#### Autoclave Pressure Test

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| Purpose | Reassemble and pressure test the autoclave at 400 psig. Note that depending upon maintenance activity; this procedure may be used for running in agitator packing or pressure test only. |

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| Safety | * If a large leak is heard during the pressure test, treat the cell environment as nitrogen rich and oxygen deficient. * Removing the blank from the TFE feedline requires a line break permit per WW-574. The permit should be filled out immediately before the physical line break by the operator supervising the line break. |

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| Initial Equipment Status | * Autoclave is closed, empty, and at ambient temperature * Autoclave jacket piping is reconnected * Autoclave is locked out * Autoclave is blanked out (if autoclave was opened or vessel entry completed) * Agitator packing bolts are hand tight * If required, any TFE feed and block valve change or other maintenance to the autoclave side of the TFE feedline has been completed. * Line blank is installed in TFE feedline on monomer weigh tank side of feed and block valves. * Both autoclave TFE feed and block valves are closed to allow operation of equipment and valves necessary for pressure test. Note, however, that a bypass may still exist on the valves. |

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| Procedure Outline | 1. Prepare Autoclave for Pressure Test 2. Startup Autoclave Jacket 3. Add Pressure Test Water to Autoclave 4. Run in Autoclave Packing 5. Pressure Test Autoclave 6. Pressure Test Trouble shooting Guide 7. Restore Autoclave to Service |

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#### Autoclave Pressure Test, Continued

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| Prepare Autoclave for Pressure Test | Contact maintenance to complete the following tasks:   1. Remove all blanks except TFE line: Ingredients Header, Mixed Gas Holder vent line, 75# steamback line (#9 only), and high pressure N2 supply line. TFE feed line must remain blanked. 2. Verify jacket piping is reassembled 3. Connect the agitator motor coupling and install agitator fuses   Operations completes the following tasks:   1. Connect all inboard and outboard injection lines 2. Connect inboard and outboard thermocouple cables and verify installation 3. Connect inboard and outboard bearing water hoses 4. Unlock and open all manual valves and switches, except TFE, using the lockout sheet:    * Inboard and outboard bearing water (4 valves)    * 6 (4 on #9) manual valves associated with the Injection System    * Ingredients Header manual valve    * Mixed Gas Holder manual valve    * 75# steamback manual valve    * Ram cleaner ball valve pin, and Ram cleaner water and air supply (if attached to autoclave)    * Motorized drop valve pin and ECR hand switch    * Agitator hand switch and ECR 5. With the exception of the TFE feedline lockout and high pressure nitrogen being hooked up, the autoclave should be in a ready to run state. |

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| Startup Autoclave Jacket | 1. Valve in jacket water supply manual and steam manual 2. Valve in seal water to circulating water pump 3. Valve in dump (to Reuse Header) manual 4. Verify all other jacket recirculation valves are open – note that some recirculation valves may be partially open to control flow to the various jacket compartments 5. Set jacket pressure controller to 30 psig in automatic, and open the makeup water automatic valve to 100% in manual. Allow several minutes for most air to be removed from jacket. 6. Unlock and start jacket water circulating pump 7. Set jacket temperature to automatic at pressure-test temperature (50o C) |

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Autoclave Pressure Test, Continued, Continued

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| Add Pressure Test Water to Autoclave | Prior to pressure testing, all the water must be removed from the clave to insure it is not overfilled.   1. Evacuate autoclave to -13 psig at 50˚C (vapor pressure at 50˚ C is 1.87 psia) to evaporate any small pockets of water. 2. If more than 30 minutes passes, check for large pockets of water or a large leak. Drain the clave and any low spots. Repeat evacuation. 3. Open autoclave vent automatic valves and verify steam jet is shutoff 4. Add 750 gallons **(or 700 gallons if the autoclave was not cleaned)** water from the common aqueous charge tank. Water temperature in the common aqueous charge tank should be between 70-90o C. Overfilling or overheating the clave can result in a blown rupture disk. 5. Close autoclave motorized drop valve, close the autoclave vent valves. 6. Start autoclave agitator. 7. Set the autoclave jacket temperature controller to 50o C, and cool the hot water down to pressure test temperature. Wait until temperature is stable before proceeding. By cooling, the water will contract and insure the system is not liquid full. 8. Close Freddy automatic valve before pressuring up the Autoclave with high pressure n2/Helium to avoid tripping SIS. |

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Autoclave Pressure Test, Continued, Continued

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| Run in Autoclave Packing | If any new packing rings have been added, have maintenance follow detailed steps in Job Method TP-006 and:  **Run the autoclave agitator**   1. Run the agitator with water in the autoclave for 30 minutes. During this time, check the packing nuts; and, if they become tight due to expansion of the packing, loosen them until just hand tight   **Pressure autoclave to 15 psig with helium and 100 psig with nitrogen**   1. Pressure autoclave to 100 psig and run agitator for 30 minutes. Have maintenance tighten packing nuts in a star pattern as needed to hold leakage to 4 to 6 drops per minute.   **Pressure autoclave to 250 psig with nitrogen**   1. Pressure autoclave to 250 psig and run agitator for 30 minutes. Have maintenance tighten packing nuts in a star pattern as needed to hold leakage to 4 to 6 drops per minute   **Pressure autoclave up 400 psig with nitrogen**   * Pressure autoclave to 400 psig and run agitator for 30 minutes. Have maintenance tighten packing nuts in a star pattern as needed to stop leakage. * Verify packing gland follower face is square to the stuffing box to within 1/16”. Record the distance from follower face to stuffing box face at 12, 3, 6, and 9 o’clock positions. * With maintenance, fill out Autoclave Packing Log sheet – P-226 to document actions taken   **Allowable pressure drop at each of the above steps is 0.5 psig in 30 minutes at constant temperature.** If pressure drop exceeds this level, see next section for troubleshooting.  **Leave Autoclave at 400 psig at end and use for pressure test.** |

