R2000H – Mechanical maintenance

Change log.

Version	Comments	Date	Released by
03	Added a service kit	24-10-2024	N.Levsen
04	Service Interval Extension	27-05-2025	N.Levsen

Repair

The repair/replacement of the following parts can be made by the owners qualified personnel:

- Changing of oil at hydraulic station.
- Replacement of oil filters in the hydraulic system.
- Replacement / refilling of air filter on hydraulic station.
- Cleaning / replacement of filters in dehumidifier.
- Replacement of cabinet air filters.
- Replacement of pneumatic filter cartridges.
- Replacement of wear plates on tools.
- Replacement of high-pressure hydraulic hoses.
- Replacement of low-pressure hydraulic hoses.
- Replacement of cooling pump.
- Replacement of hydraulic pump.
- Replacement of bypass valve on cooling circuit.
- Replacement of gaskets in hydraulic cylinder.
- Hopper clean-out and machine thawing.
- Adjustment of timing belt
- Replacement of timing belt

When making repair/replacements, use only original Cold Jet spare parts.

Terms of warranty

In order to comply with the terms of warranty, and for other safety reasons, repairs other than those stated above require relevant tools and equipment and therefore must always be made by either a Cold Jet technician or by the owners qualified personnel who has been trained by Cold Jet in the repair and maintenance of Cold Jet dry ice blasting and dry ice production machines and accessories. Beyond the necessary knowledge, the person concerned must have appropriate tools and equipment, as well as the auxiliary materials required, at his disposal.

The liability of the manufacturer under the terms of the CE endorsement as regards safety may become **invalid:**

- If repairs are made using non- Cold Jet spare parts.
- If repairs are made by unqualified personnel.
- If repairs are unsatisfactory due to lack of relevant tools and equipment.

In such cases, the liability of the manufacturer will be solely confined to any manufacturing faults/errors made prior to the machine being delivered and before repairs/replacements have been made.

Table for mechanical maintenance

Inspections to be carried out every week: Hydraulic station:

Inspect for oil leakages, check hoses, fittings, valves, and connections for leakages. Reseal if necessary. Check the oil level in the sight glass, on the hydraulic tank side. Refill if necessary.

Check the oil. Drain a small quantity of oil – 1 dl – from the hydraulic tank. Inspect the oil visually. If the oil is not clear, bright, and yellow it must be changed. Get a particle analysis of the oil if in doubt about the contamination degree.

Cold Jet recommends the owner to have a spare part package in stock, so repairs can be made quickly and with little loss of production time.

- Spare part package standard Cold Jet article no. 81717-001
- Spare part package extended Cold Jet article no. 81717-002

The table below includes all service intervals from 0 hours to 25.000 hours, 0,9 to 11,5 million cycles and from 12 to 150 months. Service must be performed at whatever values is reached first.
For each service interval the procedures to perform are listed along with Cold Jet article numbers for the service kits needed at that specific service. A service may require more than one service kit.

Service interval Hours/Cycles (million)/Months	Procedure no.	Cold Jet service kit(s) article numbers
2.000 hours / 0.9 million cycles / 12 months	2, 3, 4, 5, 6, 7, 8,	81716-001
4.000 hours / 1,8 million cycles / 24 months	2, 3, 4, 5, 6, 7, 8,	81716-001 81716-002
6.000 hours / 2,7 million cycles / 36 months	2, 3, 4, 5, 6, 7, 8,	81716-001
8.000 hours / 3,6 million cycles / 48 months	2, 3, 4, 5, 6, 7, 8,	81716-001 81716-002
10.000 hours / 4,5 million cycles / 60 months	2, 3, 4, 5, 6, 7, 8,	81716-001
12.000 hours / 5,4 million cycles / 72 months	2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 17, 18	81716-001 81716-002 81716-003 81716-004
14.000 hours / 6,3 million cycles / 84 months	2, 3, 4, 5, 6, 7, 8,	81716-001
16.000 hours / 7,2 million cycles / 96 months	2, 3, 4, 5, 6, 7, 8,	81716-001
18.000 hours / 8,1 million cycles / 108 months	2, 3, 4, 5, 6, 7, 8,	81716-001
20.000 hours / 9 million cycles / 120 months	2, 3, 4, 5, 6, 7, 8,	81716-001 81716-002
22.000 hours / 9,9 million cycles / 132 months	2, 3, 4, 5, 6, 7, 8,	81716-001
24.000 hours / 10,8 million cycles / 144 months	2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 17, 18	81716-001 81716-002 81716-003 81716-004
25000 hours / 11,5 million cycles / 150 months	11, 12, 13, 14, 15, 18	81716-005

On the HMI, the following page can be found where the time since last service and service intervals are shown. The page is accessed by selecting info (9), and then maintenance (10)

It will show the following information:

- Machine total running hours/cycles/months (1)
- Time since performing service kit 1 (2)
- Time since performing service kit 2 (3)
- Time since performing service kit 3 (4)
- Time since performing service kit 4 (5)
- Time since performing service on tool 1 (6)
- Time since performing service on tool 2 (7)
- Time since performing service on tool 3 (8)

Each block will show hours, cycles, and months since the last service along with the date of the last service. The counters must be reset after the relevant services have been performed.

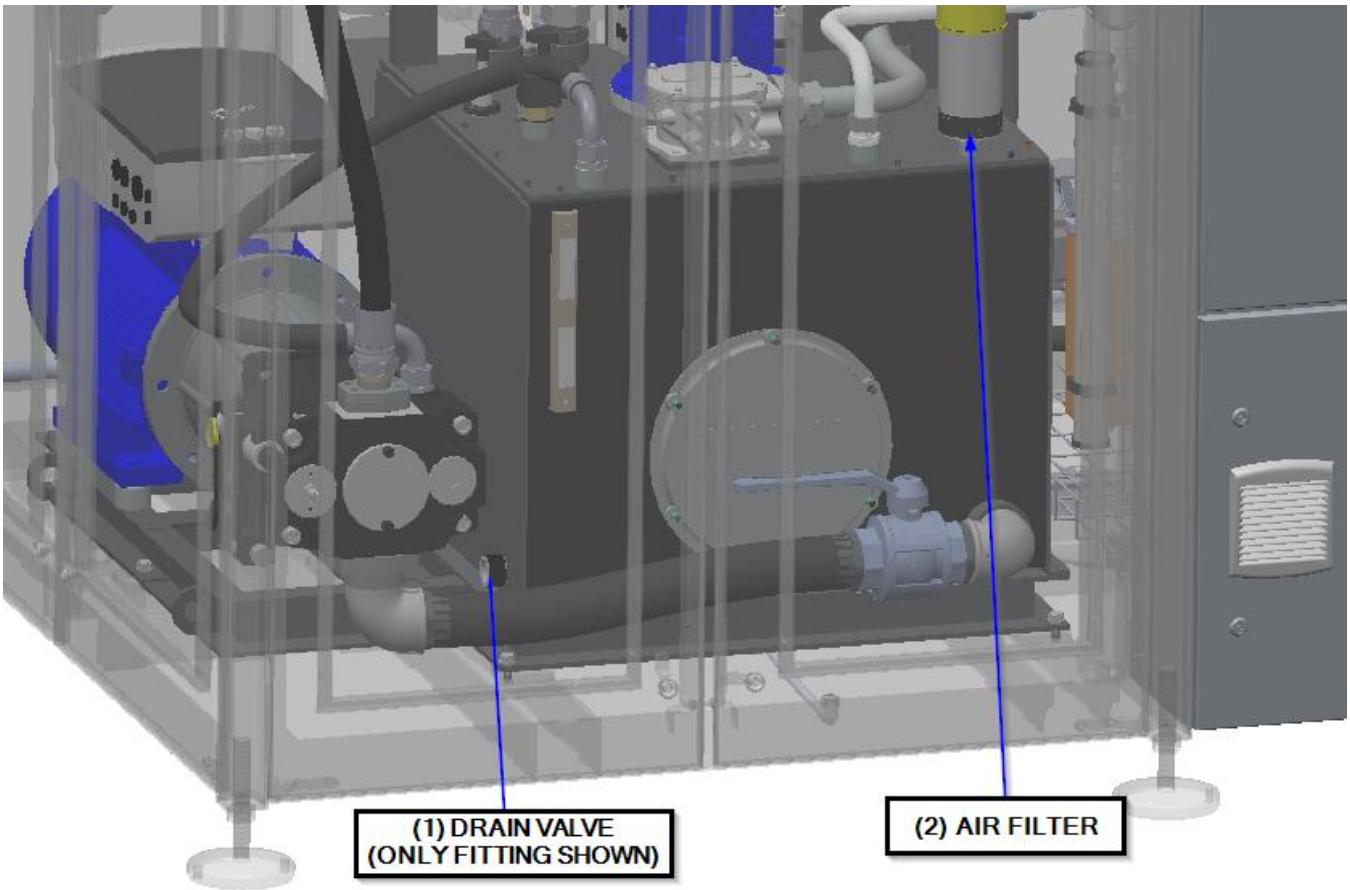
Procedures for maintenance

This table includes all relevant procedures for normal maintenance and repair.

After locating procedure numbers in the service intervals, the relevant procedure numbers can be found in the table below which leads to detailed procedures.

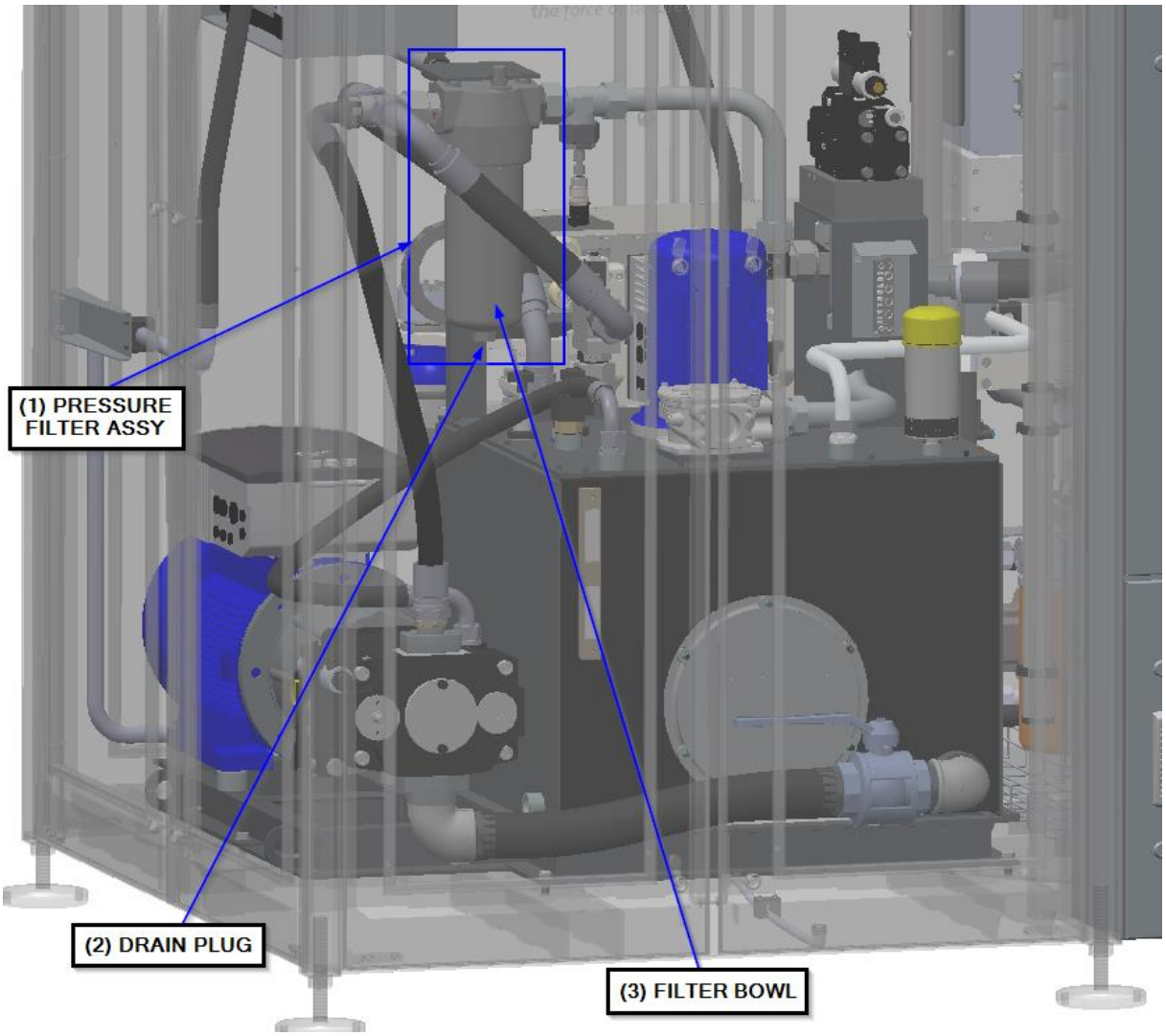
1. Procedure for changing hydraulic oil.

1. Perform lock-out tag-out of the machine before performing work.
2. Attach one end of a hose to the drain valve (1) and the other end of the hose to a suitable container.
3. Open the drain valve (1) and drain the hydraulic oil.
4. After the oil has been completely drained close the valve (1) and remove the drain hose.
5. Remove the air filter (2).
6. Refill oil though the air filter fitting – 300L (79,25 US gal).
    - Use DTE Mobil FM 46 - Cold Jet article no. 4F0221 – Approved for food manufacturing.
    - If there is no need for oil approved for food manufacturing, DTE MOBIL 10 Excel 46 – Cold Jet article no. 4F0220 can be used.
7. Re-attach air filter (2).
8. Check for leaks.



