all guards and safety devices secured with locking screws? (safety devices, guards, safety switches, photoelectric barriers, etc.)				Purpose of the locking screws: it must not be possible to remove guards or safety devices without using special tools.	
9.6	Is sufficient clearance maintained between the safety devices or safeguards and the hazardous zone?				Are all safety clearances in accordance with the requirements of the EN 294 / OSHA standards with respect to opening safeguards or ANSI B 11?	
9.7	Do the guards and/or safety mechanisms obstruct the necessary observation of the processes?					
9.7.1	Are there no sharp or uneven edges or projecting components?					
9.8	Fixed safety devices				<u>Refer to EN 953</u>	
9.8.1	Have all fixed safety devices been fitted in their designated places properly, with at least 2 locking screws?				Purpose of the locking screws: it must not be possible to remove guards or safety devices without using special tools.	
9.8.2	Are safety switches in place, which monitor the fixed safety devices that are opened more than once a year?					

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Plant designation:						
9.9	<u>Moving safety devices</u>				Refer to EN 953	
9.9.1	Are all moving safety devices monitored by safety facilities (e.g. safety switches), and does the safety monitoring loop take place in the necessary safety class?				Refer to EN 954 / ISO EN 13849?	
9.9.2	Are the moving safety devices for moving plant components with overtravel secured with magnetic safety switches?					
9.9.3	Have measures been taken to prevent manipulation of the fitted safety devices?					
9.9.4	Have measures been taken to prevent vertically moving safety devices falling?					
9.10	<u>Other safety methods (two-hand triggering facilities)</u>					
9.10.1	If a two-hand triggering facility is installed: is the maximum time permitted between pressing the two buttons no longer than 0.5 seconds?				Refer to EN 574 Vessel with lifting facility for the upper section with two-hand controller to avoid the risk of crushing when closing	
9.10.2	If a two-hand triggering facility is installed: has the workplace been designed as a one-person workplace?					Only the space occupied by the operator may be excluded from monitoring. All other machine components (front, side and rear) must be equipped with safeguards!

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Plant designation:						
10	<u>Facilities that prevent parts falling</u>				Applies where there are protective facilities / loads, which are raised by means of electric / hydraulic / pneumatic drives.	
10.1	Have facilities been installed that prevent plant components falling or dropping? Hydraulic / pneumatic check valves or mechanical fall arresters.				Securing vessels with lifting gear for cleaning and maintenance.	
11	<u>Hot and cold parts</u> Visual inspection.					
11.1	Have appropriate technical safety measures been taken to reliably prevent personnel coming into contact with very hot or very cold parts?				Insulating heated areas, as well as pipes and fittings for heat transfer media, product lines (process or filling) or grilles as barriers.	
11.2	Where this is not possible, is contact prevented by handling equipment or personal protective equipment worn by the personnel?					
11.3	Are the hot and cold surfaces marked accordingly?					
12	<u>Hazards caused by gas, vapor, mist, liquid and dust</u> Visual inspection, working zone analysis, test record					
12.1	Have safeguards / extraction facilities been installed, which restrain / discharge such emissions <u>at source</u> ?				Extracting product mist and vapor.	
12.2	Is the extraction system equipped with a function monitoring facility with alarm signal?					
12.2.1	Is this checked at regular intervals to ensure that its functions properly?					
12.2.2	Is the quantity of output air checked at regular intervals?					
12.3	Are automatic feed systems equipped with protective overcharge safeguards?					
12.4	Is a facility fitted that prevents materials being hurled out?				Vessel contents	
12.4.1	Is it possible to add material to the plant without encountering any hazards?				e.g. raw materials	

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Plant designation:						
13	<u>Risk of breaking, bursting or splintering</u> Visual inspection, check with reference to the operating manual					
13.1	Have safety measures been taken to protect employees against hazards caused by plant components breaking and splintering?				Fracture-proof inspection glass Safeguarding bursting disks	
13.2	Are all parts of the machine fitted securely, are cables, pipes, cords and hoses protected and secured? (e.g. hydraulically, pneumatically or thermally)					
13.3	Have pressure relief facilities (safety valves, bursting disks etc.) been fitted?					
13.4	Is their function / state checked and documented at regular intervals?					
13.5	Where vapor, dust and liquid escape from safety devices, are these discharged safely?					
13.5.1	Are the expansion lines checked for obstructions at regular intervals and are these checks documented?					
14	<u>Performance of production activities, such as setting, loading and unloading</u> Visual inspection and function test, checking with reference to the operating manual, instructions for use and work instructions					
14.1	Do personnel have safe access to all of the areas necessary in order to perform these activities?					
14.2	Is it safe to remain in these areas during the work operation?					
15	<u>Preventive and corrective maintenance work, cleaning and debugging</u> Checking with reference to the operating manual and the manufacturer's instructions.				Please apply the LOCKOUT procedure when performing the safety check! (Requirements of FSS 1)	
15.1	Do personnel have safe access to all of the areas necessary in order to perform this work?					
15.2	Can preventive and corrective maintenance work, cleaning and debugging be performed <u>without</u> removing the guards and safety devices?					
15.3	Can all preventive and corrective maintenance work, cleaning and debugging be performed with the machine at a standstill?					
15.5	Have protective measures been taken where it is necessary to perform work under raised loads?				Cleaning and maintenance of vessels with lifting gear, for example	