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Autoclave Pressure Test, Continued, Continued

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| Pressure Test Autoclave | If Clave is pressured from Packing run-in, skip to step 3.   1. Pressure the autoclave to 15 psig with helium 2. Pressure the autoclave to 400 psig with nitrogen 3. Allowable pressure drop is 0.5 psig in 30 minutes at constant temperature. 4. If test fails see pressure test troubleshooting guide in next section before proceeding to next step 5. Stop the autoclave agitator to avoid entraining excessive water into the vent system 6. Vent autoclave through emergency vent valve to ensure vent line is open 7. Close emergency vent valve |

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Autoclave Pressure Test, Continued, Continued

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| Pressure Test Trouble- shooting Guide | Following are steps for determining why an autoclave pressure test cannot be completed. The steps are in order of ease of implementation. If the leak is detected, slows, or stops at any step, then take appropriate action to stop the leak.   1. Start Autoclave Pressure Test Shift Turnover Form: P-207. Pull up an IP21 trace of autoclave pressure. Make sure “PMCANALOGRAWMAP” data, and stepped, is being used. Also view autoclave temperature to make sure it is stable. 2. Note that removal of valves or installation of blanks requires the autoclave to be vented down, and the autoclave to be locked out per 33P4F3; but depending upon where the leak is may not require the pressure test water to be dropped. Note that removal of packing rings or head gasket replacement requires autoclave lockout per 33P4R2. 3. Verify all automatic valves are showing closed on the DCS. 4. Verify Ingredients Header block valve (FREDDY), autoclave motorized drop valve, and ram cleaner ball valve are not leaking through by examining Ingredients Header pressure, autoclave drop line pressure, and ram cleaner ball valve pressure, respectively. Note for this to be affective, verify there are no open automatic valves in the ingredients header or drop line. 5. Verify autoclave emergency vent valve is tight. 6. Verify autoclave agitator packing is not excessively leak (see “Run In Autoclave Packing” section above for guidance). 7. Verify there is no water dripping from the autoclave head gasket. 8. **Helium** leak test all flanges/joints that were disassembled, repaired, or replaced during the outage until the leak is found. This includes the autoclave head gasket and automatic valve packing. Specific automatic valves include the Ingredients Header block valve, vent valves to atmosphere, vent valves to MGH, and knockout pot steam valve. If a helium leak is detected and you want to pinpoint the exact leak location, snoop can be applied, but do not use helium detector in areas that snoop has been applied, liquid can destroy the helium detector. 9. Check for helium leaking through the emergency vent valve by placing the detector near the emergency vent stack on the roof. 10. Close manual valve to Mixed Gas Holder. If leak stops, the MGH automatic valves are leaking though. 11. Close manual valves in vent line to atmosphere. Note there are valves to the vacuum jet, and valves from the cell E&P header, that will need to be closed. 12. Close manual valve to knockout pot steam valve. |

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Autoclave Pressure Test, Continued, Continued

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| Pressure Test Trouble- shooting Guide, (Continued) | 1. Verify agitator is not cracked/broken, or shell is not leaking into jacket:    * + Close jacket automatic dump valves in manual mode      + Shutoff jacket pump      + Open jacket makeup water valve 100% to pressurized jacket to process water header pressure.      + Close jacket makeup water valve and steam valve to trap pressure in jacket.      + Monitor jacket pressure for any increase indicating the agitator or shell has been compromised. 2. Call technical for additional assistance. |

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| Restore Autoclave to Service | Complete the following steps to restore autoclave to service:   1. Drop pressure test water to waste water hold up tank (not the decanter) using up to 3 psig Nitrogen via Ingredient Header. 2. To ensure injection lines are coupled securely, pump water from A, B & E injection systems to the autoclave. Observe lines in the cell for possible leaks. 3. Open autoclave automatic vent valves 4. Set autoclave jacket temperature to 80o C after water has been dropped   Call maintenance to assist in TFE line blank removal, N2 line blank installation, and any final reassembly steps.   1. Remove the TFE feed line blank (CAUTION: this is a line break)  * Verify TFE feedline is locked out per either 33P4F3, 33P4F4, or 33P4F9. * Verify with delta P transmitter and then purge tap pressure gauge on the 3rd level that there is zero line pressure. * If line has any pressure, clear line per above mentioned procedures before removing blank  1. Restore the TFE feedline to normal service per the operating procedure used to prepare the TFE feedline for maintenance (either 33P4F3, 33P4F4, or 33P4F9). 2. Close the high pressure nitrogen supply valve. Reinstall the high pressure nitrogen line blank on the autoclave side of the manual isolation valve. 3. Reconnect ram cleaner if not already attached 4. Remove any remaining autoclave locks |

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Autoclave Pressure Test, Continued, Continued

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| Vacuum Test Autoclave | 1. Evacuate autoclave to -10 psig and at a constant jacket temperature of 50o C. If more than 30 minutes passes without attaining vacuum, check for pockets of water. Drain the clave and any low spots. Repeat evacuation. 2. Allowable pressure increase is 0.2 psig in 30 minutes. 3. If vacuum test fails then check high pressure N2 blank installation and repeat vacuum test. If this fails, the low pressure autoclave test described in 33P4F03 can be completed to find the leak. |

End of topic