Hydraulic Systems

HIT SRL

79 procedures · 157 maintenance tips (pillole)

Technical Reference Document

Procedures

Hydraulic Cylinders

What is the correct sequence to trace the source of a hydraulic cylinder leak?

1. Carefully check the source of the leakage before taking any action; it may be possible to rectify the fault without disassembly.
2. Check for external leakage at the cylinder end welds, the sleeve coupling welds, and between the cylinder barrel and cylinder head — this could be due to a defective O-ring or damaged O-ring sealing surfaces, both of which can be rectified with the cylinder in place; also check between the cylinder head and piston rod, which could be due to a damaged piston rod or a damaged or worn piston rod seal.
3. Check for internal leakage by pressurizing the cylinder and checking whether the piston sinks back; this could be due to a worn piston seal.

Note: *Carry out all fault tracing with as low a pressure in the system as possible, since high pressure causes the seals to close tighter, preventing detection of leaks.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-trace-the-source-of-a-hydrau

What is the correct sequence to dismantle a hydraulic cylinder for repair?

1. Remove the cylinder from its mounting and undo the connections.
2. Plug the cylinder connections and hoses without delay.
3. If the cylinder is opened, observe the strictest cleanliness.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-dismantle-a-hydraulic-cylind

How are hydraulic cylinder ball joints greased?

1. Check the integrity, fastening and seal of the cylinders, unions and pipes, and check that the oil scraper rings on the rods and head show no signs of leaking.
2. Grease the ball joints at the base of the cylinder and on the rod using the special lubricators.

Note: *Do not grease the rod sliding area.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-are-hydraulic-cylinder-ball-joints-greased

What is the correct general sequence for repairing a leaking hydraulic cylinder by replacing its seals?

1. Remove the relevant hydraulic cylinder and immediately fit protective caps or plugs to the hydraulic cylinder and hose connections.
2. Take the cylinder to the workshop, drain any remaining oil, and carefully wash the outside of the cylinder.
3. Dismantle and assemble the cylinder according to the instructions for that particular cylinder type.
4. Remove all seals and scraper rings, using a screwdriver as shown for the cylinder head seal, and clean all components thoroughly.
5. Fit the lip seal in the cylinder head with the lip facing inwards towards the piston, oiling it and pressing it in by hand.
6. Fit the piston seal by hand: fit the centre sealing ring onto the piston first, then the two backing rings and the two guide rings.
    - Never use compressed air for removing the piston from the cylinder; you could sustain serious injuries.
    - Take extreme care when removing the seal in the cylinder head, to avoid scratching the bottom of the groove, since oil leakage will otherwise occur in the future.
    - Do not use tools to press in the lip seal, since even a minute scratch may cause it to leak.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-general-sequence-for-repairing-a-leaking

What is the correct sequence to find the source of a hydraulic cylinder leak?

1. Carry out all fault finding with the minimum hydraulic pressure required to actually discover the leakage.
2. Check extremely carefully where the leakage comes from before taking any action, since it may be possible to stop it without costly dismantling.
3. Check for external leakage: welds on cylinder ends, welds on coupling connections, leakage between the cylinder pipe and cylinder head (a faulty O-ring or damaged O-ring sealing surface), and leakage between the cylinder head and piston rod (a damaged piston rod or worn piston rod seal).
4. Check for internal leakage between the hydraulic piston seal and the cylinder pipe, due to a worn piston seal, by putting the cylinder under pressure and checking whether the piston sinks back.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-find-the-source-of-a-hydraul

What is the correct sequence to dismantle a hydraulic cylinder for seal inspection?

1. Loosen the cylinder from its mounting and loosen the hydraulic connections.
2. Immediately plug the cylinder connections and hoses/lines.
3. Open the cylinder observing the highest possible level of cleanliness.
4. Check the surfaces of all seals and sealing grooves: O-ring grooves (internal and external), piston rod seals in the cylinder head, the sealing groove on the piston, the cylinder pipe surface, the piston rod's chromium-plated surface, and all sliding (dynamic) surfaces.

Note: *When fitting the cylinder head, fit it absolutely straight, preferably by hand; never hit it with a mallet or hammer, since an askew cylinder head can damage the piston rod seal's lip and destroy its sealing function.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-dismantle-a-hydraulic-cylind-2

What is the correct sequence to remove a piston rod seal with a screwdriver?

1. Insert the screwdriver into the inside of the seal's V shape (or, for a TICLA-type seal, between the inner sealing lip and the intermediate bead) without touching any sealing surface.
2. Lever the seal out and twist it up to remove it.
    - The screwdriver must only come into contact with the inside of the V shape so it cannot touch and damage a sealing surface; a score from the screwdriver on a sealing surface will have a disastrous effect and cause major leakage.
    - On a TICLA-type seal, insert the screwdriver between the inner sealing lip and the intermediate bead instead, for the same reason.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-remove-a-piston-rod-seal-wit

What is the correct sequence to remove the wiper from a hydraulic cylinder head?

1. Carefully tap a screwdriver down between the wiper and the cylinder head, working only against the outer edge of the wiper.
2. Lever the wiper out.
3. Polish off any marks left on the cylinder head.

Note: *No tools should be introduced from the inside, as this can score the cylinder pipe, which in turn can damage the piston rod, or damage the piston rod seals when the piston is fitted.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-remove-the-wiper-from-a-hydr

What is the correct sequence to dismantle a double-action piston seal?

1. Remove the guide rings and support rings.
2. Move the sealing body over to one side of the sealing groove.
3. Press up the material so that there is a gap between the seal and the piston.
4. Cut the seal off with a knife, without damaging the surface of the piston.
5. Carefully check the seal for damage that may have caused leakage, by bending over the seal section by section and checking the sealing surface with a finger nail.

Note: *Be very careful when fitting the piston in the cylinder pipe to avoid damage to the seal from the threading in the cylinder pipe, since the whole surface within the cylinder pipe is a sealing surface.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-dismantle-a-double-action-pi

What is the correct sequence to fit a double-action piston seal?

1. Fit the middle sealing body first.
2. Fit the support rings.
3. Fit the guide rings.

Note: *Fit everything by hand, without tools, in order to prevent damage.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-fit-a-double-action-piston-s

What is the correct sequence to repair minor damage to a piston rod's chrome surface?

1. Locate the damage with finger tips and finger nails.
2. Using a small, finely polished panel-beating hammer, work the material in from the area surrounding the damage, working from the outside in towards the damage, until a sharp mark becomes a more even irregularity.
3. Polish with emery cloth in stages, using grades from 240 to 600, wrapping the cloth around a file for support.
4. For larger damage: fill the damaged area with a weld, completely remove all welding cinder, file down the weld to the same level as the chrome surface, and polish to an even finish with emery cloth.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-repair-minor-damage-to-a-pis

What is the correct sequence to lubricate a single-action hydraulic cylinder that operates over only a limited part of its stroke?

1. Unscrew the breather filter.
2. Spray 300-500 ml of hydraulic fluid into the filter connection.
3. Run the cylinder to the limits of the piston stroke a number of times, until no more hydraulic fluid is forced out of the breather filter connection point.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-lubricate-a-single-action-hy

What is the daily lubrication procedure for all hydraulic cylinders?

1. Run all cylinders to the piston stroke limit so that the whole of each cylinder is lubricated.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-daily-lubrication-procedure-for-all-hydraulic-cy

Pumps

What is the correct sequence to replace a fixed-displacement gear pump?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Clean the hydraulic oil pumps and the area around them.
4. Mark up and detach the hydraulic hoses from the pump, plugging all connections immediately to protect the hydraulic system from impurities.
5. Remove the pump: remove the retaining bolts, then pull the pump backwards and lift it away.
6. Transfer the connection adapters to the new pump, checking that the O-rings are intact and fitted correctly.
7. Check the pump seals, replacing them if necessary.
8. Fit the gear pump and axial piston pump, checking that the gear grips the shaft, then fit the pump's retaining bolts, using thread locking fluid to lock the screws and seal the screw holes in the transmission.
9. Connect the hydraulic hoses according to the markings, checking that the O-rings are intact and fitted correctly.
10. Turn on the power supply and start the engine.
11. Check that the hose connections and the seal between the gear pump and axial piston pump are tight.
12. Check the hydraulic oil level with all hydraulic cylinders fully retracted, topping up if needed.
    - Read the safety instructions for oil before working.
    - Pre-fill the pumps with oil through the pressure connection before taking them into service; if necessary, vent the pumps by loosening the hoses on the delivery side.
    - If the pump is replaced due to malfunction, also change the oil and filter.
    - Overfilling the oil can cause leakage and environmental damage; the hydraulic oil level is checked with all hydraulic cylinders fully retracted.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-a-fixed-displacement

What is the correct sequence to check the hydraulic oil pumps?

1. Operate and warm up the machine so the hydraulic oil reaches operating temperature, approximately 50°C.
2. Turn off the engine.
3. Connect a pressure gauge to the pressure connection on hydraulic oil pump 1.
4. Start the engine and let it idle.
5. Check the stand-by pressure for one pump at a time, in order (pump 1, 2, 3, 4), comparing against the values on the machine's pressure plate; the pressure difference between the pumps must always be maintained.
6. Increase engine speed to approximately 1100 rpm and run the extension function against its end-position (overflow), by running the boom out to max and continuing to request max extension with the control lever.
7. Check the max pressure on hydraulic oil pump 1, comparing it against the pressure plate; all pumps should give the same pressure.
8. Turn off the engine.
9. Transfer the pressure gauge to the next pump and repeat the checks on all four pumps.