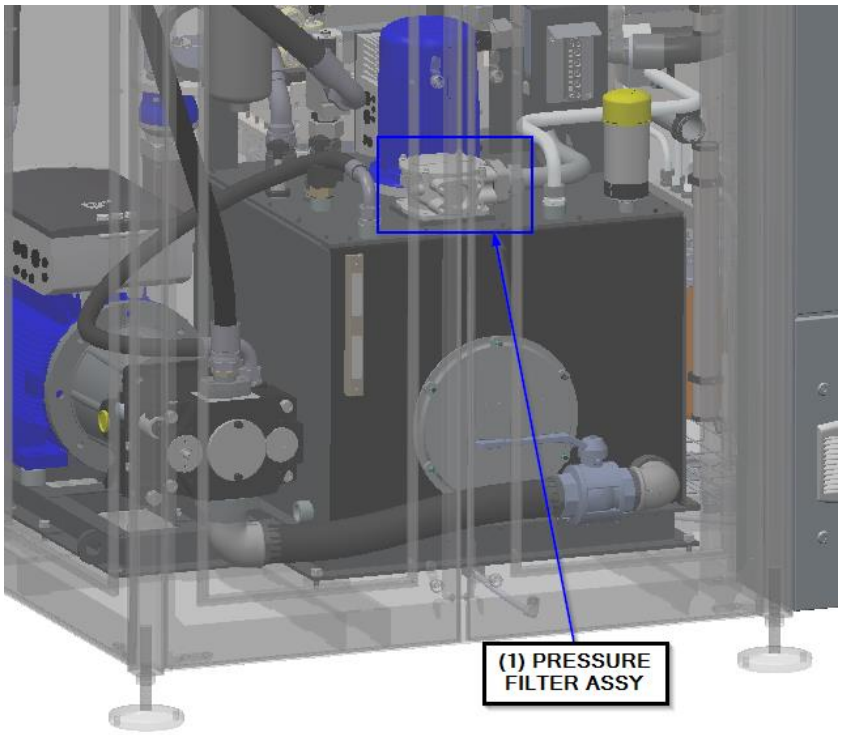
2. Procedure for replacement of pressure filter

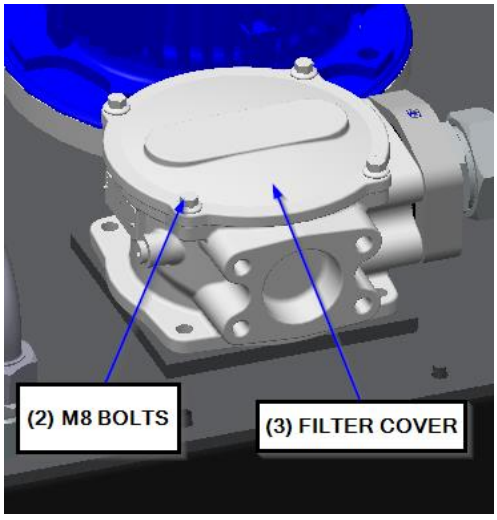
1. Perform lock-out tag-out of the machine before performing work.
2. Ensure that the system is not pressurized.
3. Locate the pressure filter (1).
4. Drain the pressure filter by removing the drain plug (2) and drain into a suitable container.
5. Unscrew the bowl (3) from the filter housing.
6. Replace the filter element found in the bowl. The bowl is reused.
7. Screw the bowl back into place. Tighten to 35-40 Nm (25,8 – 29,5ft-lbs)
8. Screw in the drain plug. Tighten to 35-40 Nm (25,8 – 29,5ft-lbs)
9. Check for leaks.



3. Replacement of return filter

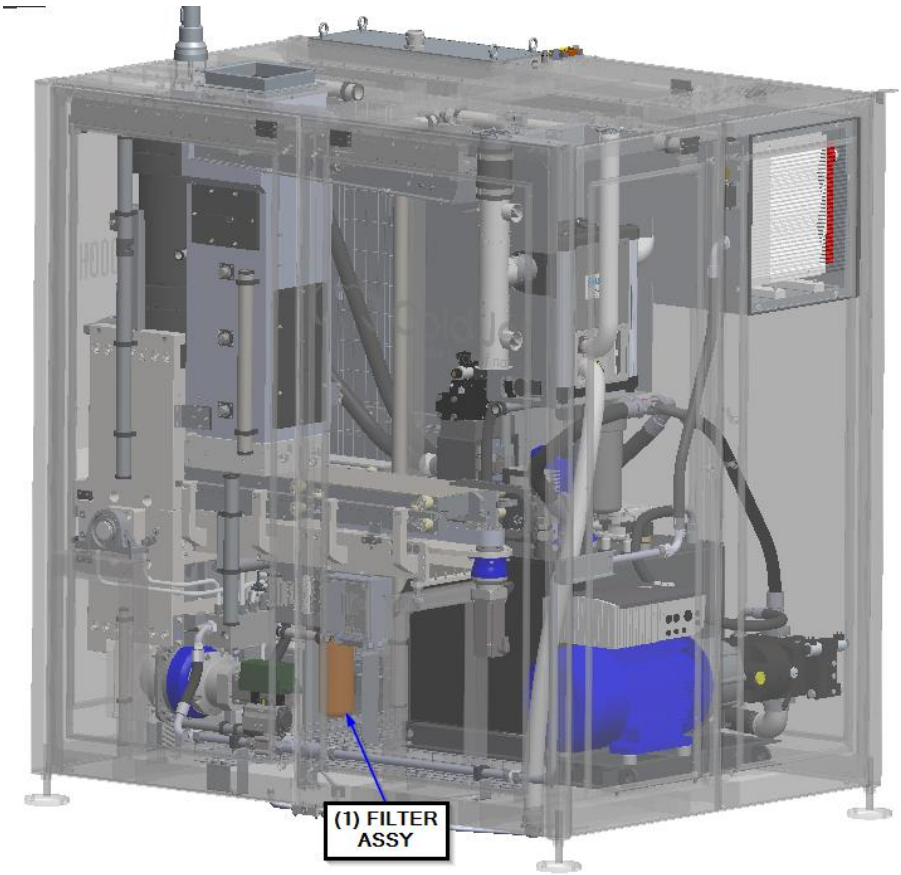
1. Perform lock-out tag-out procedure before performing work.
2. Locate the return filter assembly (1).
3. Remove the four M8 bolts (2) and remove the filter cover (3).
4. Remove and discard the filter element.
5. Inspect all seals.
6. Lubricate all seals.
7. Mount new filter cartridge.
8. Re-install the cover (3) and tighten the four M8 bolts (2) to 10 Nm (7 ft-lbs).
9. Check for leaks.

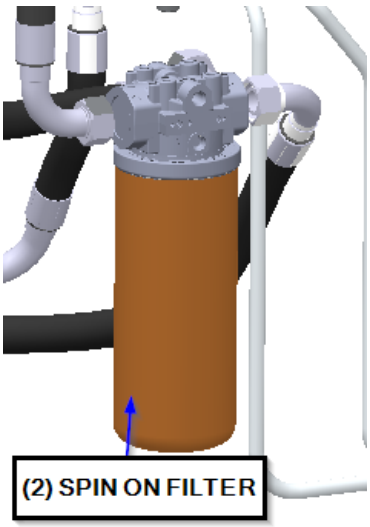




4. Replacement of oil filter on oil cooling loop

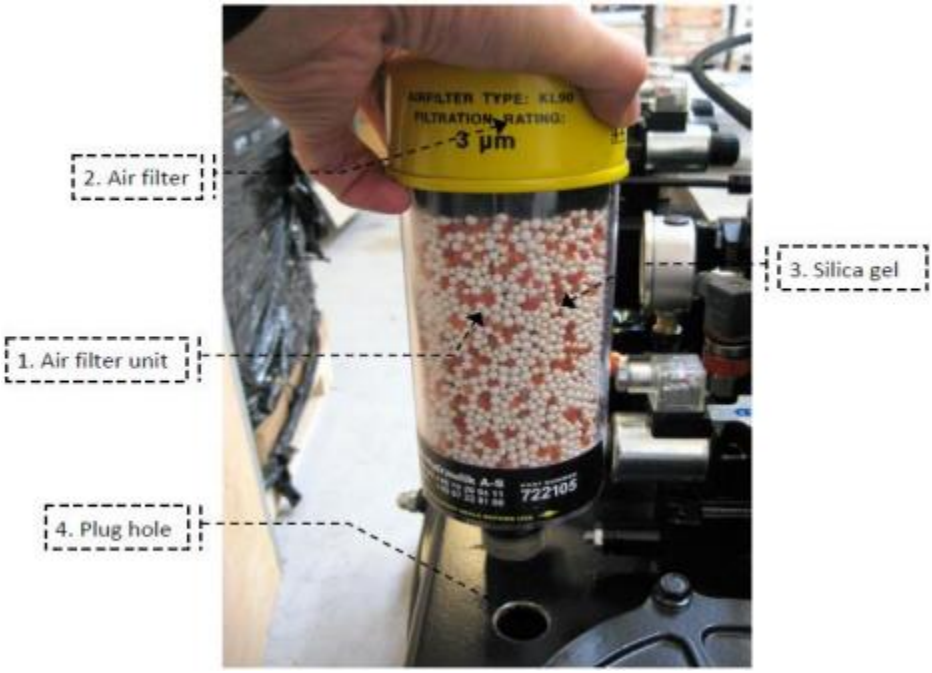
1. Perform lock-out tag-out procedure before performing work.
2. Locate the filter (1).
3. Remove the spin-on filter (2).
4. Lubricate the O-ring on the new filter.
5. Spin on the new filter – hand tighten.
6. Check for leaks.





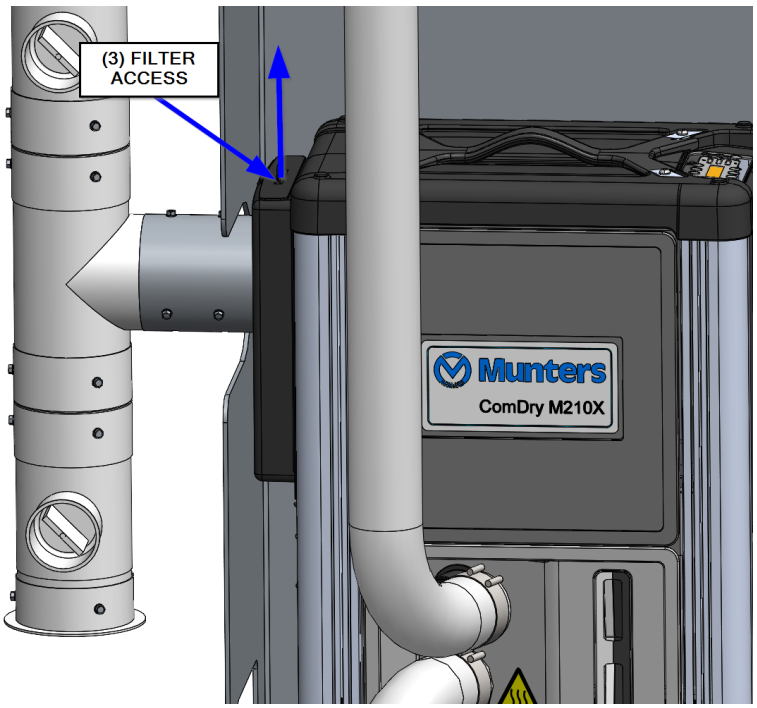
5. Replacement / refilling of air filter on hydraulic station

1. Perform lock-out tag-out procedure before performing work.
2. The filter is located on top of the hydraulic station.
3. Unscrew the air filter unit (1) from the station.
4. Unscrew the yellow air filter (2) and pull out the filter pad.
5. Pour out and discard the silica gel (3).
6. Replace it with new silica gel.
7. Replace the air filter pad.
8. Mount the air filter (2) on the air filter unit (1).
9. Mount the air filter unit (1) in the plug hole (4).
10. Check for leaks.



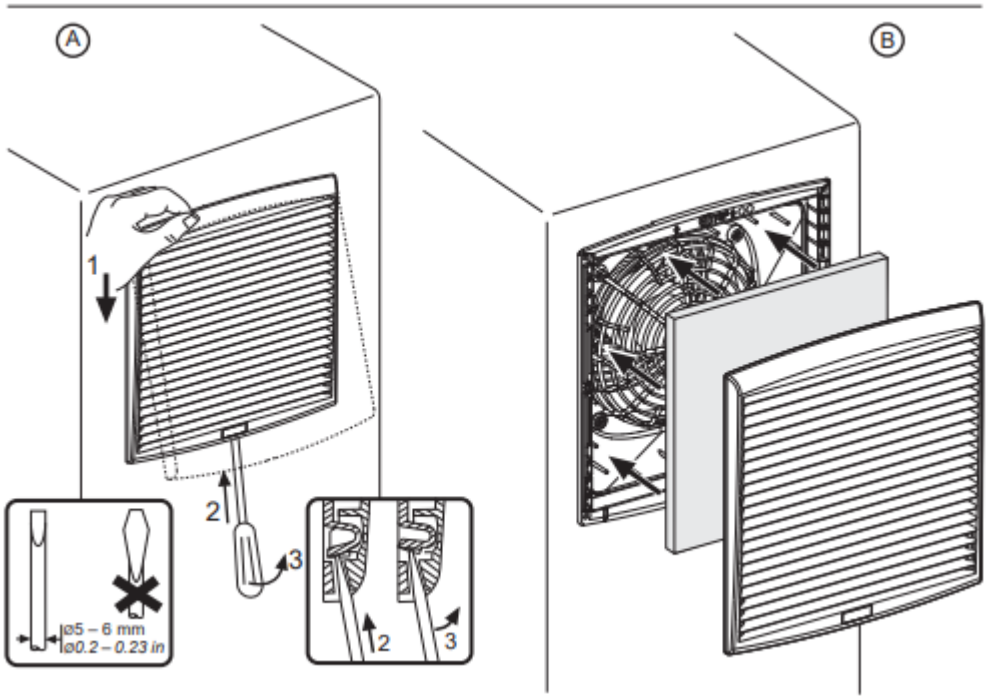
6. Replacement of filters in dehumidifier

1. Perform lock-out tag-out procedure before performing work.
2. Locate the de-humidifier unit.
3. Pull out the filter holder (1).
4. Open the filter holder (2) and replace the filter.
5. Close the filter holder and insert it into the de-humidifier.
6. Open the small opening (3) for the second filter by pulling on the tab.
7. Pull up the filter through the hole.
8. Insert the new filter.
9. Close the cover.