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Plant designation:						
15.6	Are there any hazards associated with stored energy? (e.g. pressure reservoirs, hydraulic accumulators, electric capacitors, etc.)					
15.8	Have facilities been installed, which enable the release of stored energy and put the plant in a de-energized state, and are these facilities marked accordingly?					
15.9	Are warnings given for systems, which cannot be de-energized? (on the machine, in the operating manual and in the instructions for use)					
15.10	Are the parts of the system, which cannot be completely de-energized, marked in a manner that cannot be misunderstood?					
15.11	Have checking cycles been defined for the guards and safety devices and are these observed? (e.g. for light curtains, emergency stop, flashback arresters etc.)					
15.12	Are there work instructions, which lay down the procedure for handing over machines for maintenance and repair purposes?				FSS 1	
16	<u>Protection against electric shock and indirect contact with electric current</u> Visual inspection					
16.1	Do the machine and control facilities offer protection against accidental electric shock? (e.g. proper IP standards for enclosure, cable insulation, operator control elements etc.)					
16.2	Does the machine / electrical system offer protection against indirect contact with electric current in the event of an insulation fault? (e.g. correct grounding, correct cable rating for ground conductor, grounding the machine enclosure, insulation monitoring, etc.)				IEC 364-3 e.g. BGV-A3 test	
17	<u>Risk of people slipping, tripping or falling</u> (in connection with machines) Visual inspection					
17.1	Have measures been taken to ensure that personnel cannot slip, trip or fall?					
17.2	Have suitable catwalks, platforms or intermediate platforms been installed to ensure safe access to the equipment? For maintenance, cleaning, loading with raw materials or removing the product at parts of the plant, which cannot be reached from the floor, for example?				Stable, non-slip steps, non-slip platform surface.	
18	<u>Ergonomics</u>					
18.1	Are the controller and operator control elements easily accessible?					

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Plant designation:						
18.2	Are the displays, indicators and measuring instruments required for operation easy to read?					
19	Entering the vessel					
19.1	Are there suspension points to secure personnel?					
19.2	Is rescue equipment provided?				Block and tackle and lifebelt	
20	Testing and certification					
20.1	Have the plant components been designed and built in accordance with the applicable national legislation?					
20.2	Do the component manufacturers hold the necessary permits?				e.g. local legislation for vessels: AD 2000 for EU, ASME for USA, SQL for China	
20.3	Have the components undergone pressure testing performed and documented by the manufacturer?					
20.4	Once installed, did the plant undergo initial pressure testing and was this documented?				System pressure test	
20.5	Have organizational measures been taken to cover periodic testing?					
20.5.1	Are these tests performed and documented?					
21	Explosion protection				Only applies where explosion protection requirements must be met	
21.1	Is the plant operated in an area, in which a dangerous, potentially explosive atmosphere may occur (potentially hazardous zone)?				Germany: refer to TRBS 2152	
21.1.1	Have measures been taken to completely prevent the formation of a dangerous, potentially explosive atmosphere (in and around the plant)?				Germany: refer to TRBS 2152	
21.1.2	If the answer to 21.1.1 is "no" : Has the plant been classified according to potentially hazardous zones and has the classification record been included in the explosion protection document?					

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Plant designation:						
21.1.3	Have records been kept of implemented explosion protection measures (in the explosion protection document)?					
21.2	Avoiding the formation of a dangerous, potentially explosive atmosphere:					
21.2.1	Does the safety concept allow for the formation of a dangerous, potentially explosive atmosphere, which may occur during inerting (e.g. with nitrogen or carbon dioxide), in all stages of the process (including starting the plant and closing it down, faults)?					
21.3	Have suitable measures been taken to reliably prevent ignition of a dangerous, potentially explosive atmosphere in the potentially hazardous zone under examination (all relevant ignition sources)?				Germany: refer to BGR 104 (or the TRBS 2152 series) and BGR 132 (TRBS 2153 in future)	
21.3.1	Have the individual components been designed in accordance with the current requirements for the specified potentially hazardous zone and do they bear the appropriate identification markings? ("Ex" symbol, equipment group, equipment category, explosion group, temperature class etc.)				Individual components = equipment, protective systems Equipment group II: in use for days Equipment category: e.g.: Cat. 1 for Zone 0 G: gas, D: dust Refer to: the German Ordinance on Industrial Safety and Health (BetrSichV) and the Directive on equipment intended for use in potentially explosive atmospheres (94/9/EC)	
21.3.2	Do items of electrical equipment built before 1995 bear "Ex" identification markings?					
21.3.3	Have all conductive plant components been grounded?				Also refer to : DIN EN 13463 for calibration	
21.3.4	Have measures been taken to reliably eliminate the possibility of components heating up to an unacceptable extent (e.g.: shaft bearings, chain drive, friction surfaces, slides)?				e.g.: by means of temperature or level monitoring, or maintenance	

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Plant designation:						
21.3.5	Is mechanical explosion protection assured?				Mechanically generated sparks e.g. frictional or impact action between metal components Also refer to DIN EN 13463	
21.3.6	Have measures been taken to ensure that plant components, which are protected for use in potentially hazardous locations, are checked for compliance with the national regulations at regular intervals?				Germany: Refer to: the German Ordinance on Industrial Safety and Health (BetrSichV)	
21.4	If the answer to 21.3. is "no": Have design measures been taken to reduce the effects of an explosion to a harmless level?				e.g.: pressure relief facilities	
21.4.1	Have measures been taken to reliably prevent flame propagation in lines to other systems?				e.g. by means of flashback arresters extinguishing medium barriers quick-release fittings non-return valves	
21.4.2	Other design measures implemented					