Note: *Always depressurize the hydraulic systems before starting to work in them; avoid skin contact with the oil, use protective gloves.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-hydraulic-oil-pump

What is the correct sequence to vent the variable hydraulic pumps?

1. Vent the pumps before the engine is started.
2. Connect compressed air at a maximum of 0.1 bar pressure to one of the breather filter connections on the hydraulic tank, and plug the other breather filter connection.
3. Loosen the relevant hoses somewhat from the pump connections.
4. Tighten the hose connections again once air-free hydraulic fluid runs out.
5. Empty the accumulators by opening the accumulator evacuating valve.
6. Start the engine and stop it again to check the stop function.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-vent-the-variable-hydraulic

What is the correct sequence to set the stand-by, main pressure limitation, and system pressures on the variable hydraulic pumps?

1. Start the engine and allow it to idle.
2. Connect a manometer to each of the four measurement outlets in turn and check the stand-by pressure pump by pump, adjusting the stand-by pressure adjustment screws as needed while maintaining the same pressure differentials between pumps.
3. If the main valves are being replaced or their seals broken, unscrew fully counter-clockwise the pressure limitation adjusting screws on both inner pumps.
4. Screw in fully clockwise the corresponding adjusting screws on both main valves.
5. Connect the manometer to the designated test outlet.
6. Have an assistant increase engine revs to approximately 1100 rpm and extend the boom fully out until the function is overflowing, keeping it overflowing during the next step.
7. Screw in the pressure limitation adjusting screw for the inner pump until the manometer reading is 5 MPa higher than the pressure stated on the hydraulic plate.
8. Unscrew counter-clockwise the adjusting screw on the left main valve until the manometer reading is 3 MPa higher than the pressure stated on the hydraulic plate.
9. Move the manometer to the corresponding test outlet on the right main valve and repeat the pressure limitation adjustment for the other inner pump and the right main valve.
10. Connect the manometer to the test outlet for the first pump and overflow the extension function again as before.
11. Set the system pressure for that pump with its adjusting screw for max pressure, referring to the hydraulic plate for the target pressure.
12. Move the manometer to the next test outlet and repeat the system pressure setting for that pump.
13. Repeat the system pressure setting for all four pumps in the same way; all pumps should be set to the same pressure, and the sequence in which they are set is not significant.
    - Immediately shut down the engine if the charging pressure exceeds the pressure stated on the hydraulic plate.
    - The pressure stated on the machine's hydraulic plate for the main valves must be set on the pumps, not on the main valves.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-set-the-stand-by-main-pressu

What is the correct sequence to set the steering pressure and check the accumulator charging and servo pressures?

1. Connect the manometer to the test outlet on the priority valve, turn the steering wheel to maximum wheel deflection, and rev the engine to 1200 rpm; check that the pressure reading corresponds to the hydraulic plate, adjusting with the steering pressure screw if needed.
2. Allow the engine to idle.
3. Connect the manometer to the test outlet on the accumulator charging valve.
4. Close the accumulator evacuating valve.
5. Check that the accumulator charging starts at 15 MPa and stops at the pressure stated on the hydraulic plate, adjusting with the accumulator charging pressure screw if needed.
6. Connect the manometer to the servo pressure test outlet and check that the pressure reading corresponds to the hydraulic plate (the servo pressure is not adjustable).

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-set-the-steering-pressure-an

What is the correct sequence to check the hydraulic oil pump for brakes and steering?

1. Operate and warm up the machine so the hydraulic oil reaches operating temperature (at least 50°C).
2. Put the machine in service position.
3. Depressurise the hydraulic system.
4. Connect a pressure gauge to the measuring outlet for pump pressure brakes and steering on the main valve.
5. Start the engine and let it idle.
6. Close the accumulator drain valve and check the pump pressure during charging, confirming it rises to the specified feed pressure on the pressure plate.
7. Depressurise the hydraulic system.
8. Remove the pressure gauge and fit the protective cap on the pressure check connection.
9. Close the accumulator drain valve, checking it is completely closed and the lock ring tightened.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-hydraulic-oil-pump-2

What is the correct sequence to check the hydraulic oil pump for load handling?

1. Operate and warm up the machine so the hydraulic oil reaches operating temperature (at least 50°C).
2. Put the machine in service position.
3. Depressurise the hydraulic system.
4. Connect a pressure gauge to the measuring outlet for pump pressure load handling on the main valve.
5. Close the accumulator drain valve and the attachment relief valve.
6. Start the engine and let it idle.
7. Check that the feed pressure corresponds with the pressure plate.
8. Turn off the engine.
9. Depressurise the hydraulic system.
10. Remove the pressure gauge and fit the protective cap on the pressure check connection.
11. Close the accumulator drain valve, checking it is completely closed and the lock ring tightened.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-hydraulic-oil-pump-3

Hydraulic Oil Filter

What is the correct sequence to change the hydraulic oil filter?

1. Clean the area around the cover plates on the hydraulic oil tank.
2. Turn off the engine and the main electrical power.
3. Remove the cover plates over the hydraulic oil filters.
4. Prepare a receptacle to collect any oil spills.
5. Lift up the filter unit and place it in the receptacle, letting the hydraulic oil drain.
6. Part the filter unit and remove the filter cartridge, noting the placement of the parts; handle the cartridge as environmentally hazardous waste.
7. Clean the filter holder's parts, paying special attention to the magnetic rod.
8. Fit the new filters and assemble the filter units.
9. Fit the filter units and the cover plates, tightening the bolts crosswise.
10. Check the oil level in the hydraulic oil tank with the boom completely lowered and retracted; the oil level should be at the top of the level glass, topping up if needed.
    - Always depressurize the hydraulic systems before starting to work in them; avoid skin contact with the oil, use protective gloves.
    - Ensure cleanliness around the filter and filling point; dirt particles may cause machine damage.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-fil

What is the correct sequence to change the hydraulic oil filter (high pressure filter)?

1. Put the machine in service position.
2. Depressurize the hydraulic and brake systems.
3. Place a receptacle under the oil filters to collect any oil spills.
4. Clean the outside of the hydraulic oil filters.
5. Remove the drain plugs in the bottom of the filters and let the oil drain, waiting a while since it drains slowly.
6. Remove the filter brackets and clean them.
7. Remove the filter inserts, noting the position of the O-rings.
8. Fit the O-rings on the filter inserts and filter brackets, lubricating them with hydraulic oil.
9. Fit the new filter inserts on the filter bracket.
10. Fit the filter bracket and the drain plug.
11. Close the drain valve on the accumulator charging valve.
12. Turn on the main electric power and start the engine.
13. Check that the filter brackets do not leak.
14. Remove the receptacle, handling filters and oil as environmentally hazardous waste.
15. Check the oil level in the hydraulic oil tank with the boom completely lowered and retracted; the oil level should be at the top of the level glass, topping up if needed.
    - Always depressurize the hydraulic systems before starting to work in them; avoid skin contact with the oil, use protective gloves.
    - Ensure cleanliness around the filter and filling point; dirt particles may cause machine damage.
    - The filter brackets are heavy; loosen them carefully.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-fil-2

What is the correct sequence to change the hydraulic oil fine filter?

1. Put the machine in service position.
2. Clean the area around the fine filter.
3. Remove the cover.
4. Prepare a receptacle.
5. Lift up the filter cartridge and place it in the receptacle, letting the hydraulic oil drain.
6. Fit the new filter cartridge and fit the cover on the fine filter.
    - Always depressurize the hydraulic systems before starting to work in them; avoid skin contact with the oil, use protective gloves.
    - Ensure cleanliness around the filter when working; dirt particles may cause machine damage.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-fin

What is the correct sequence to change the high pressure hydraulic oil filter?

1. Clean the outside of the filter and the area around it.
2. Place a vessel under the filter to collect any spillage.
3. Empty the filter bowl by unscrewing the drain plug.
4. Unscrew the filter bowl.
5. Slide off the filter cartridge.
6. Replace the two O-rings between the filter head and the filter bowl, moistening them with hydraulic fluid before fitting.
7. Remove the new filter cartridge from its packaging and immediately fit it.
8. Clean the filter bowl carefully and half fill it with hydraulic fluid.
9. Screw the filter bowl back into position.
10. Start the engine to purge the system of air, and check that the filter does not leak.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-high-pressure-hyd

What is the correct sequence to change the servo hydraulics filter cartridge?

1. Unscrew the bottom section of the housing and withdraw the cartridge downwards.
2. Fit a new cartridge, check the O-ring, and refit the bottom section of the housing.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-servo-hydraulics

What is the correct periodicity to change the brake cooling circuit hydraulic oil filter?

1. Change the filter (or both filters, if the machine has the two-filter option).

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-periodicity-to-change-the-brake-cooling

What is the correct sequence to change the hydraulic oil filter?