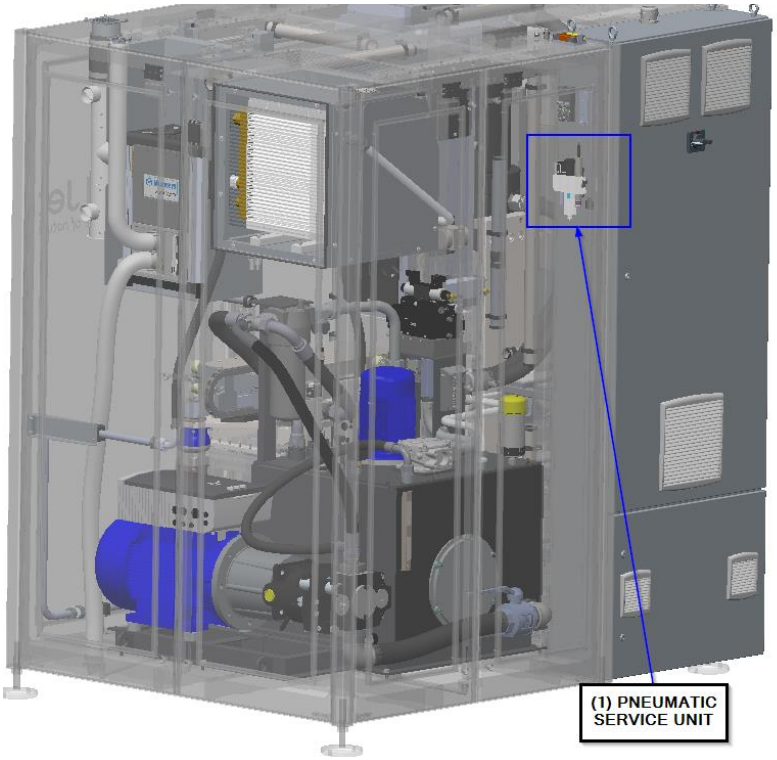
7. Replacement of cabinet fan filters

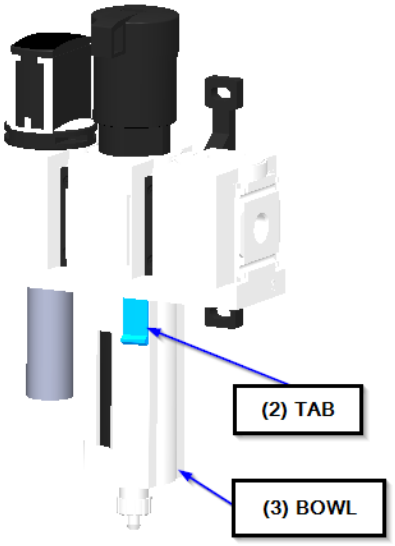
1. Locate the two fans and three outlets on the cabinet.
2. The procedure is the same for each of the five filters to be replaced.
3. Push down on the grate (1).
4. Insert a 5-6mm straight screwdriver into the slot at the bottom of the grate and push up on the tab (2).
5. Lever the screwdriver out (3) and remove the grate.
6. Replace the filter and snap the grate into place.



8. Replacement of pneumatic filter cartridge

1. Perform lock-out tag-out procedure.
2. Locate the pneumatic filter (1).
3. Pull down on the tap (2).
4. Remove the bowl (3).
5. Remove and discard the dirty filter.
6. Insert a new filter in the bowl.
7. Re-install the bowl.

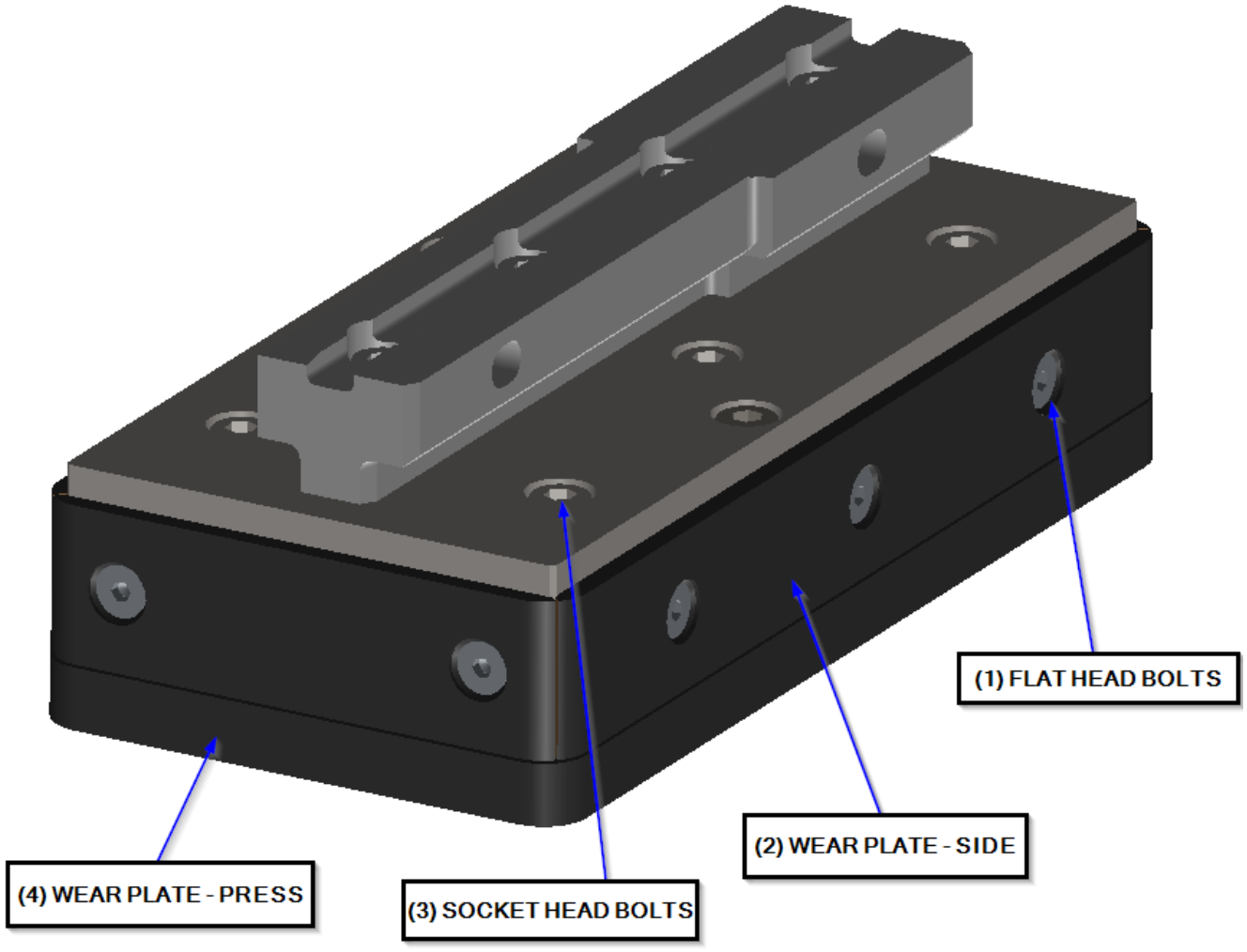




9. Replacement of wear plates on press/eject tools

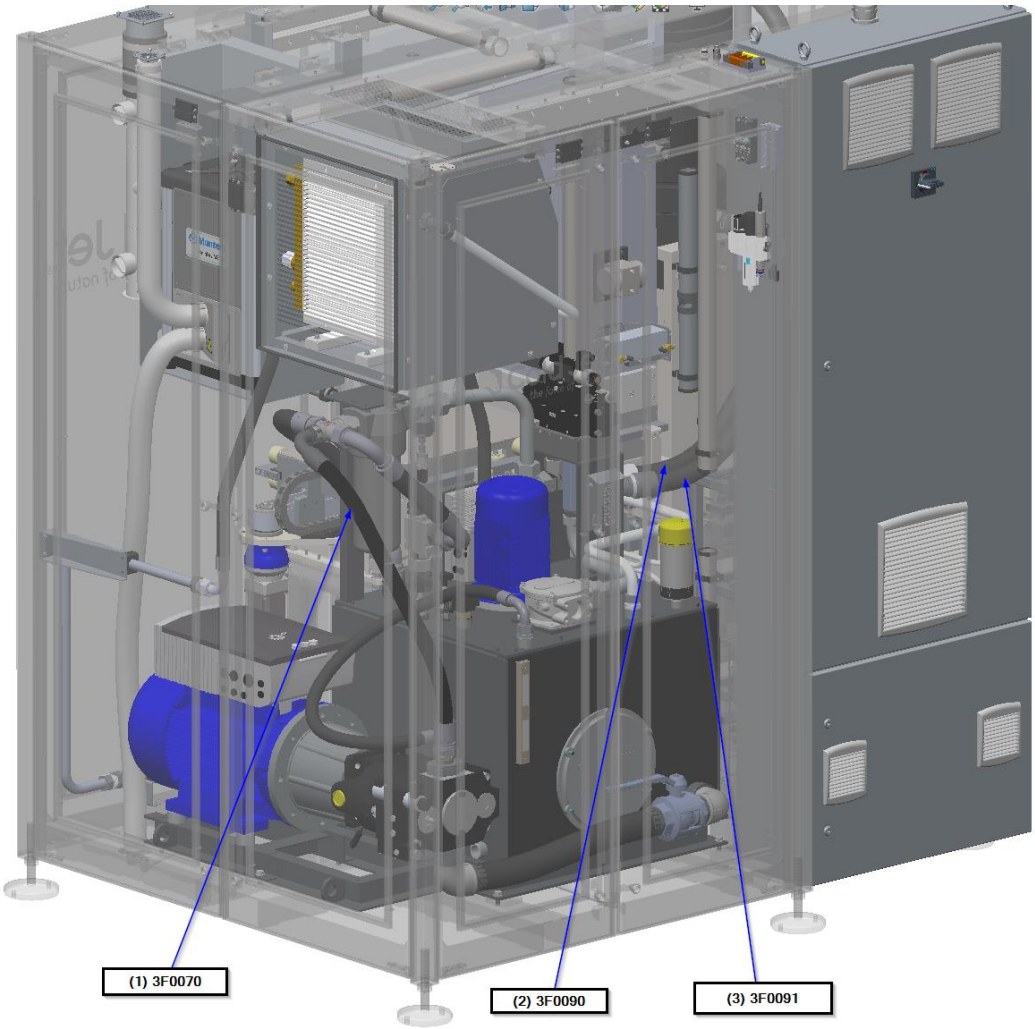
This process is the same for all different sizes of tools although the quantity and placement of bolts may be different as well as the wear plate part numbers.

1. Remove the flat head bolts (1) for wear plates on sides of tool, remove wear plates on side (2).
2. Remove socket head bolts (3) for wear plate on press face, remove wear plate on press face (4).
3. Clean threads before mounting new wear plates.
4. Use semi-permanent thread locking compound.
5. Installation is reverse of removal.



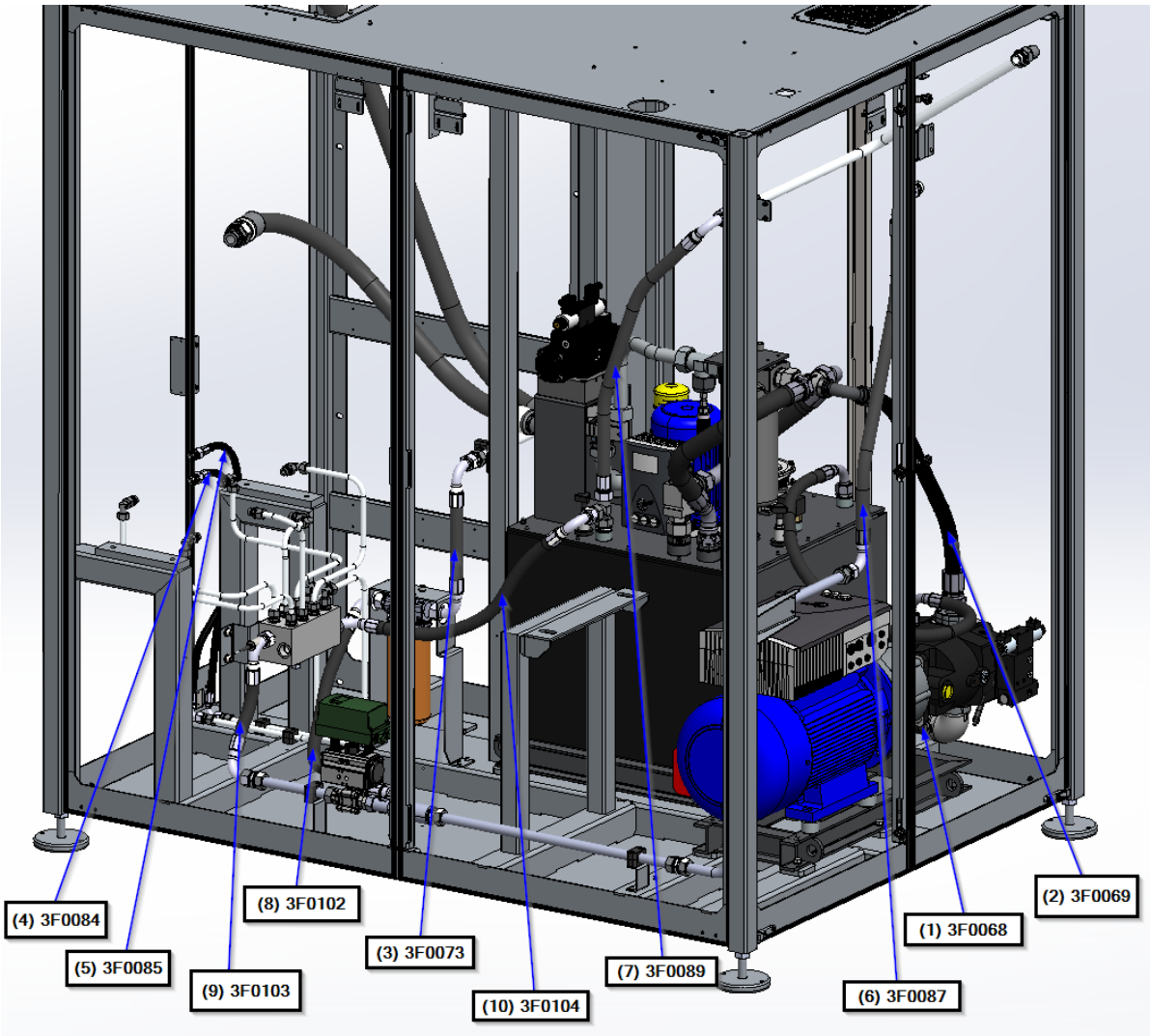
10. Replacement of high-pressure hydraulic hoses

1. In manual mode, move the press cylinder to bottom position.
2. Perform lock-out tag-out procedure.
3. Identify the hoses to be replaced (1), (2), (3).
4. It is recommended to drain oil from the tank before removing hoses.
5. Ensure that the new hoses are clean on the inside to prevent contaminants in hydraulic components.
6. Remove the lower part of each hose first and drain the hose into a suitable container.
    a. NOTE: TAKE CARE NOT TO SPILL HYDRAULIC OIL IN THE MACHINE!
7. Remove the upper part of the hydraulic hoses.
8. Install new hoses.
9. Torque hose fittings according to table at end of document.
10. Refill oil though the air filter fitting – 300L (79,25 US gal).
    a. Use DTE Mobil FM 46 - Cold Jet article no. 4F0221 – Approved for food manufacturing.
    b. If there is no need for oil approved for food manufacturing, DTE MOBIL 10 Excel 46 – Cold Jet article no. 4F0220 can be used.
11. Check for leaks.