1. Turn off the engine and turn off the main electric power.
2. On machines with a raised cab, remove the footstep over the covers and clean the covers and surrounding area.
3. Remove the cover plates over the hydraulic oil filters.
4. Lift up the filter unit and place it in the receptacle, letting the hydraulic oil drain.
5. Part the filter unit and remove the filter insert, handling it as environmentally hazardous waste and noting the position of the parts.
6. Clean the filter holder's parts, paying special attention to the magnetic rod.
7. Fit the new filters and assemble the filter units.
8. Install the filter units and cover plates, tightening the bolts crosswise.
9. On machines with a raised cab, refit the footstep over the covers.
10. Check the oil level.

Note: *Ensure cleanliness around the filter and filling point when working on the hydraulic tank; dirt particles may cause machine damage.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-fil-3

Flushing and cleaning the hydraulic system oil circuit on a quayside container crane

1. Before filling, filter the hydraulic oil, use clean oil-filling tools, and do not remove the filter at the oil tank entry just to speed up filling.
2. When removing the oil filling cover, filter cover, inspection holes or oil pipe for maintenance, keep away from flying dust; remove dirt around the tank cover and impurities at the connection point before opening it (do not use water to clean the impurities, to prevent water infiltration).
3. Use cleaning materials that do not shed fibre impurities, and clean and blow-dry hydraulic elements and hoses before assembling; clean the filter whenever the oil is changed.
4. Use a cleaning oil of the same type as the system oil, keeping its temperature between 45 and 80 degrees C, and flush with a large oil flow to fully remove impurities. Flush the hydraulic system more than three times, discharging the cleaning oil completely after each flush before it cools down. Before filling new oil, clean the filter and install a new filter element.

Note: *Clean oil is essential to the hydraulic system: impurities entering small damping holes or precision component gaps can damage components, jam oil passages, and endanger safe operation. Impurities can enter via unclean hydraulic oil, unclean filling tools, careless filling or maintenance, impurities shed from hydraulic elements, or air/water ingress.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#flushing-and-cleaning-the-hydraulic-system-oil-circuit-on-a

Replacing a free-standing hydraulic pump on a telescopic spreader

1. Turn off the electrical supply using the main switch.
2. Disconnect the inlet, outlet and drain hoses from the pump.
3. Fit the new pump.
4. Reconnect the inlet and outlet hoses.
5. Reconnect the drain hose to the pump.
6. Set the pump flow and pressure per the relevant drawing.

Note: *When ordering a new hydraulic pump, always state the direction of rotation as marked on the old pump housing. Every time the pump is emptied, new oil must be added until it starts to run out of the drain hose.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#replacing-a-free-standing-hydraulic-pump-on-a-telescopic

Changing the oil in a mobile harbour crane's pumps coupler unit

1. Vent the coupler through the breather fitted on its upper part.
2. Drain the oil through the plug fitted in the lower part.
3. Disconnect the radiator return pipe to discharge the oil from the cooling circuit.
4. Fill through the upper plug to the maximum level shown on the dipstick.
5. After starting the main engine, check the oil level again and top up if necessary.

Note: *Change the oil according to the time intervals shown in the maintenance table. The replacement oil must be the same as, or equivalent to, the oil already in the coupler.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#changing-the-oil-in-a-mobile-harbour-crane-s-pumps-coupler

Filtration & fluid

How often must the hydraulic system fluid and filter be replaced on a terminal tractor?

1. Replace both the hydraulic system fluid and the filter at least once a year at the very minimum.

Note: *Never exceed this interval.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-often-must-the-hydraulic-system-fluid-and-filter-be-repl

Under what condition should hydraulic oil level be checked, and how?

1. Check the level of the hydraulic oil with the motor switched off.
2. Make sure the level reaches the top notch.
3. Before topping up, make sure the area around the filler cap is clean and only use oil taken from a clean container.
    - Do not check or change the hydraulic oil level before it has cooled down.
    - Do not do any welding or have oxyhydrogen welding flames near the hydraulic oil tank.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#under-what-condition-should-hydraulic-oil-level-be-checked-a

What safety precautions and checks apply to the hydraulic fluid sump?

1. Before starting inspection, make sure no one starts up the machine, unless expressly asked to do so.
2. Sight check: check the integrity, seal and fastness of the sump, and check connection pipes and unions.
3. Oil level: check using the special indicator on the sump; a low level points to external leaks.
4. Fluid drainage: drain through one of the free cocks under the sump into a pan; if the sump is emptied, carefully remove all impurities without using wool or man-made fibre cloths or tools that leave threads.
5. Topping up the fluid: pre-filter the fluid at 10 microns and pour it into the sump through the quick coupling on the filter covers, using the same type of fluid as already in the sump.
6. Changing the fluid: change up to the maximum level indicated on the sump, with all hydraulic cylinders in position.
    - Never use fluid that has deteriorated due to long or incorrect storage.
    - Never loosen or unscrew pipes or unions when the hydraulic system is under pressure.
    - Dispose of used fluid according to the regulations applicable in the country where the machine is used.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-safety-precautions-and-checks-apply-to-the-hydraulic-fl

How should the water side and oil side of a hydraulic fluid cooling circuit be cleaned?

1. Water side: periodically inspect the water circuit to eliminate mineral deposits or impurities inside the pipes; this can be performed by removing only the bottom and swabbing the pipes.
2. Oil side: clean by swilling with solvent to degrease aluminium parts; allow the solvent to flow against the current for about 30 minutes.
3. Afterwards, eliminate residues by swilling with hot water.

Note: *Never loosen or unscrew pipes or unions with the hydraulic circuit under pressure.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-should-the-water-side-and-oil-side-of-a-hydraulic-fluid

Accumulator

What is the correct sequence to replace the lift/lower accumulator damping (piston accumulator)?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Mark up and detach the hydraulic hoses from the accumulator, plugging the connections immediately to protect the hydraulic system from impurities.
4. Remove the accumulator attaching bolts.
5. Remove the accumulator.
6. Charge the new accumulator, as standard with 10 MPa preload pressure (this pressure can be lowered to achieve the desired functionality).
7. Transfer the connection adapters to the new accumulator.
8. Fit the new accumulator.
9. Connect the hydraulic hoses to the accumulator according to the marking, checking that the O-rings are intact and fitted correctly.
10. Turn on the main electric power and start the engine; run the engine at idling speed.
11. Test the lifting and lowering a couple of times.
12. Check that the accumulator's connections are sealed tightly.
    - Read the safety instructions for oil before working.
    - Handling the accumulator requires special equipment and training.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-lift-lower-accum

What is the correct sequence to check the brake accumulator's pre-charge pressure without special tools?

1. Put the machine in service position.
2. Connect a pressure gauge (0-25 MPa) to the measuring outlet for accumulator pressure on the main valve.
3. Turn on the main electric power and start the engine.
4. Charge the accumulator until the accumulator charging valve changes to cooling.
5. Turn off the engine.
6. Lower the pressure by braking carefully several times while checking the pressure gauge; when the pressure reaches approximately 7.0 MPa it must decrease immediately to 0 MPa.
7. Check that the accumulator's connection is sealed tightly.
8. Once the accumulator is fully charged, turn off the engine and turn the starter key to position I.
9. Check that at least 8 brake applications can be performed before the pressure drops to 7.0 MPa, and that the low brake pressure error code activates at 11.5 MPa.
    - Read the safety instructions for oil before working.
    - If the pressure decreases immediately when the engine is turned off, the accumulator has no pre-charge pressure; after checking that the accumulator drain valve is closed, this indicates inner leakage and the accumulator must be replaced.
    - If the pressure reduces slowly to below 7.0 MPa, the pre-charge pressure is too low and the accumulator must be replaced or serviced by authorised personnel.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-brake-accumulator

What is the correct sequence to replace the brake accumulator?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Clean the accumulator and the surrounding area.
4. Place a receptacle under the accumulator.
5. Disconnect the hydraulic hose from the accumulator.
6. Undo the clamp that holds the accumulator to the chassis.
7. Transfer the connection adapter to the new accumulator, checking that the seal is intact and fitted correctly.
8. Check that the new accumulator has the correct pre-charge pressure, according to the pressure plate.
9. Fit the new accumulator.
10. Connect the hose to the accumulator, checking that the O-rings are intact and fitted correctly.
11. Turn on the main electric power and start the engine.
12. Check that the accumulator's connection is sealed tightly.
13. Remove the receptacle and treat the waste oil as environmentally hazardous waste.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-brake-accumulato

How is the hydraulic accumulator's gas precharge pressure checked?

1. Periodically check the gas precharge pressure, working in a fairly constant environment temperature and with the hydraulic system not under pressure.
    - Accumulators must only be repaired by skilled personnel.
    - Under no circumstances weld, braze, or drill the outer casing of an accumulator.
    - The compressed gas in the accumulators is dangerous due to the accumulated energy; strictly follow all safety precautions.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-the-hydraulic-accumulator-s-gas-precharge-pressure-ch

Cab Tipping Cylinder

What is the correct sequence to replace the hand-controlled cab tipping pump?

1. Put the machine in service position.
2. Place a receptacle under the pump.
3. Detach the hydraulic hoses from the pump.
4. Remove the two bolts that secure the pump to the chassis.
5. Replace the pump.
6. Fit in reverse order.
7. Fill up the system with hydraulic fluid.

Note: *Vent the hydraulic system by lifting and lowering the cab a few times, then check the fluid level and top up as necessary.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-hand-controlled

What is the correct sequence to replace the electric cab tipping pump?

1. Put the machine in service position.
2. Place a receptacle under the pump.
3. Detach the hydraulic hoses from the electric pump.
4. Release the electric connections from the electric pump.
5. Remove the bolts that secure the electric pump to the bracket.
6. Replace the electric pump.
7. Fit in reverse order.
8. Fill up the system with hydraulic fluid.

Note: *Vent the hydraulic system by lifting and lowering the cab a few times, then check the fluid level and top up as necessary.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-electric-cab-tip

What is the correct sequence to replace the cab tipping cylinder?

1. Put the machine in service position.
2. Tip the cab.
3. Secure the cab in the tipped position by opening both cab doors and pulling a lifting strop through, fixed to a lifting device such as a travelling crane.
4. Place a receptacle under the hydraulic cylinder.
5. Detach the hydraulic hoses from the hydraulic cylinder.
6. Remove the two bolts that secure the hydraulic cylinder to the chassis and cab.
7. Replace the hydraulic cylinder.
8. Fit in reverse order.
9. Fill up the system with hydraulic fluid.
    - Protect the cab in a suitable manner to ensure it is not damaged when fixed or lifted by the lifting device.
    - Vent the hydraulic system by lifting and lowering the cab a few times, then check the fluid level and top up as necessary.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-cab-tipping-cyli

What is the correct sequence to repair (recondition) the cab tipping cylinder?

1. Put the machine in service position.
2. Remove the cab tipping cylinder.
3. Install the protection plug on the connection coupler and clean the cylinder assembly in a suitable cleaning solvent, then dry with compressed air.
4. Connect the cylinder to a suitable cab tilt hand pump, making sure the connections match; turn the pump's selector valve to UP and operate the pump until the plunger rod is fully extended, then shift to DOWN and retract the cylinder rod approximately 10 mm.
5. Remove the dust wiper from the cylinder top end carefully with two small screwdrivers.
6. Use a special tool to tap the gland 5 to 10 mm back on the plunger rod.
7. Remove the upper retaining ring from the cylinder and operate the pump to remove the plunger rod.
8. Remove the retaining ring from the plunger rod, then remove the piston and the O-ring below it.
9. Remove the retainer stop-ring and the gland.
10. Check the plunger rod, the top part of the cylinder, and the inner cylinder tube for scores and damage.
11. Slide a new wiper carefully onto the plunger rod, followed by the gland.
12. Use a special cone to fit the retainer ring on the plunger rod.
13. Fit a new O-ring in the groove at the plunger rod end, then slide on the piston, making sure it is fitted in the correct direction.
14. After dismantling the plunger assembly from the cylinder, unscrew the valve (17 mm hexagon) with an extended socket wrench.
15. Remove the pilot piston by blowing with an air nozzle in port B.
16. Check the piston and O-ring for scratches and damage.
17. With the cylinder tube clamped horizontally in a vice, mount the piston together with a new valve assembly and new seal rings.
18. Tighten the valve seat to a torque of approximately 50 Nm.
19. Use a special tool to tap the upper bearing approximately 10 mm into the cylinder and install the retaining ring, making sure it snaps into its groove.
20. Pull back the cylinder rod with an instant jerk to place the upper bearing in the correct position.
21. Reconnect the cylinder to the hand pump, checking the connections; turn the selector valve to DOWN/DRIVE, pump, and retract the plunger rod completely, refilling the pump reservoir with the appropriate fluid as necessary.
22. Set the pump selector valve to UP, pump the plunger rod to the fully extended position, pressurize the system, and check for leaks.
23. Set the pump selector valve to DOWN/DRIVE again; the pressure drops immediately but the plunger rod must remain solid, since the safety valve blocks the internal pressure — after the following pump stroke this valve opens and releases the internal pressure; if this fails, repeat the check, since the non-return valve is then suspected to leak.
24. After completing the tests, fit the dust wiper.
    - Before any repair, check the cylinder assembly for excessive wear, damage, and especially scars or dents on the chromed plunger rod; if found, replace the complete cylinder instead, as repair is not justified.
    - Never use compressed air to drive out the plunger rod assembly.
    - Renew the complete cylinder if scores or scratches are found on the plunger rod or the inner cylinder tube.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-repair-recondition-the-cab-t

Tank

How is the hydraulic oil level checked?

1. Check the level of the hydraulic oil with the motor switched off.
2. Confirm the level reaches the top notch.
3. Before topping up, make sure the area around the filler cap is clean, and only use oil taken from a clean container.
    - Do not check or change the hydraulic oil level before it has cooled down.
    - Do not weld or use oxy-hydrogen welding flames near the hydraulic oil tank.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-the-hydraulic-oil-level-checked

How is fluid drained from the hydraulic sump?

1. Drain the fluid through one of the free cocks under the sump, collecting the used fluid in a pan.
2. If the sump is emptied, carefully remove all impurities, without using wool or man-made fibre cloths or tools that leave threads.
    - Dispose of used fluid according to applicable regulations.
    - Never loosen or unscrew pipes or unions when the hydraulic system is under pressure.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-fluid-drained-from-the-hydraulic-sump

How is hydraulic fluid topped up in the sump?

1. Pre-filter the fluid at 10 microns.
2. Pour the fluid into the sump through the quick coupling on the filter covers, using a type of fluid identical to that already in the sump.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-hydraulic-fluid-topped-up-in-the-sump

How is the hydraulic fluid completely changed?

1. Change the fluid up to the maximum level indicated on the sump, with all hydraulic cylinders in position.
2. Use a fluid identical or equivalent to that already in the sump.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-the-hydraulic-fluid-completely-changed

Hydraulic Oil

What is the correct sequence to change the hydraulic oil?

1. Put the machine in service position.
2. Place a 700-litre receptacle under the hydraulic oil tank's drain plug.
3. Remove the plug and let the oil drain into the receptacle.
4. Fit the drain plug once the oil has drained, making sure the seal washer is installed.
5. Handle the spent oil as environmentally hazardous waste.
6. If the hydraulic oil filters are also due for changing, replace them before the tank is filled with oil.
7. Fill oil through the filling holes on the filters' cover plates, so the oil being filled is itself filtered.
8. Check the oil level in the hydraulic oil tank with the boom completely lowered and retracted; the oil level should be visible in the level glass, topping up if needed.

Note: *Always depressurize the hydraulic systems before starting to work in them; avoid skin contact with the oil, use protective gloves.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil

What is the correct sequence to check the hydraulic oil level?

1. Put the machine in service position.
2. Check the oil level in the hydraulic oil tank, which should be in the centre of the sight glass, filling as required.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-hydraulic-oil-leve

What is the correct sequence to change the hydraulic oil?

1. Put the machine in service position.
2. Remove the filler cap and pump out the hydraulic oil into a collection container.
3. Once most of the oil has been pumped out, place a container under the tank's drain plug and drain the last of the oil.
4. Fit the drain plug once the oil has drained, making sure the washer seal is included.
5. If the hydraulic oil filters are also due for changing, replace them before filling the tank with oil.
6. Fill new hydraulic oil in the filler holes on the filters' cover plates, so the oil being filled is itself filtered, until the level is in the middle of the sight glass, with all hydraulic cylinders retracted.
    - Ensure cleanliness around the filter and filling point; dirt particles may cause machine damage.
    - Do not overfill, due to risk of leakage and environmental damage.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-2

What hydraulic-system operations are checked during the 500-hour Type A preventive maintenance service?

1. Check the hydraulic oil level.
2. Check for oil leaks from the hydraulic system's pipes, fittings and components.
3. Check the operation of the hydraulic oil cooling fans.
4. Check the hydraulic oil cooling fans' wiring.
5. Clean the hydraulic oil radiator.
6. Check the condition of the primary hydraulic components.
7. Check for oil leaks from pipes, fittings and components (general).

Note: *Maintenance must be carried out only by qualified, authorised personnel, working in conditions of maximum safety.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-hydraulic-system-operations-are-checked-during-the-500

Pumps & power

What factors should be periodically checked when inspecting hydraulic pumps?

1. Viscosity of the fluid used.
2. Oil level (a low level slows down machine operating speed).
3. Noise.
4. Condition of filters (a blocked filter slows down oil flow and reduces pump speed).
5. Blow-bys and oil leaks.
6. Outlet valve adjustment.
7. Rate of flow and pressure, using special instruments.
    - Only skilled personnel are allowed to use measuring instruments.
    - Never loosen or unscrew pipes and unions when the hydraulic system is under pressure.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-factors-should-be-periodically-checked-when-inspecting

What precautions should be followed when replacing hydraulic motor components?

1. Work in a clean environment.
2. Work with solvents and blow clean air onto all parts, except the gaskets, before re-assembly.
3. Take care not to damage the gaskets.
4. Do not dent the worked surfaces.
5. Make sure the components enter their housings without excessive pressure, which would indicate incorrect assembly.
6. Whenever hand pressure is not enough, use only rubber hammers, never steel hammers.
7. Maintain the set direction of rotation during assembly.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-precautions-should-be-followed-when-replacing-hydraulic

Accumulators & damping

Why must a hydraulic accumulator's outer casing never be welded, brazed or drilled?