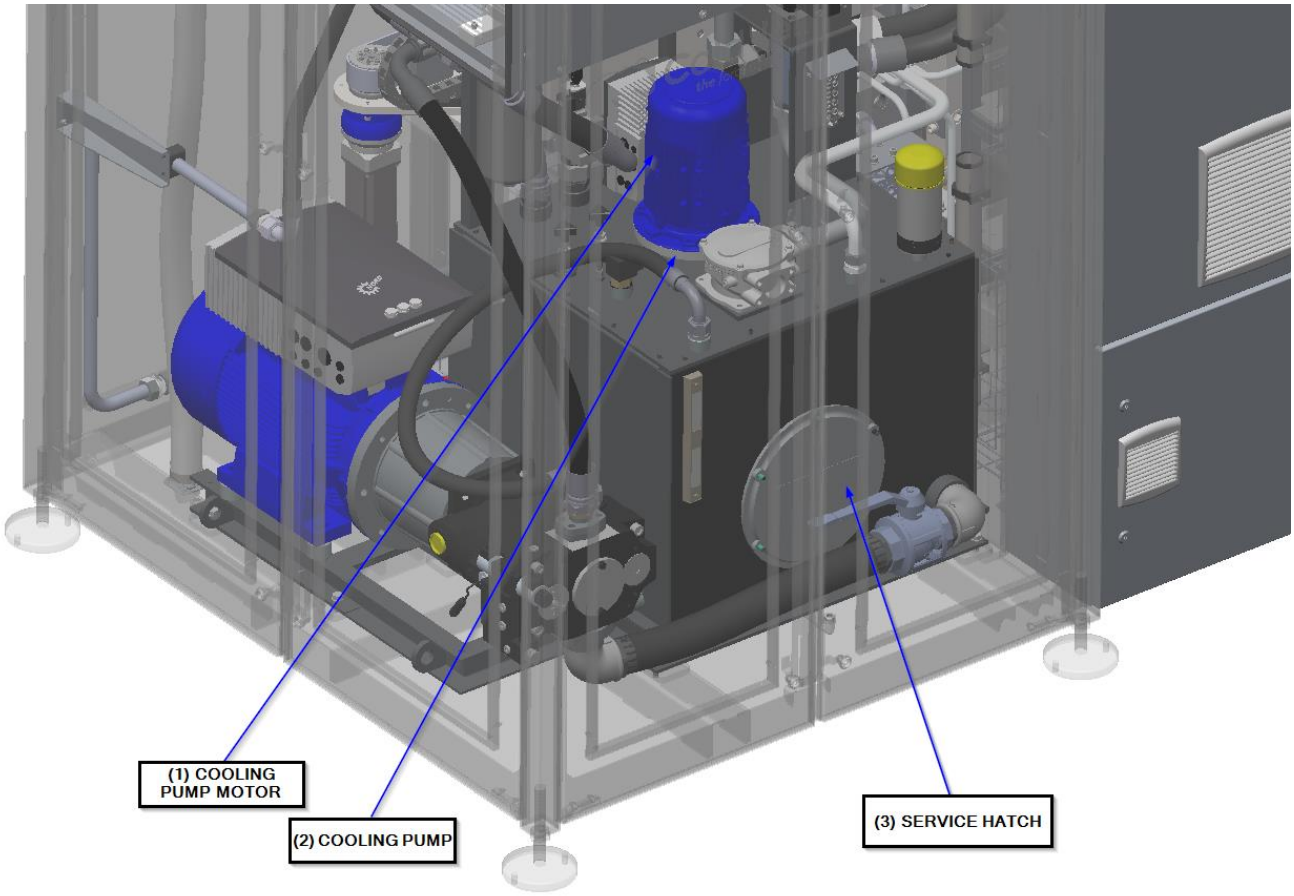
11. Replacement of low-pressure hoses

1. Perform lock-out tag-out procedure before starting work.
2. It is recommended to drain the tank before removing hoses.
3. Identify the hoses to be replaced, (1), (2), (3), (4), (5), (6), (7), (8), (9), (10).
4. Ensure that the new hoses are clean on the inside to prevent contaminants in hydraulic components.
5. Remove the lower part of each hose first and drain the hose into a suitable container.
    a. NOTE: TAKE CARE NOT TO SPILL HYDRAULIC OIL IN THE MACHINE!
6. Remove the upper part of the hydraulic hoses.
7. Install new hoses.
8. Torque hose fittings according to table at end of document.
9. Refill oil though the air filter fitting – 300L (79,25 US gal).
    a. Use DTE Mobil FM 46 - Cold Jet article no. 4F0221 – Approved for food manufacturing.
    b. If there is no need for oil approved for food manufacturing, DTE MOBIL 10 Excel 46 – Cold Jet article no. 4F0220 can be used.
10. Check for leaks.



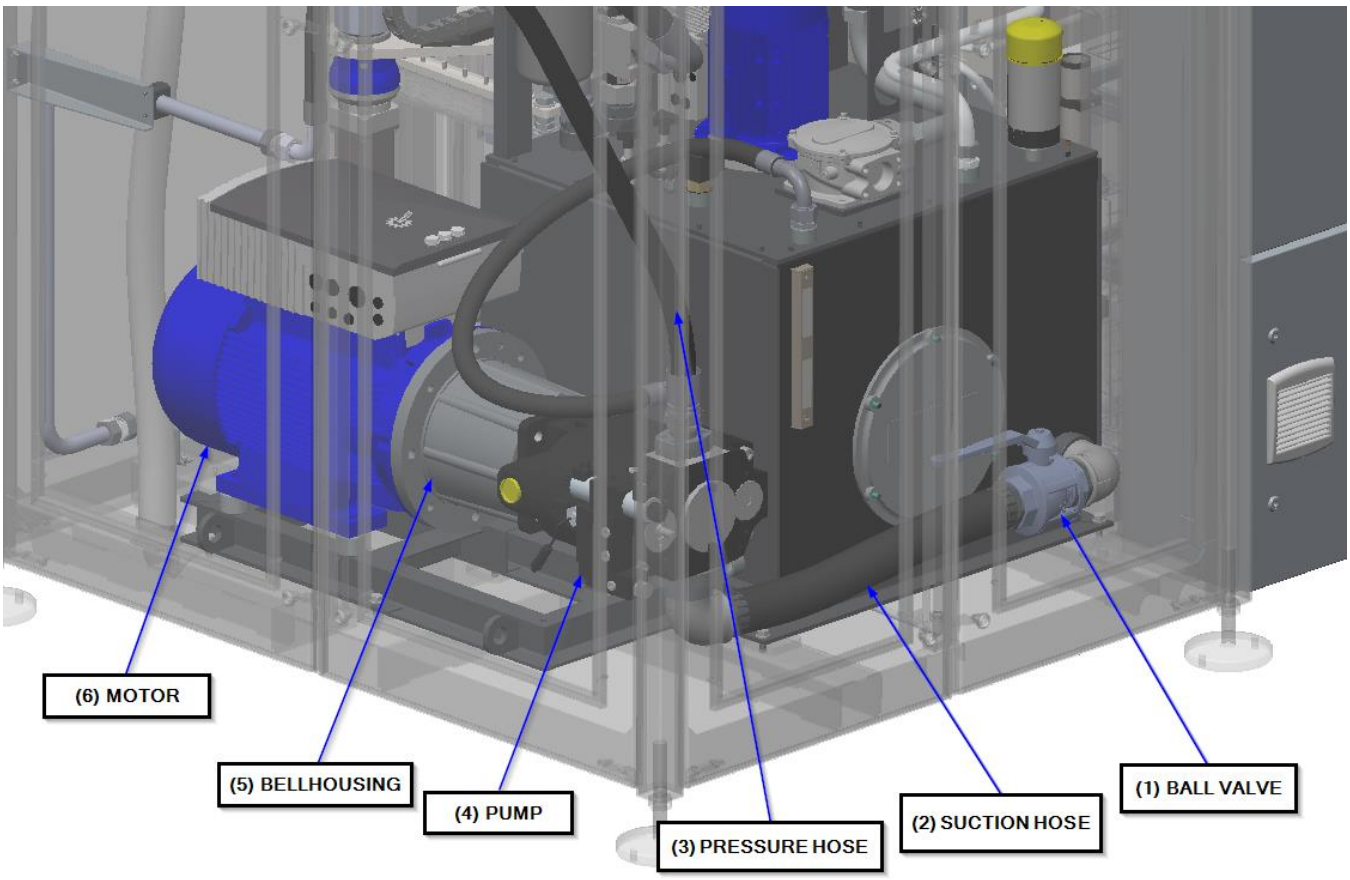
12. Replacement of oil pump – cooling circuit

1. Perform lock-out tag-out procedure before starting work.
2. Drain the hydraulic tank.
3. Remove the pump motor (1) and spider connection between the motor and the pump (2).
4. Remove the service hatch (3).
5. Remove the pipes and hoses that are attached to the cooling pump inside the tank.
6. Remove the cooling pump by removing the bolt and lifting it up from the tank.
7. Re-install everything by reversing the above process.
8. Torque hydraulics according to torque values at end of document.
9. Refill oil though the air filter fitting – 300L (79,25 US gal).
    a. Use DTE Mobil FM 46 - Cold Jet article no. 4F0221 – Approved for food manufacturing.
    b. If there is no need for oil approved for food manufacturing, DTE MOBIL 10 Excel 46 – Cold Jet article no. 4F0220 can be used.
10. Check for leaks.



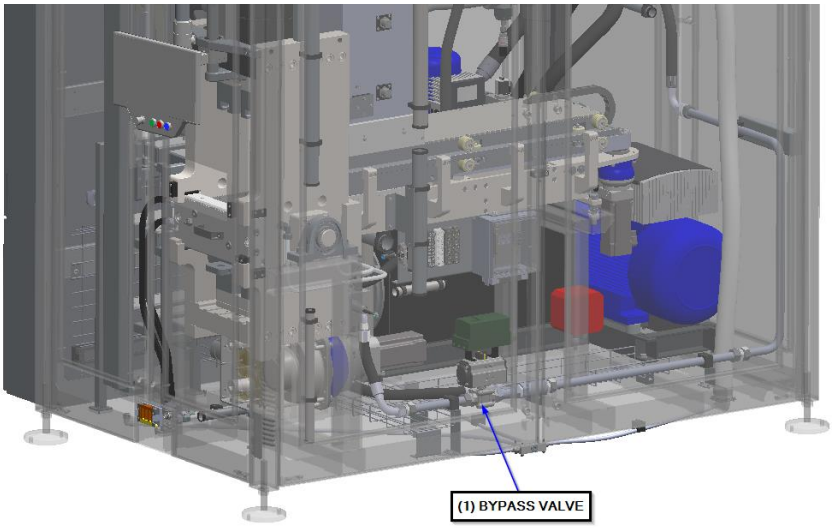
13. Replacement of hydraulic pump

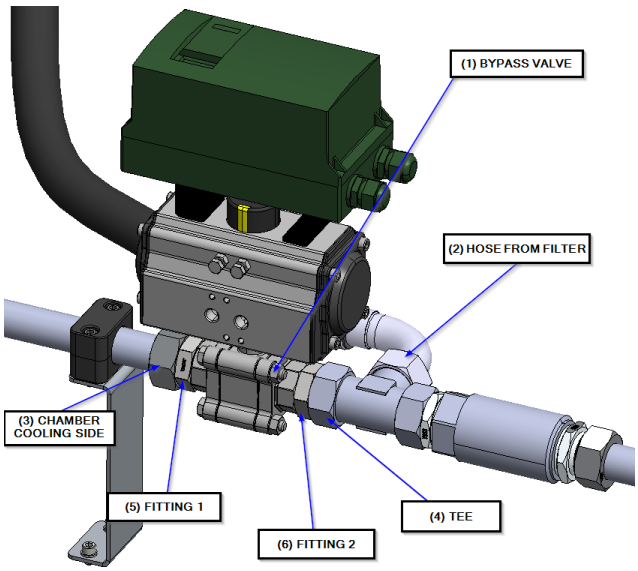
1. Perform lock-out tag-out procedure before starting work.
2. Close ball valve (1) on tank.
3. Remove hoses (2), (3) from pump (4).
    a. NOTE: TAKE CARE NOT TO SPILL HYDRAULIC OIL IN THE MACHINE!
4. Remove bolts holding bellhousing (5) to the motor (6) – take care to support the pump and bell housing.
5. Remove the pump and bellhousing from the motor.
6. Remove the bolts between the pump and bell housing.
7. Change out the spider coupling between the motor and the pump.
8. Re-installation is the reverse of the procedure described above.
9. Torque hoses according to values at end of document.
10. Open ball valve after all hoses have been installed.
11. Check for leaks.