1. The accumulators must only be repaired by skilled personnel.
2. Under no circumstances must the outer casing be welded, brazed or drilled.

Note: *The compressed gas in the accumulators is dangerous due to the accumulated energy.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#why-must-a-hydraulic-accumulator-s-outer-casing-never-be-wel

What is the correct sequence to depressurize the hydraulic system before working on it?

1. Put the machine in service position.
2. Depressurize the hydraulic system by opening the accumulator drain valve on the valve block.
3. Verify that the accumulator pressure has been released, measuring with a pressure gauge on the pressure check connection by the accumulator charging valve.
    - Keep the drain valve open as long as work is in progress.
    - Working with a pressurized hydraulic system endangers your life.
    - Avoid skin contact with the oil; warm oil can cause burn injuries, rashes and irritation, and may be corrosive to mucous membranes in the eyes, skin and throat.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-depressurize-the-hydraulic-s

Control Levers

What is the correct sequence to replace a load handling control lever?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Remove the cover from the control levers (six screws).
4. Detach the control levers from the bracket (four screws).
5. Cut the cable tie and fold down the gaiter to expose the control levers' connections.
6. Lift the control levers off the bracket.
7. Remove the hose connections.
8. Unscrew the control levers.
9. Replace the control lever in question, replacing the O-ring as well in case of leakage.
10. Check that there are no leaks when the levers are refitted.
11. Fit in reverse order.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-a-load-handling-cont

What checks should be performed when function-testing the electro-hydraulic control levers?

1. Check if the dead zone is sufficient by test-running the machine on a rough surface and noting whether any hydraulic function moves; if it does, increase the dead range (for example, by 10 steps).
2. Check the smoothness of the lift/lower movement at idle and at maximum rpm.
3. Check the smoothness of the tilt in/out movement, in the same way as lift/lower.
4. Check the smoothness of the side shift movement, in the same way as lift/lower.
5. Check the smoothness of the positioning (spreading) movement, in the same way as lift/lower.
6. Check the smoothness of the levelling movement, in the same way as lift/lower.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-checks-should-be-performed-when-function-testing-the-el

Tilt Cylinder

What is the correct sequence to replace the tilt cylinder?

1. Tilt the mast forward.
2. Put the machine in service position.
3. Depressurize the hydraulic system.
4. Connect lifting equipment to the lifting lugs on the mast in a secure manner.
5. Secure the tilt cylinder to an overhead crane.
6. Place a container under the hose connections on the tilt cylinder to collect oil waste.
7. Mark and undo the hydraulic connections to the tilt cylinder, plugging all connections at once to protect the hydraulic system from contamination.
8. Release the tilt cylinder from the mast and frame by removing the screws that hold the lock plate for the cylinder shafts.
9. Remove the cylinder shafts, using a slide hammer if necessary.
10. Remove the tilt cylinder.
11. Transfer the connection adapters to the new tilt cylinder.
12. Connect the new tilt cylinder: install the cylinder shafts, checking that the bearings in the cylinder anchorages are correctly aligned before installing them; rotate the shaft to find the correct position for the lock plate; mount the lock plate and secure it with the two screws; repeat for the other cylinder.
13. Grease the cylinder anchorages.
14. Connect the hydraulic hoses to the tilt cylinder according to the marking, checking that the O-rings are intact and fitted correctly.
15. Undo the lifting equipment.
16. Turn on the main electric power and start the engine; run the engine at idling speed.
17. Test the tilt a couple of times.
18. Check that the tilt cylinders' connections are sealed tightly.
19. Check the tilt function, adjusting the new tilt cylinder as necessary.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-tilt-cylinder

How is the tilt cylinder stroke adjusted if the mast is twisted during tilting?

1. Tilt the mast so that the cylinders are half extended.
2. Put the machine in service position.
3. Undo the screws.
4. Turn the piston rod with a hook spanner.
5. Check that the cylinder strokes are equal in length.
6. Check the tilt function, repeating the adjustment until the tilt function operates correctly.
7. Install the screws.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-the-tilt-cylinder-stroke-adjusted-if-the-mast-is-twis

Main Valve

What is the correct sequence to inspect and adjust hydraulic pressures on the main valve?

1. Warm the machine up so the hydraulic oil reaches working temperature, about 50°C.
2. Switch off the engine.
3. Connect a pressure gauge to the relevant measurement union on the main valve.
4. Start the engine and check accumulator charging: allow the accumulator to charge until charging switches to cooling the brakes, read the pressure and compare it with the permissible pressure on the pressure sign, then apply the brakes repeatedly and read off the pressure at which the accumulator starts charging again (should be about 13.5 MPa), adjusting as necessary with the accumulator pressure adjustment screw.
5. Check steering pressure: increase the engine speed to about 1100 rpm, turn the steering to full lock and continue activating the function, read the pressure and compare it with the pressure sign, then increase engine speed to about 1800 rpm and read the pressure again — the difference should not exceed ±1.0 MPa — adjusting as necessary with the steering pressure adjustment screw.
6. Check lift and tilt pressure: increase the engine speed to about 1100 rpm, activate the tilt to its end position and continue activating the function, read the pressure and compare it with the pressure sign, then increase engine speed to about 1800 rpm and read the pressure again — the difference should not exceed ±1.0 MPa — adjusting as necessary with the lift and lower adjustment screw.
7. Check side shift and spreading pressure: increase the engine speed to about 1100 rpm, activate side shift or spread to its end position and continue activating the function, then read the pressure (this pressure is not adjustable).
8. Check the servo pressure to the control levers: read the pressure and compare it with the pressure sign, adjusting as necessary with the servo pressure adjustment screw.
    - Read the safety instructions for oil before work.
    - The hydraulic pressure must only be adjusted by authorised personnel.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-inspect-and-adjust-hydraulic

What precautions must be followed when servicing the main valves?

1. Never use the spool ends or housings for clamping or gripping when lifting a valve block.
2. Never subject spool ends or housings to blows or shocks, since rough treatment may deform the spool and lead to immediate seizure.
3. Protect the valves from moisture and dirt, taking particular care to prevent dirt from entering the connection ports; protect the ports and other joint faces from scoring and bruising, and keep unconnected ports plugged.
4. When fitting pipes and hose couplings, observe meticulous cleanliness, ensuring no swarf, flakes of paint or other impurities enter the valve, and do not overtighten the couplings.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-precautions-must-be-followed-when-servicing-the-main-va

Other Hydraulic Systems procedures

What rules apply when installing a new flexible hydraulic hose?

1. Avoid fitting and leaving taut flexible hoses; hoses must be fitted so they are not under tension except that of their own weight.
2. Never fall below a minimum acceptable curving radius.
3. If the hose makes a curve, it must be long enough to respect the straight sections.
4. Choose the shape of the terminals to prevent further stress on the hose.
5. Cover any structure or area the hose could come into contact with, to protect it against undesired external action.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-rules-apply-when-installing-a-new-flexible-hydraulic-ho

What is the correct sequence to replace a load control valve?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Detach the hydraulic hose from the load control valve, plugging the connection immediately to protect the hydraulic system from impurities.
4. Remove the connection adapter.
5. Undo the old load control valve with a flat blade screwdriver and remove it.
6. Fit the new load control valve (torque a 1-inch valve to 20 Nm).
7. Fit the connection adapter.
8. Connect the hydraulic hose to the adapter, checking that the O-rings are intact and fitted correctly.
9. Turn on the main electric power and start the engine; run the engine at idling speed.
10. Test the lifting and lowering a couple of times, checking the maximum lowering speed with maximum load.
11. Check that the connections are sealed tightly.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-a-load-control-valve

What is the correct sequence to replace the side shift cylinder?

1. Put the machine in service position.
2. Secure the side shift cylinder to the fork carriage with a strap.
3. Remove the shaft connecting the side shift cylinder to the fork by removing the screw and knocking out the shaft.
4. Contract the side shift cylinder with the machine running.
5. Put the machine in service position.
6. Depressurize the hydraulic system.
7. Place a receptacle under the hydraulic hoses attached to the side shift cylinder.
8. Mark up and detach the hydraulic hoses from the side shift cylinder, plugging the connection immediately to protect the hydraulic system from impurities.
9. Remove the shaft connecting the side shift cylinder to the carriage by removing the screw and pulling out the shaft.
10. Transfer the connection adapters to the new side shift cylinder.
11. Fit the new side shift cylinder.
12. Fit the shafts and screws that connect the side shift cylinder to the fork carriage and forks.
13. Connect the hydraulic hoses to the side shift cylinder according to the marking, checking that the O-rings are intact and fitted correctly.
14. Turn on the main electric power and start the engine; run the engine at idling speed.
15. Test the side shift and spreading a couple of times.
16. Check that the connections are sealed tightly.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-side-shift-cylin

What is the correct sequence to replace the spreading flow divider?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Place a container under the flow divider to collect oil waste.
4. Mark up and detach the hydraulic hoses from the flow divider, plugging the connections immediately to protect the hydraulic system from impurities.
5. Remove the two bolts that secure the flow divider to the carriage.
6. Remove the flow divider.
7. Transfer the connection adapters to the new flow divider.
8. Fit the new flow divider.
9. Connect the hydraulic hoses to the flow divider according to the marking, checking that the O-rings are intact and fitted correctly.
10. Turn on the main electric power and start the engine; run the engine at idling speed.
11. Test the spreading a couple of times.
12. Check that the flow divider's connections are sealed tightly.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-spreading-flow-d

What is the correct sequence to replace the load holding valve?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Mark up and detach the hydraulic hoses from the load holding valve, plugging the connections immediately to protect the hydraulic system from impurities.
4. Remove the two bolts that secure the load holding valve to the chassis.
5. Remove the load holding valve.
6. Fit the new load holding valve.
7. Turn on the main electric power and start the engine; run the engine at idling speed.
8. Test the tilt a couple of times.
9. Check that the load holding valve's connections are sealed tightly.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-load-holding-val

What is the correct sequence to replace the levelling cylinder?