14. Replacement of bypass valve on cooling system

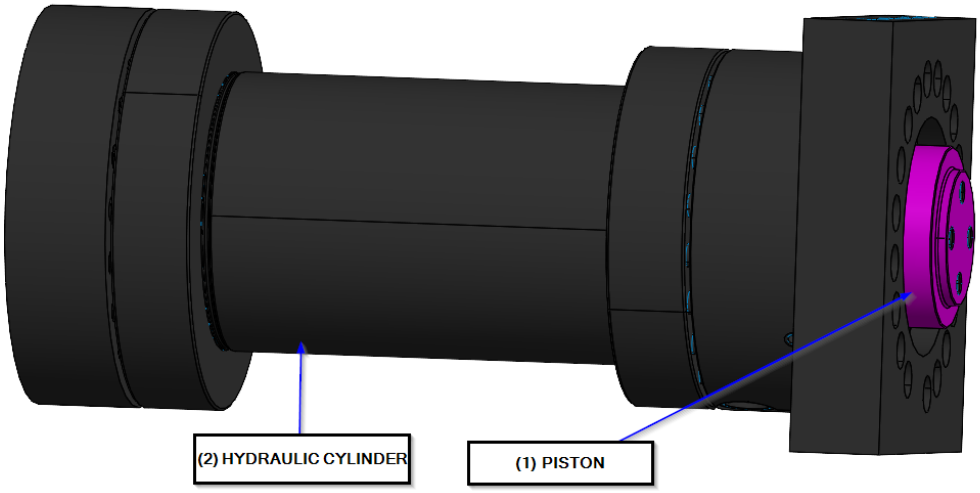
1. Perform lock-out tag-out procedure before performing work.
2. Locate the bypass valve (1).
3. Remove the hose (2) coming from the oil filter and drain the oil into a suitable container.
4. Place a container below the bypass valve as some oil will come out from the chamber cooling side (3).
    a. It is recommended to have two male-threaded L28-M38x2.0 plugs ready to mount in the pipe fittings (3) & (4) to prevent excessive oil spillage.
5. Loosen the union on the tee (4).
6. Loosen the union on pipe (3).
7. Remove the bypass valve.
8. Remove the fittings (5) & (6) from the old bypass valve and mount them on the new valve.
9. Installation of the new valve is the opposite of the above.
10. Torque hoses and pipes according to values in table at end of document.
11. Check for leaks.

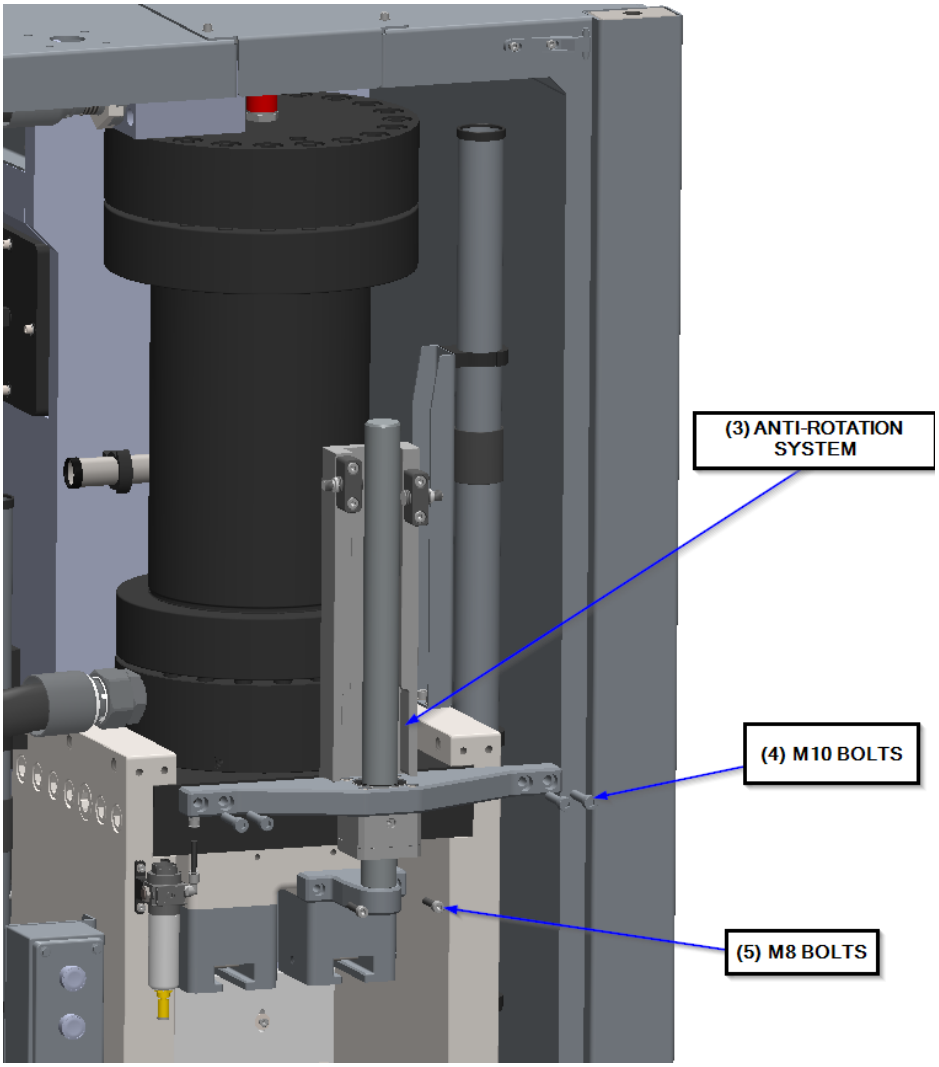


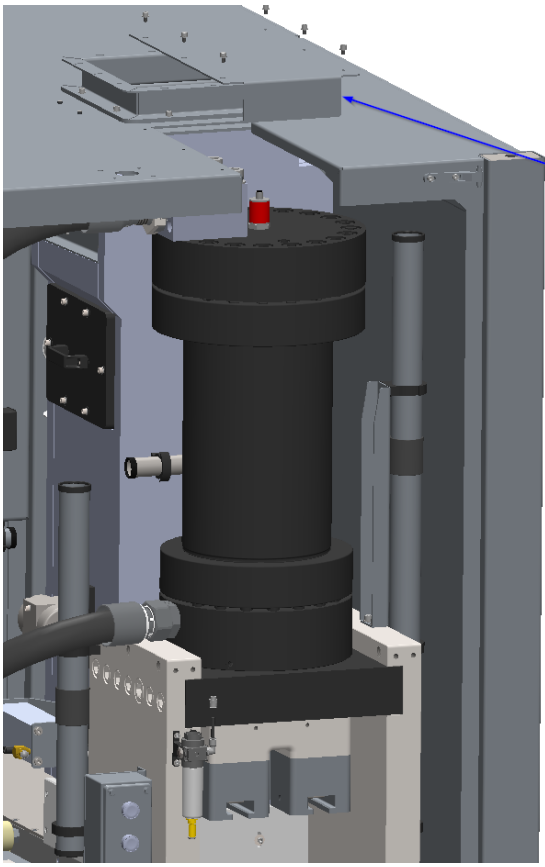


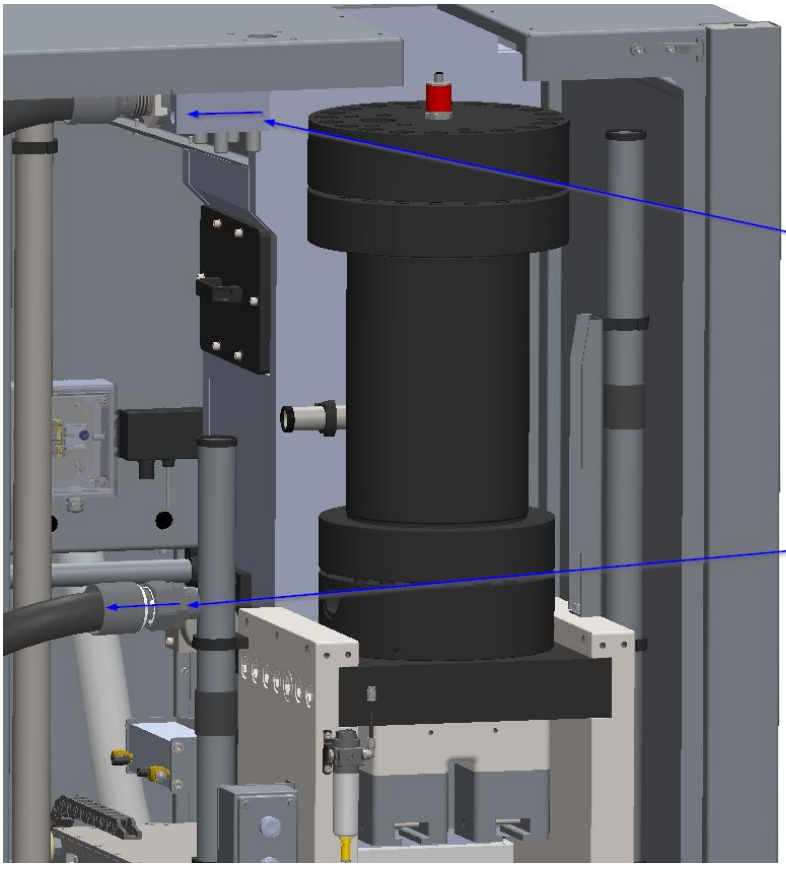
15. Replacement of gaskets in hydraulic cylinder

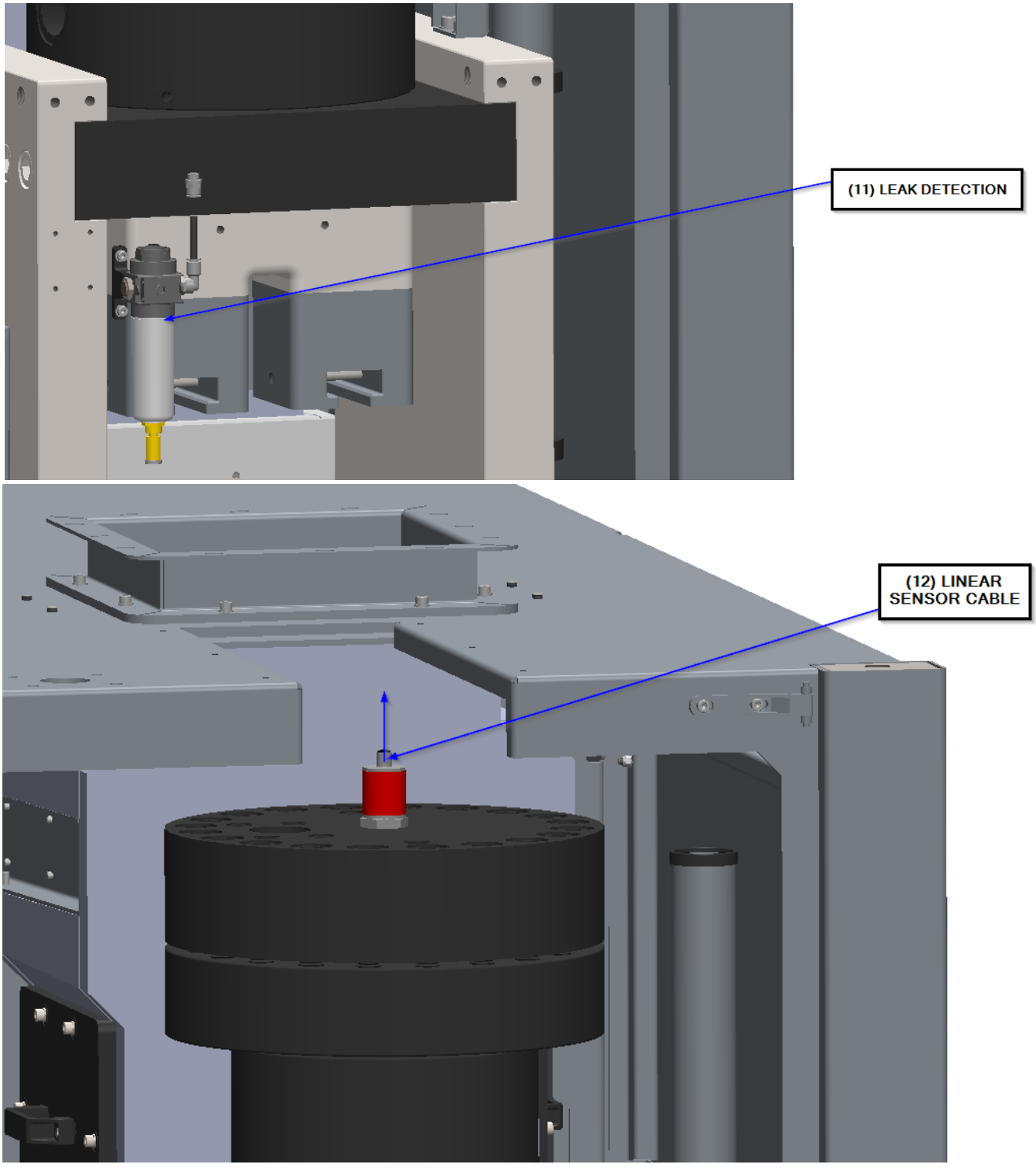
1. Drive the piston (1) of the hydraulic cylinder (2) to the top in manual mode and secure the piston with a strap or similar.
2. Perform lock-out tag-out procedure before continuing.
3. Remove the anti-rotation system (3) by removing the bolts (4) & (5) from the process unit (6) and press attachment (7)
4. Remove the plate (8) from the top of the frame.
5. Remove the hose (9) from the bottom of the hydraulic cylinder (2) – Plug the end.
6. Remove the flange and hose (10) from the top of the hydraulic cylinder (2) – Plug the end.
7. Remove the leak detection (11) from the hydraulic cylinder (2).
8. Remove the cable from the linear sensor (12).
9. Mount two M20 lifting eyes in the designated holes (13) & (14).
10. Mount lifting equipment to the lifting eyes (13) & (14).
11. Remove the bolts (15) and shoulder screws (16) holding the hydraulic cylinder (2) to the process unit (6).
12. Slide out the cylinder (2) from the process unit (6).
13. Place the cylinder (2) in a suitable location where it will not be damaged.
14. Remove the press attachment (7) from the piston (1) by removing the four socket head bolts (17) from the bottom of the press attachment (7).
15. Remove all 19 bolts (18) from the bottom plate (19) of the cylinder (2).
16. Slide out the piston (1) from the hydraulic cylinder (2).
17. Replace all gaskets.
18. Slide the piston (1) back into the hydraulic cylinder (2).
19. Mount the bottom plate (19) and mount all 19 bolts (18) – Tighten according to spec in section “Cylinder tightening sequence”
20. Re-attach the press attachment (7) on the piston (1). Use semi-permanent thread locking compound on the four socket head bolts (14) and tighten to 370 Nm (273 ft-lbs).
21. Slide the cylinder (2) into the grooves in the process unit (6).
22. Lubricate and mount the bolts (15) and shoulder screws (16) and tighten to 370 Nm (273 ft-lbs).
23. Remove the lifting equipment and the M20 lifting eyes (13) & (14).
24. Attach the cable to the linear sensor (12).
25. Mount the leak detection (11) to the hydraulic cylinder (2).
26. Attach the flange and hydraulic hose (10) to the top of the hydraulic cylinder (2)
27. Attach the hydraulic hose (9) to the bottom port of the hydraulic cylinder (2).
28. Torque hoses according to values in table at end of document.
29. Re-install the anti-rotation system (3) to the press attachment (7) and process unit (6). Lubricate the bolts (4) & (5) and tighten (4) to 21,4 Nm (15.8 ft-lbs) and (5) to 44 Nm (32.4 ft-lbs)
30. Re-install the plate (8) to the top of the frame.
31. Drive the piston (1) up and down in manual mode a couple of times to get the air out of the cylinder.
32. Check for leaks.