1. Put the machine in service position.
2. Remove the screw that holds the rod end of the cylinder in the fork carriage.
3. Contract the cylinder with the machine running so the rod goes into the cylinder.
4. Put the machine in service position.
5. Depressurize the hydraulic system.
6. Mark and undo the hydraulic connections to the levelling cylinder, plugging all connections at once to protect the hydraulic system from contamination.
7. Remove the split pin and the shaft that is holding the cylinder in the fork.
8. Remove the levelling cylinder.
9. Transfer the connection adapters to the new levelling cylinder.
10. Connect the new levelling cylinder: install the cylinder shaft and split pin holding the cylinder to the fork, and install the screw holding the cylinder to the fork carriage.
11. Connect the hydraulic hoses to the levelling cylinder according to the marking, checking that the O-rings are intact and fitted correctly.
12. Turn on the main electric power and start the engine; run the engine at idling speed.
13. Test the levelling a couple of times.
14. Check that the levelling cylinder's connections are sealed tightly.

Note: *Read the safety instructions for oil before working.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-levelling-cylind

What is the correct sequence to calibrate the automatic clamping function?

1. Select calibration of the automatic clamping function from the setup menu.
2. Close the automatic clamping unit completely, then open it slightly so the clamp is almost closed but under no pressure.
3. Confirm to start the automatic calibration; the current on the cartridge is slowly increased while current and pressure are recorded.
4. Wait for calibration to complete; if successful, the values are stored in the ECU memory, otherwise the calibration is reported as failed and no values are saved.
    - The clamping pressure rises to 160 bar during calibration, which can damage a roll; use an already damaged roll for calibration.
    - Calibration fails and the values are not saved if the pressure was too high when calibration started (above 40 bar) or if the pressure did not reach 160 bar during calibration.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-calibrate-the-automatic-clam

What is the correct sequence to replace the hydraulic tank heater?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Drain the machine of hydraulic oil using a pumping device.
4. Remove the two screws that hold the plastic cover.
5. Unplug the electric cables from the connections.
6. Remove the lock nut which holds the wiring harness in the heater.
7. Remove the heater from the machine.
8. Replace the heater.
9. Fit in reverse order.
    - Read the safety instructions for oil before working.
    - The tank heater is connected to high voltage (110-400V); connection and reconnection may only be performed by personnel authorised to work with high voltage.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-hydraulic-tank-h

What is the correct sequence to replace the hydraulic oil temperature sensor?

1. Put the machine in service position.
2. Depressurize the hydraulic system.
3. Detach the electrical connectors from the sensor.
4. Replace the sensor.
5. Fit in reverse order.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-replace-the-hydraulic-oil-te

What precautions should be observed when replacing a hydraulic motor?

1. Work in a clean environment.
2. Work with solvents and blow clean air onto all parts (except the gaskets) before re-assembly.
3. Take care not to damage the gaskets.
4. Do not dent the worked surfaces.
5. Make sure the components enter their respective housings without undergoing excessive pressure, which would indicate an incorrect assembly position.
6. When hand pressure is not enough, use only rubber hammers, never steel hammers.
7. Maintain the set direction of rotation during assembly.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-precautions-should-be-observed-when-replacing-a-hydraul

How is the hydraulic fluid cooling circuit (heat exchanger) cleaned?

1. On the water side, periodically remove the bottom of the exchanger and swab the pipes to eliminate mineral deposits or other impurities.
2. On the oil side, clean by swilling with a solvent (perchlorethylene) to degrease the aluminium parts, letting the solvent flow against the current for about 30 minutes, then eliminate residues by swilling with hot water.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#how-is-the-hydraulic-fluid-cooling-circuit-heat-exchanger-cl

What is the correct sequence to troubleshoot a suspected hydraulic hose fault?

1. Depressurize the hydraulic and brake systems.
2. Study the relevant hydraulic diagram, checking between which components the suspected hose is connected and where it is spliced.
3. Locate the hose on the machine, starting at one component and following the hose to the next.
4. Inspect the entire hose and splicing points for chafing damage, pinching damage, and leaks, changing any damaged hoses.
    - Always depressurize the hydraulic and brake systems before starting work on them, due to the risk of personal injury from oil under high pressure.
    - When removing a hydraulic hose, always change the O-ring on hoses that have one (ORFS).

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-troubleshoot-a-suspected-hyd

What is the correct sequence to change the load handling servo filter?

1. Put the machine in service position.
2. Depressurize the hydraulic systems.
3. Turn the start key to position 0 and turn off the main electric power.
4. Clean the outside of the filter housing and filter holder.
5. Remove the filter holder and remove the cartridge downward.
6. Clean the inside of the filter holder.
7. Place the new cartridge in the filter holder.
8. Check that the O-ring on the filter holder is intact and in place.
9. Fit the filter and filter holder.
10. Check the hydraulic oil level with the lift cylinders completely down and the extension cylinder completely in; the level should be at the top of the level glass, topping up as needed.
    - Always depressurize the hydraulic systems before working on them; avoid skin contact with the oil, use protective gloves.
    - The hydraulic oil level is checked with the boom completely lowered and retracted.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-load-handling-ser

What is the correct sequence to check the servo pressure at the pressure reducer?

1. Operate and warm up the machine so the hydraulic oil reaches operating temperature, at least 50°C.
2. Put the machine in service position.
3. Depressurize the hydraulic systems.
4. Turn the start key to position 0.
5. Connect a pressure gauge (0-25 MPa) to the test outlet on the pressure reducer.
6. Start the engine and check the servo pressure, comparing it with the pressure plate; turn the steering wheel or activate a load handling function to activate the hydraulic oil pumps, since the servo pressure is higher than their stand-by pressure.
7. Depressurize the hydraulic and brake systems.
8. Remove the pressure gauge and fit the protective cap on the pressure check connection.

Note: *Always depressurize the hydraulic systems before working on them; avoid skin contact with the oil, use protective gloves.*

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-servo-pressure-at

What is the correct sequence to change the hydraulic oil tank's breather filter?

1. Turn off the engine and the main electrical power.
2. Clean the area around the filter housing.
3. Remove the filter housing by pressing down and turning approximately 1/8 turn clockwise.
4. Change the filter cartridge, handling it as environmentally hazardous waste.
5. Fit the filter housing by pressing down and turning approximately 1/8 turn counter-clockwise.
6. Reset the filter indicator by pressing down the button in the middle of the glass centered on the filter cartridge.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-change-the-hydraulic-oil-tan

What is the correct sequence to check and top up the hydraulic fluid level?

1. Check the fluid level on the fluid sight-glass, with all hydraulic pistons in the bottom positions.
2. Top up the hydraulic fluid as necessary, using the specified oil grade.
    - Hydraulic fluid is chemically aggressive; avoid extended contact with the skin.
    - In systems with a separate tank for the brake system, the hydraulic fluid for the brake system must never contain any additives.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-and-top-up-the-hydraul

What is the correct sequence to check the accumulators' pre-charging pressure?

1. Always check that the engine shut-off controls function correctly.
2. Empty the accumulators into the tank by opening the accumulator evacuating valve.
3. Remove three of the accumulators from the connector and plug the connector holes.
4. Connect a 0-250 bar pressure gauge to the test outlet on the accumulator charging valve.
5. Start the engine and allow the first accumulator to build up pressure.
6. Switch off the engine and reduce the pressure by pumping the foot brake repeatedly; the pressure should fall slowly until approximately 5 bar below the recommended pre-charging (gas) pressure, then fall to 0 immediately, and any earlier immediate drop indicates internal leakage requiring replacement.
7. Open the accumulator evacuating valve and empty the accumulator into the tank.
8. Repeat the check for the other three accumulators.
    - Always empty the accumulators before working on the system, using the accumulator evacuating valve adjacent to the accumulator connection point, and open the reserve servo pressure valve too.
    - Immediately shut down the engine if the charging pressure exceeds the levels stated on the hydraulic system information plate.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-check-the-accumulators-pre-c

What is the correct sequence to adjust the wet disc brake (WDB) system?

1. Check the pre-charging pressure of the accumulators.
2. Check the accumulator charging pressure with the engine stopped: connect a pressure gauge to the measurement tapping on the accumulator charging valve, discharge the accumulator with the evacuating valve, close the evacuating valve, start the engine, let the accumulator charge, and read the charging pressure, adjusting the accumulator charging valve and repeating as necessary.
3. Bleed the brake circuit: open the bleed nipple on the inside of each drive axle hub, depress the brake pedal, let the oil flow out until free from air bubbles, then shut off the nipple while the pedal is still depressed; repeat for the other hub.
4. Check the pressure from the brake pedal: connect a pressure gauge to the measurement tapping on the brake pedal valve below the operator's cab, depress the pedal fully, and read the pressure against the hydraulic system plate, leaving the gauge in position.
5. Stop the engine and check for leakage at the pedal: depress the pedal and read the pressure, which must not drop for 15 seconds; release the pedal and confirm the pressure drops to 0, otherwise the brake valve is leaking.
6. Use the accumulator evacuating valve to release the pressure from the accumulator.
7. Start the engine and run it until full pressure is achieved.
8. Stop the engine and check that the brakes can be applied 6-8 times before the pressure drops to 70 bar, and that the low brake pressure warning lamp lights up at 115 bar.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-adjust-the-wet-disc-brake-wd

What is the correct sequence to depressurise the hydraulic and brake systems?

1. Put the machine in service position.
2. Depressurise the working hydraulic system: turn on the system voltage, turn the start key to position I, and repeatedly activate the load handling functions.
3. Turn the start key to position 0 and turn off the system voltage.
4. Depressurise the brake system by opening the drain valve on the accumulator charging valve.
5. Depressurise the attachment by opening the attachment relief valve.
    - Keep the accumulator drain valve open as long as work is in progress; after finishing, close the drain valve and tighten the lock ring.
    - Hydraulic oil may be directed the wrong way through the fine filter if the attachment relief valve is not closed before the engine is started; check that it is closed.

Source: https://www.hitsrl.it/technical-resources/procedures/hydraulic-systems/#what-is-the-correct-sequence-to-depressurise-the-hydraulic-a

Maintenance Tips

Cylinders & Seals

Why does hydraulic cylinder performance and failure modes in lifting equipment occur on this equipment?

Hydraulic cylinders provide the linear motion required for boom luffing, stabilizer deployment, and tower adjustments. Their performance depends on hydraulic pressure, seal integrity, and mechanical alignment. Understanding cylinder behavior and failure modes is essential for maintaining safe and efficient operation.

The cylinder consists of a barrel, a piston — a part HIT Srl supplies — a rod, and seals. Hydraulic pressure acts on the piston to extend or retract the rod. The force generated depends on the pressure and the piston area. Engineers design cylinders to handle the maximum expected loads with a safety margin.

Seal integrity is critical for cylinder performance. Seals prevent hydraulic fluid from leaking past the piston or out of the cylinder, a component HIT Srl stocks. Seal wear can cause internal leakage, reducing cylinder efficiency. External leakage can lead to loss of hydraulic fluid and contamination of the environment.

Mechanical alignment affects cylinder performance. Misalignment between the cylinder and the load can cause side loading, which increases wear on the rod and seals. Engineers design mounting points to minimize misalignment, but operators must ensure that the machine is set up correctly.

Cylinder failure modes include seal wear, rod bending, barrel deformation, and piston damage. Seal wear is the most common failure mode. Rod bending can occur if the cylinder is subjected to excessive side loading. Barrel deformation can occur if the cylinder is overloaded. Piston damage can occur if contaminants enter the hydraulic system.

Regular maintenance helps prevent cylinder failures. This includes inspecting seals, checking for leaks, and ensuring proper lubrication. Operators must avoid overloading the cylinder and ensure that the machine is set up correctly.

Understanding hydraulic cylinder performance and failure modes helps operators use the machine safely and technicians maintain it properly. Proper maintenance and awareness of cylinder behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#why-does-hydraulic-cylinder-performance-and-failure-modes-in

What does maintaining multi-stage hydraulic cylinder design involve?

Multi-stage hydraulic cylinders — parts HIT Srl supplies — are used in telescopic booms to provide long extension with compact retraction. Understanding the engineering logic behind multi-stage cylinder design is essential for safe and efficient operation.

Multi-stage cylinders consist of multiple nested stages that extend sequentially. Each stage must handle the load transmitted through the boom, a component HIT Srl stocks. Engineers design stages with high-strength materials and optimized wall thickness to maximize strength while minimizing weight.

Hydraulic flow must be controlled precisely to ensure smooth extension and retraction. Engineers use flow dividers and pressure compensators to synchronize stage movement. Proper lubrication is essential to reduce friction and prevent wear.

Seal integrity is critical for multi-stage cylinders. Each stage requires seals to prevent hydraulic leakage. Seal wear can cause internal leakage, reducing efficiency. Regular inspections help identify seal wear and prevent failures.

Understanding multi-stage cylinder design helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-multi-stage-hydraulic-cylinder-design

What does maintaining hydraulic load-holding behavior in long-stroke cylinders involve?

Long-stroke hydraulic cylinders — parts HIT Srl supplies — are used in boom luffing, telescoping, and stabilizer systems. Their ability to hold loads under variable pressure is critical for maintaining stability and preventing uncontrolled movement. Understanding hydraulic load-holding behavior is essential for safe and efficient operation.

Load-holding valves, components HIT Srl stocks, prevent cylinders from drifting under load. These valves maintain back pressure, ensuring that the cylinder remains in position even if hydraulic supply pressure fluctuates. Engineers design load-holding valves with precise tolerances to ensure reliable performance. Pressure compensators help maintain stable pressure across the valve.

Long-stroke cylinders experience varying pressure along their length. As the cylinder extends, the effective piston area changes, altering the force required to hold the load. Engineers must account for these variations when designing hydraulic circuits. Proportional valves allow fine control of flow and pressure, enabling smooth movement.

Seal integrity is critical for load-holding behavior. Seal wear can cause internal leakage, reducing the cylinder's ability to hold the load. External leakage can lead to loss of hydraulic fluid and contamination. Regular inspections help identify seal wear and prevent failures.

Environmental conditions influence load-holding behavior. Temperature affects hydraulic fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing response time. Hot fluid reduces lubrication, increasing internal leakage. Proper filtration is essential to prevent contamination.

Understanding hydraulic load-holding behavior in long-stroke cylinders helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-hydraulic-load-holding-behavior-in-lon

What does maintaining interaction between boom luffing cylinders and pivot frames involve?

Boom luffing cylinders, components HIT Srl stocks, generate the force required to raise and lower the boom. Under high compression loads—such as during heavy lifts or long-radius operations—these cylinders and their pivot frames experience significant mechanical stress. Understanding their structural interaction is essential for maintaining boom alignment, preventing deformation, and ensuring long-term reliability.

Luffing cylinders — parts HIT Srl supplies — must handle high compression forces. Engineers design cylinders with high-strength materials and optimized geometries to maximize strength. Cylinder rods must resist buckling under compression. Bearings allow smooth rotation at pivot points, while lubrication pathways ensure consistent performance.

Pivot frames distribute forces from the cylinders into the superstructure. Engineers design pivot frames with reinforced cross-members and gussets to maximize strength. Welded joints must withstand repeated loading cycles. Finite element analysis helps identify stress hotspots and guide reinforcement design.

Dynamic forces further influence structural interaction. When the boom moves rapidly, transient forces can cause oscillation. These oscillations generate lateral forces that travel through the cylinders and into the pivot frames. Operators must use smooth, controlled inputs to minimize dynamic excitation.

Environmental conditions influence structural behavior. Temperature affects material properties, while corrosion can weaken structural components. Protective coatings and regular inspections help mitigate these risks.

Understanding structural interaction between boom luffing cylinders and pivot frames under high compression loads helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of structural behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-interaction-between-boom-luffing-cylin

How do you maintain MHC travel steering and alignment systems to prevent failure?

Travel steering and alignment systems ensure that Mobile Harbour Cranes move safely along the quay. These systems must maintain precise wheel alignment, stable steering response, and consistent traction under varying surface conditions.

Wheel alignment must be measured using laser tools. Misalignment increases tire wear, reduces traction, and causes uneven load distribution. Any deviation from manufacturer specifications must be corrected.

Steering cylinders — parts HIT Srl supplies — must be inspected for rod condition, seal integrity, and pressure stability. Any sign of leakage or rod scoring must be addressed immediately.

Steering linkages must be checked for wear, corrosion, and play. Loose linkages reduce steering precision and increase stress on travel components.

Travel motors must be inspected for smooth response and pressure stability. Any irregularity in motor performance can cause steering drift.

Environmental conditions significantly influence steering behavior. Salt exposure accelerates corrosion, while dust from bulk cargo can infiltrate mechanical joints.

In summary, maintaining travel steering and alignment systems requires rigorous inspection, alignment verification, hydraulic testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#how-do-you-maintain-mhc-travel-steering-and-alignment-system

How do you maintain reachstacker telescopic cylinder systems to prevent failure?

Telescopic cylinders provide the extension and retraction force required for boom movement. These cylinders — parts HIT Srl supplies — operate under extreme pressure cycles, especially during long-reach container handling. Maintaining their reliability requires meticulous inspection of rods, seals, bearings, and hydraulic circuits.