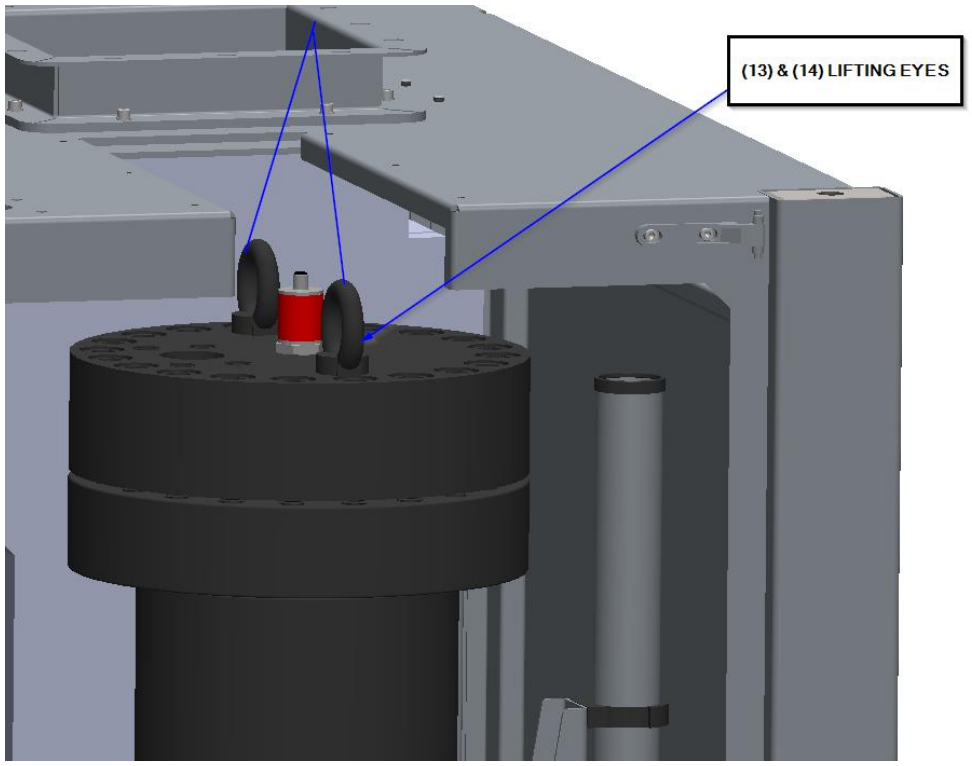

(2) HYDRAULIC CYLINDER
(1) PISTON

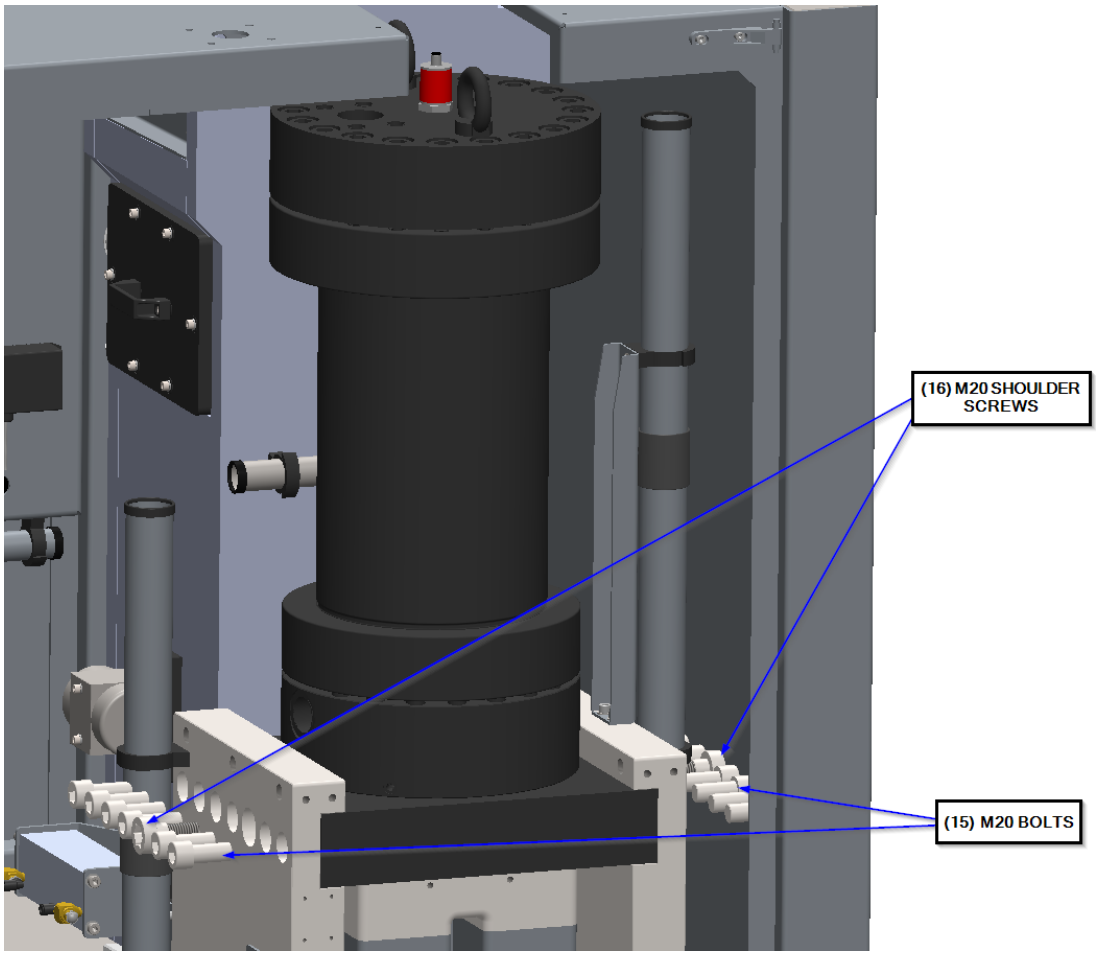

(3) ANTI-ROTATION SYSTEM
(4) M10 BOLTS
(5) M8 BOLTS

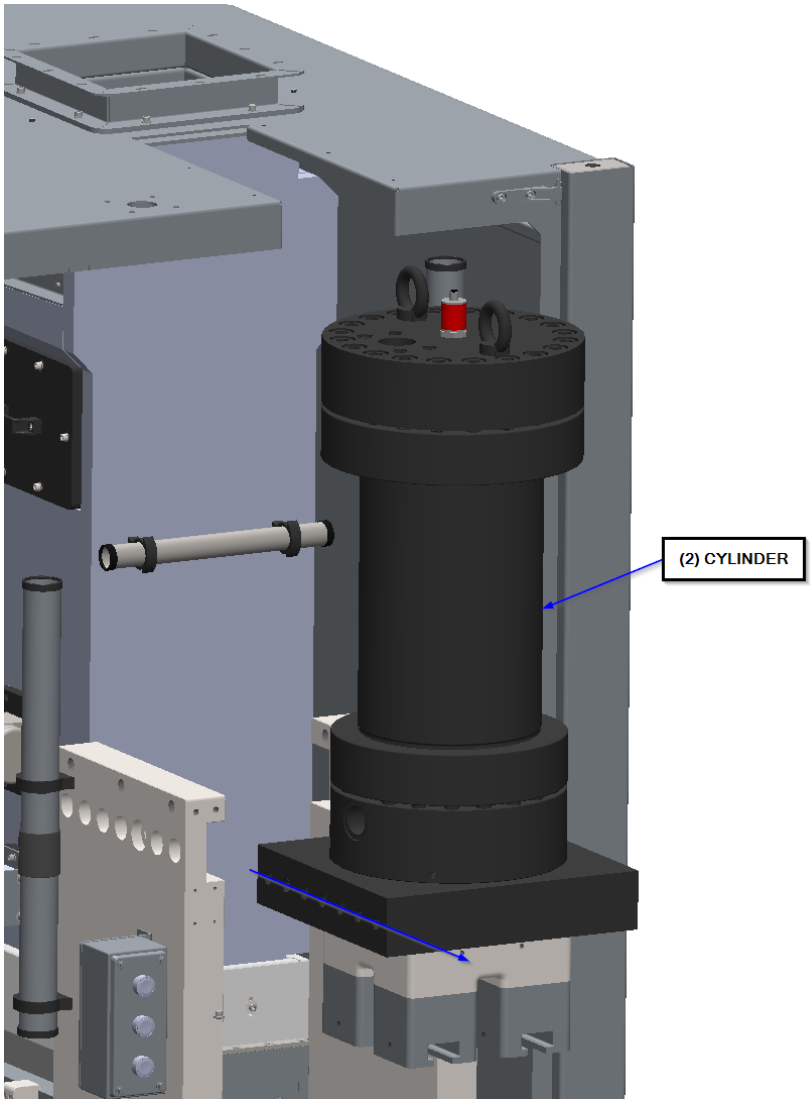

(8) BLANKING PLATE

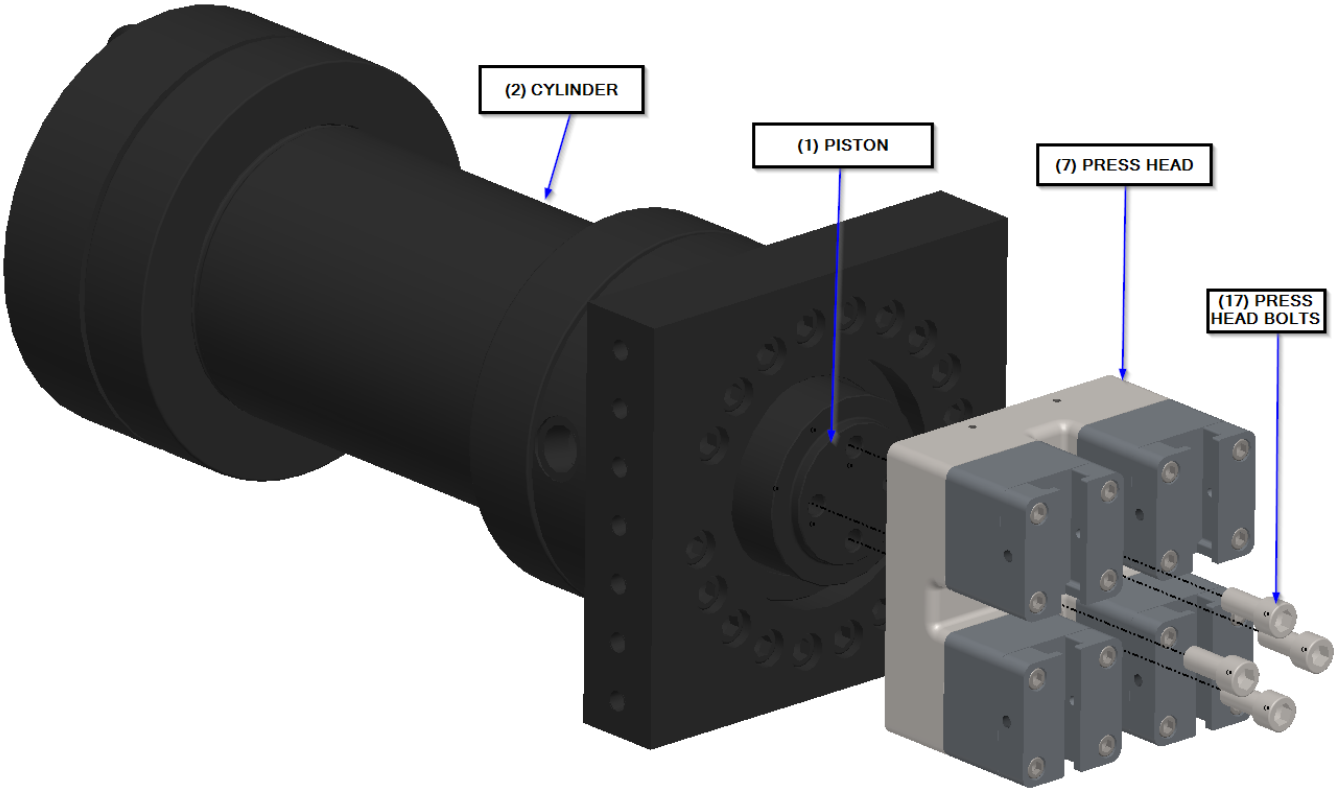

(10) FLANGE AND HOSE
(9) HOSE

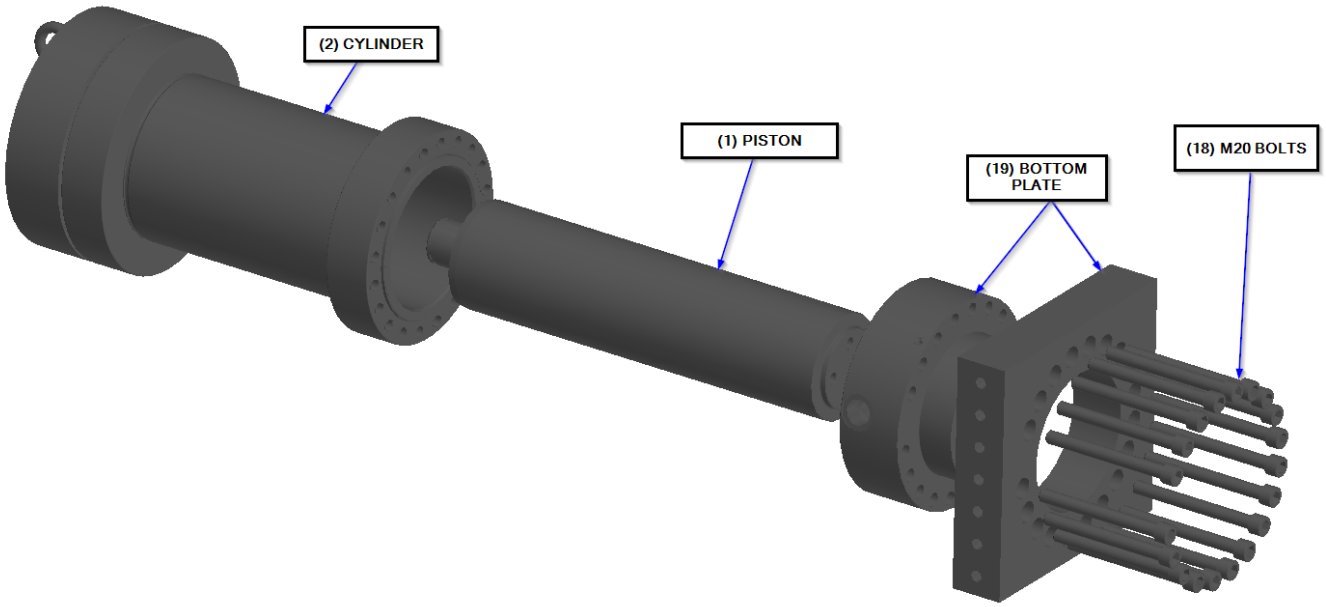

(11) LEAK DETECTION
(12) LINEAR SENSOR CABLE


(13) & (14) LIFTING EYES


(16) M20 SHOULDER SCREWS
(15) M20 BOLTS

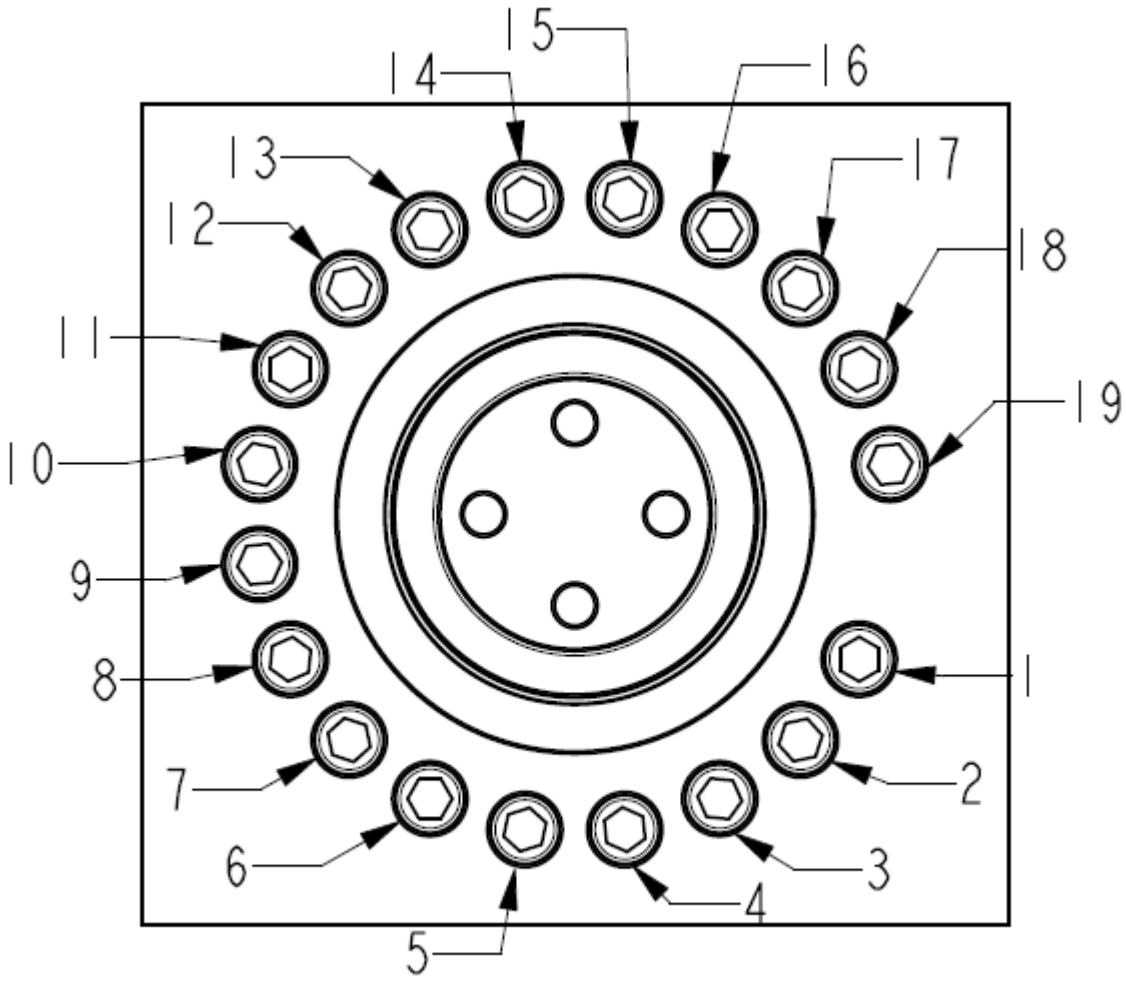

(2) CYLINDER


(2) CYLINDER
(1) PISTON
(7) PRESS HEAD
(17) PRESS HEAD BOLTS


(2) CYLINDER
(1) PISTON
(19) BOTTOM PLATE
(18) M20 BOLTS

Cylinder tightening sequence

1. The bolts must be tightened to 541 Nm (399 ft-lbs)
2. The bolt tightening sequence must be done twice.
3. The bolts must be cross tightened following the sequence described below.
    a. 1-11-16-6-2-12-17-7-3-13-18-8-4-14-19-9-5-15-10



16. Hopper clean-out and thawing

Normal conditions

Under normal stop conditions, the machine will clear the hopper when stopping the machine. The machine will then go into a mode called afterheat, which will run for an hour. This mode heats the area of the process unit surrounding the chamber and the chamber itself. Additionally, during this hour, the de-humidifier will also keep running to help speed up the thawing of the machine.

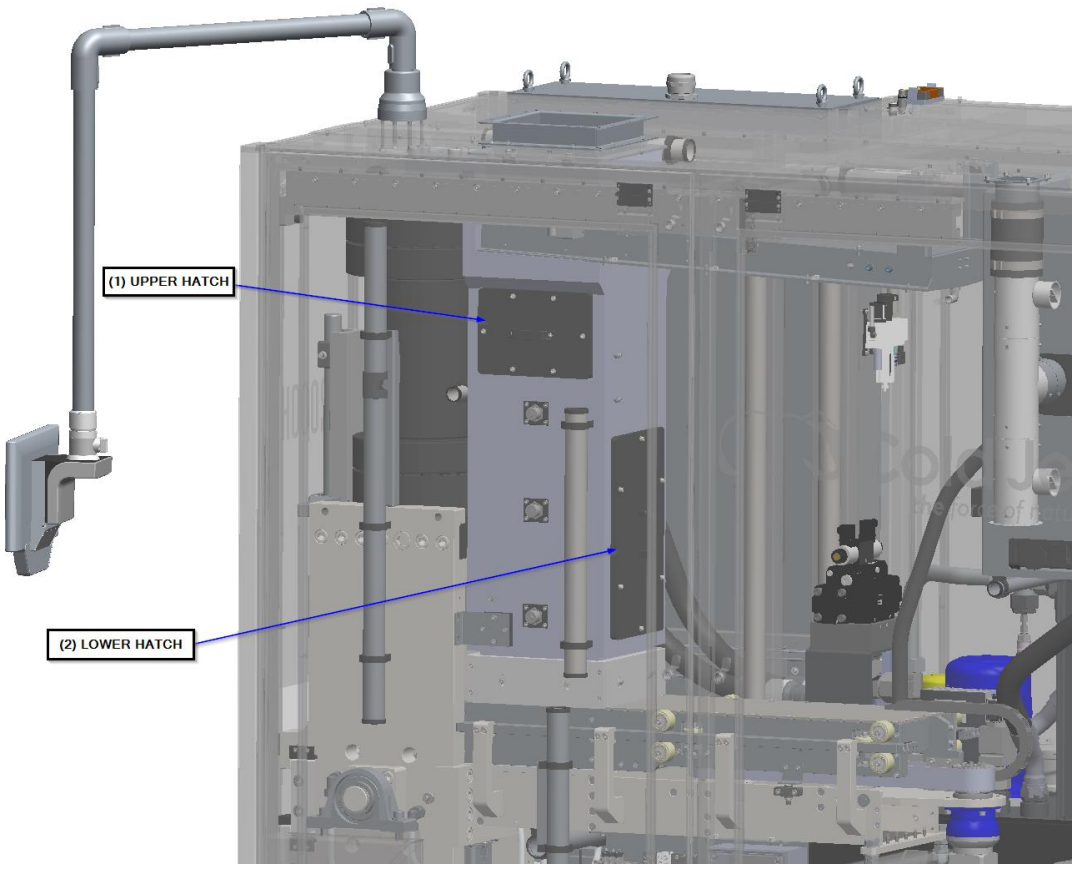
Error that stops the machine

If the machine goes into an error state, or emergency stop, and it is possible to get the machine running again by fixing the fault, the hopper can be emptied by selecting the option “empty hopper” from the start screen. This mode will empty the hopper as under a normal shut-down procedure and will start the afterheat cycle once the hopper has been emptied. The afterheat will continue to run for an hour to warm up the chamber.

Blocked hopper

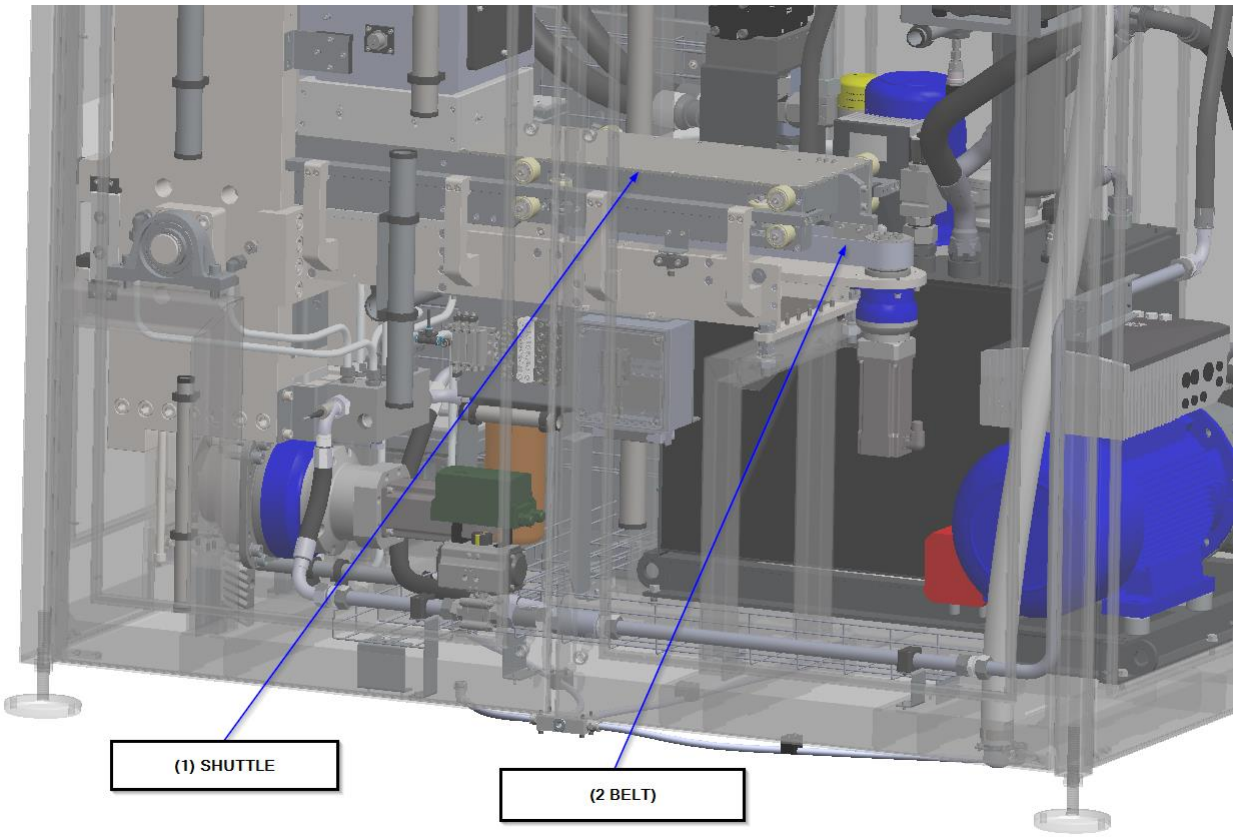
If the hopper is blocked, the machine can be cleared out by removing one or more of the hatches (1), (2), depending on where the blockage is situated. The hatches are removed by unscrewing the socket head cap screws holding them in place. The blockage can then manually be removed, and the hatches can be put back into place.

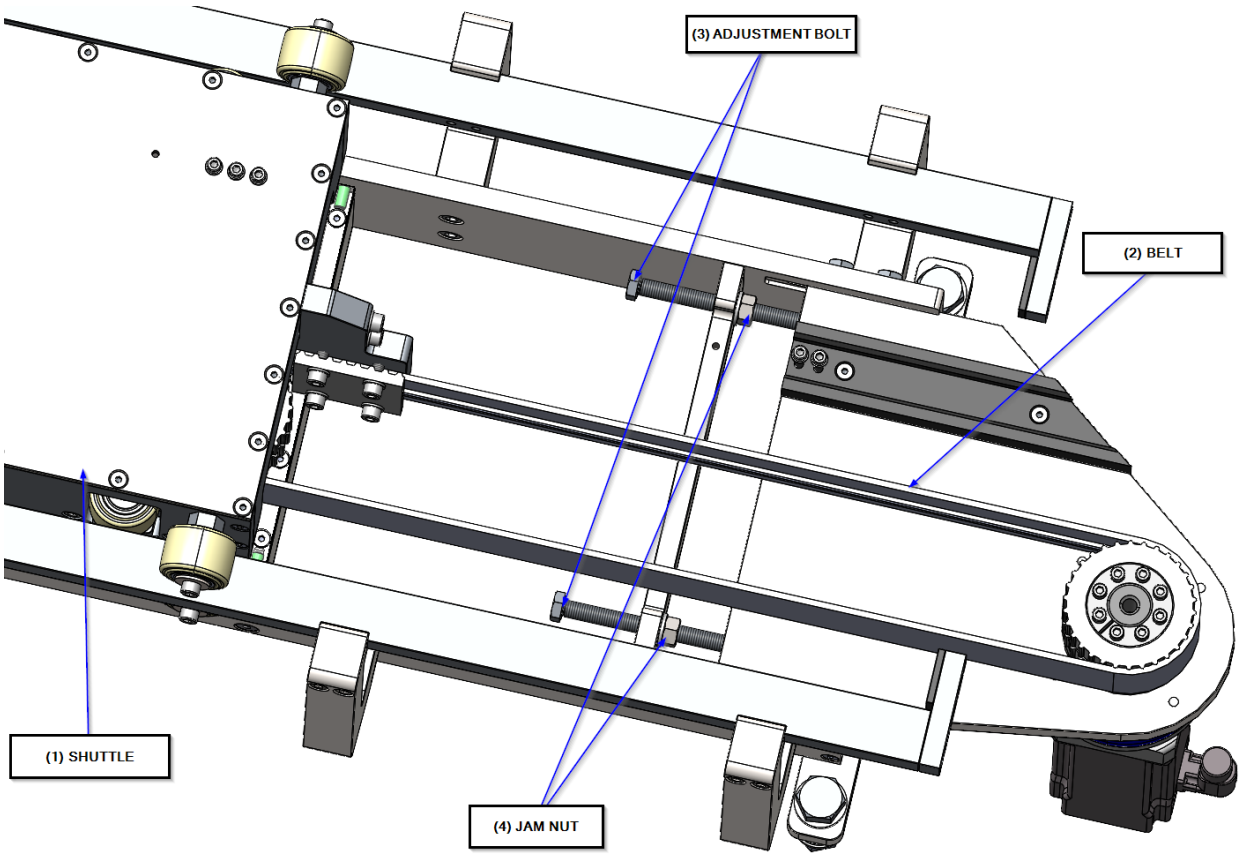
To thaw out the machine, the afterheat cycle can be manually selected from the start screen of the HMI. The afterheat and de-humidifier will then run for an hour as it does under a normal stop scenario.



17. Adjustment of timing belt

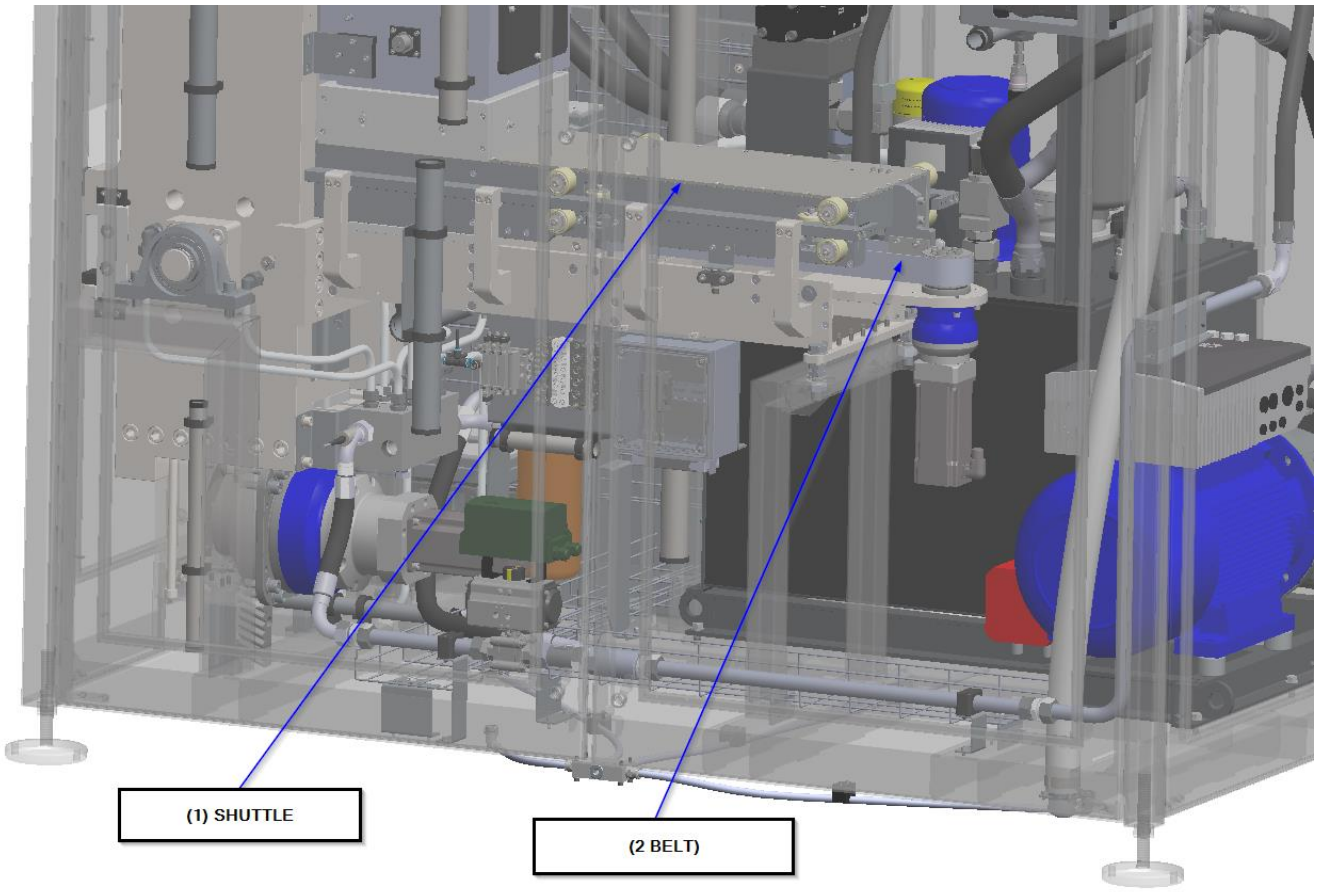
1. Perform lock-out tag-out procedure before starting work.
2. Locate the shuttle (1) and timing belt (2) in the machine.
3. By hand, push the shuttle as far forward as it will go to access the belt.
4. Measure the tension of the belt.
    a. A properly adjusted belt should have a resonance frequency of 62 Hz.
5. If the belt does not vibrate at the correct frequency, it must be adjusted.
    a. If the frequency is above 62 Hz, the belt must be loosened.
    b. If the frequency is below 62 Hz, the belt must be tightened.
6. Locate the adjustment bolts below the shuttle (3) and the jam nuts.
7. Loosen the jam nuts (4).
8. Turn the adjustment bolt an equal amount to either tension or loosen the belt.
9. Check the frequency of the belt.
10. When the frequency of the belt is at 62 Hz, tighten the jam nuts and do a final check of the belt frequency to verify that the frequency has not changed.
11. The machine is now ready to run.

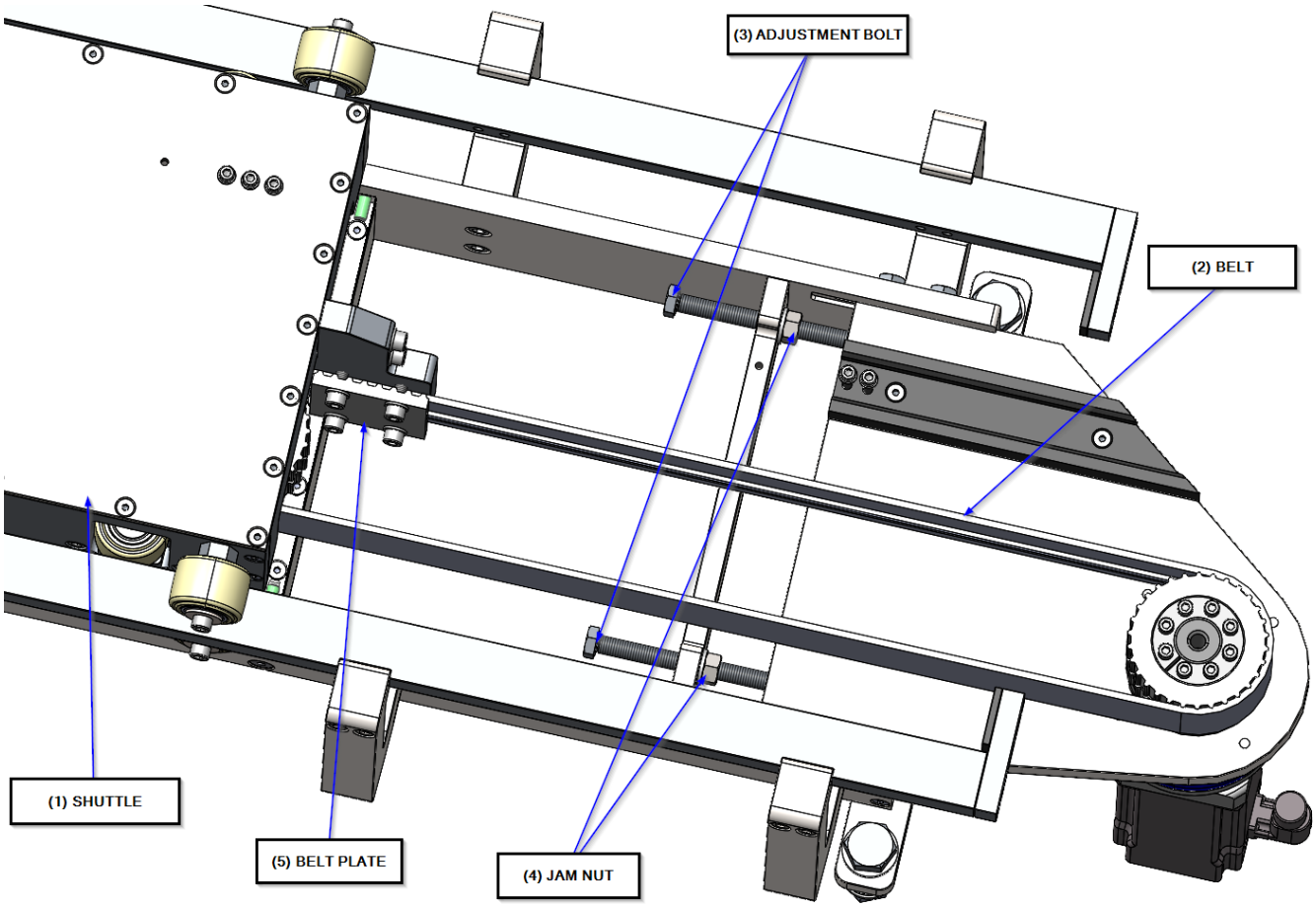



(3) ADJUSTMENT BOLT
(2) BELT
(1) SHUTTLE
(4) JAM NUT

18. Replacement of timing belt

1. Perform lock-out tag-out procedure before starting work.
2. Locate the shuttle (1) and timing belt (2) in the machine.
3. By hand, push the shuttle as far forward as it will go to access the belt.
4. Locate the adjustment bolts below the shuttle (3) and the jam nuts (4).
5. Loosen the jam nuts (4).
6. Loosen the adjustment bolts by turning them counterclockwise – Turn them the same number of turns.
7. Locate the belt clamp (5) – remove the bolts.
8. Take off the old belt and mount the new belt.
9. Mount the belt clamp (5) – Tighten the bolts to 21.4 Nm (15.8 ft-lbs)
10. Tighten the adjustment bolts and check the belt frequency, it should be 62 Hz.
    a. If the frequency is above 62 Hz, the belt must be loosened.
    b. If the frequency is below 62 Hz, the belt must be tightened.
11. When the frequency of the belt is at 62 Hz, tighten the jam nuts and do a final check of the belt frequency to verify that the frequency has not changed.
12. The machine is now ready to run.




(3) ADJUSTMENT BOLT
(2) BELT
(1) SHUTTLE
(5) BELT PLATE
(4) JAM NUT

19. Hydraulic hose and pipe fittings – torque values

Thread metric	Tube O. D.	Nominal torque Nm (ft-lbs)
M12x1.5	06L	16 Nm (11.8 ft lbs)
M14x1.5	08L	16 Nm (11.8 ft lbs)
M16x1.5	10L	26 Nm (19.2 ft lbs)
M18x1.5	12L	37 Nm (27.3 ft lbs)
M22x1.5	15L	47 Nm (34.7 ft lbs)
M26x1.5	18L	89 Nm (65.6 ft lbs)
M30x2	22L	116 Nm (85.5 ft lbs)
M36x2	28L	137 Nm (101 ft lbs)
M45x2	35L	226 Nm (167 ft lbs)
M52x2	42L	347 Nm (256 ft lbs)
M14x1.5	06S	26 Nm (19.2 ft lbs)
M16x1.5	08S	42 Nm (31 ft lbs)
M18x1.5	10S	53 Nm (39.1 ft lbs)
M20x1.5	12S	63 Nm (46.5 ft lbs)
M22x1.5	14S	79 Nm (58.3 ft lbs)
M24x1.5	16S	84 Nm (62 ft lbs)
M30x2	20S	126 Nm (93 ft lbs)
M36x2	25S	179 Nm (132 ft lbs)
M42x2	30S	263 Nm (194 ft lbs)
M52x2	38S	368 Nm (271 ft lbs)