Cylinder rods must be inspected for pitting, scoring, and corrosion. Salt exposure accelerates rod degradation, leading to seal wear and leakage. Any rod showing surface defects must be polished or replaced.

Rod seals, components HIT Srl stocks, must be inspected for wear, cracking, and deformation. High-pressure cycles generate heat that accelerates seal degradation. Any seal showing signs of hardening or swelling must be replaced.

Cylinder barrels must be inspected for corrosion, deformation, and structural integrity. Internal corrosion reduces cylinder efficiency and increases wear on piston seals.

Hydraulic connections must be inspected for leakage, corrosion, and correct torque. Salt exposure accelerates oxidation on fittings and connectors.

Environmental conditions significantly influence cylinder behavior. High ambient temperatures reduce fluid viscosity, while dust from bulk cargo can infiltrate hydraulic systems.

In summary, maintaining telescopic cylinders requires rigorous inspection, seal management, lubrication control, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#how-do-you-maintain-reachstacker-telescopic-cylinder-systems

How do you maintain reachstacker hydraulic cylinder cushioning and end-stroke damping systems to prevent failure?

Hydraulic cylinder cushioning systems protect the boom, spreader — a part HIT Srl supplies — and chassis from shock loads during end-stroke events. These systems must maintain precise damping characteristics despite rapid load changes, contamination, and thermal stress. Ensuring reliability requires meticulous inspection of cushioning valves, piston geometry, seals, and hydraulic fluid quality.

Cushioning valves, components HIT Srl stocks, must be inspected for contamination, wear, and correct response. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking or delayed response must be serviced immediately.

Piston cushioning grooves must be inspected for wear, scoring, and deformation. Incorrect groove geometry reduces damping efficiency and increases shock loads on structural components.

Cylinder rods must be inspected for straightness, chrome integrity, and corrosion. Salt exposure accelerates corrosion, especially around rod seals. Any rod showing pitting or flaking must be replaced.

End-stroke seals must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear. Any seal showing signs of hardening or deformation must be replaced.

Environmental conditions significantly influence damping behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining hydraulic cushioning systems requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#how-do-you-maintain-reachstacker-hydraulic-cylinder-cushioni

What does maintaining hydraulic flow balancing, cylinder synchronization, and side-lift stability control involve?

Side-loader hydraulic systems must maintain perfect synchronization between multiple cylinders to lift loads laterally without tilt or drift. Their hydraulic architecture is more complex than that of front-lift machines.

The first pillar is cylinder synchronization. Dual or triple cylinders — parts HIT Srl supplies — must extend at identical speeds. Any imbalance causes load tilt.

The second pillar is flow divider performance. Flow dividers ensure equal flow to paired cylinders, components HIT Srl stocks. Wear or contamination causes uneven lifting.

The third pillar is pressure compensation. Lateral lifting requires stable pressure. Pressure drops cause drift or sudden movement.

The fourth pillar is load-holding valve integrity. Load-holding valves prevent cylinder creep. Faulty valves cause slow sinking.

The fifth pillar is hose routing. Side-mounted hoses are exposed to abrasion and impact. Damaged hoses cause pressure loss.

The sixth pillar is contamination control. Hydraulic contamination causes valve sticking and cylinder scoring.

The seventh pillar is thermal stability. Hydraulic oil heats quickly during lateral lifting. Overheated oil reduces viscosity and increases drift.

The eighth pillar is operator modulation. Smooth joystick control reduces hydraulic shock loads.

Proper hydraulic balancing ensures safe and precise lateral lifting.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-hydraulic-flow-balancing-cylinder-sync

What should be checked when inspecting steering cylinder leak and play inspection?

The steering system on a reachstacker works under high pressure, turning heavy rear wheels often while the machine is stationary (dry steering), which puts maximum stress on the cylinders. An obvious safety check involves inspecting the steering cylinders for hydraulic fluid leaks around the rod seals. A leak here is not just an environmental issue; it indicates seal failure that can lead to a sudden loss of steering assist. Inspect the chrome plating on the cylinder rods for piţng, scratches, or corrosion. Damaged chrome will tear up new seals in a matter of hours. Check the mechanical play in the spherical bearings (eyelets) at both ends of the cylinder. Excessive play causes the machine to wander on the road and leads to tire wear. Lift the rear of the machine (safely jacked) and wiggle the wheels to check for wear in the steering pins and bushings. HIT Srl offers comprehensive sealing kits and complete replacement steering cylinders. Our seal kits use high- grade polyurethane and PTFE materials to resist the harsh conditions of port terminals. Check the hydraulic hoses feeding the cylinders. They flex constantly and are prone to rubbing against the chassis. Replace any hose that shows wire exposure. Verify that the steering priority valve is functioning; the steering should remain light even when the boom is being operated simultaneously. For steering knuckles, kingpins, and tie rods, HIT Srl provides fast identification and delivery to keep your machine safe and maneuverable.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-should-be-checked-when-inspecting-steering-cylinder-lea

Why does hydraulic cylinder drift and holding valves occur on this equipment?

Hydraulic drift occurs when a cylinder slowly extends or retracts without operator input. For a reachstacker holding a 40-ton container, boom drift is a terrifying safety violation. It is obvious that the load must remain static when the controls are in neutral. Test for drift by lifting a known load to a safe height, marking the cylinder rod position with tape, and shuţng off the engine. Measure the movement after 15 minutes. If it drops, the holding valve (counterbalance valve) or the internal piston seal is leaking. The holding valve is a safety device bolted directly to the cylinder port. It locks the oil inside the cylinder in case a hose bursts. If this cartridge valve is contaminated with metal shavings, it cannot seat tightly. HIT Srl supplies replacement counterbalance cartridges and seal kits for lift cylinders. We ensure your load stays where you put it. Check the pilot line that opens the holding valve. If there is residual pressure in the pilot line due to a faulty main valve spool, the holding valve might be "cracked open" slightly. Internal cylinder leakage (piston seal bypass) allows oil to move from the high-pressure side to the low-pressure side. The cylinder barrel may be ballooned (expanded) causing the seal to lose contact. Drifting hydraulics are a major inspection failure point. Restore holding power with components from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#why-does-hydraulic-cylinder-drift-and-holding-valves-occur-o

What does maintaining spreader extension cylinder damping involve?

When the spreader extends to 20ft or 40ft, it hits mechanical stops. The hydraulic cylinders have internal cushioning (damping) to slow down the beam just before impact. It is obvious that without damping, the metal-on-metal impact will crack the spreader beams. Extend the spreader at full speed. It should decelerate smoothly in the last 50mm of travel. If it bangs hard against the stop, the internal damping spear or valve is worn out. Check the external relief valves on the extension circuit. If set too high, the cylinder overcomes the cushioning effect. Inspect the mechanical stop blocks inside the beam. They should be square. If they are mushroomed or cracked, the impact forces are too high. HIT Srl supplies extension cylinders with integrated damping, seal kits, and replacement stop blocks. We preserve the structural integrity of your lifting attachment. Check for "drift" after extension. If the spreader creeps back in after hiţng the stop, the piston seal is leaking. Synchronization issues often stem from unequal damping in the two cylinders. Shock loads destroy steel structures. Cushion the blow with hydraulic components from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-spreader-extension-cylinder-damping-in

What does maintaining steering cylinder chrome rod condition involve?

The steering cylinders are low to the ground, behind the wheels. They are constantly bombarded by stones, gravel, and salt water. It is obvious that stone chips on the chrome rod destroy the hydraulic seals. Extend the steering fully and wipe the rods clean. Run your fingernail along the rod. If you catch a scratch or dent, that defect will act like a file on the wiper seal. Check for piţng corrosion. Salt eats through the chrome plating, causing the underlying steel to rust and blister . Inspect the rod straightness. Hiţng a curb can bend the rod, causing the piston to bind inside the barrel. HIT Srl supplies replacement steering cylinder rods, complete cylinders, and heavy-duty wiper seals. We protect your hydraulic integrity. Install protective bellows (boots) if operating in highly abrasive environments. Polish out minor scratches if possible, but deep damage requires replacement. Leaking steering cylinders are an environmental hazard. Fix them with HIT Srl components.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-steering-cylinder-chrome-rod-condition

What does maintaining hydraulic cylinder gland nut torque involve?

The gland nut (head nut) holds the rod and piston inside the cylinder barrel. It is under cyclic pressure load. It is obvious that if this nut backs off, the cylinder will leak massively or blow the rod out entirely. Visually inspect the gap between the gland and the barrel. There should be none. If you see clean threads or a gap, the gland is loosening. Look for a "locking screw" or plate that secures the gland. Ensure it is present and tight. Check for "breathing." Have an operator cycle the cylinder against the stop. Watch the gland. If it moves in and out, the threads are failing. HIT Srl supplies replacement cylinder glands, seals, and locking hardware. We ensure your cylinders stay intact. If the gland has been loose, check the barrel threads. They may be stripped, requiring barrel replacement. Always torque the gland to spec when resealing a cylinder. Cylinder safety prevents boom collapse. Maintain it with HIT Srl expertise.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-hydraulic-cylinder-gland-nut-torque-in

What does maintaining steering cylinder gland seal leakage involve?

The gland is the removable head of the cylinder through which the rod moves. It contains the rod seal and wiper. It is obvious that a leak here not only drains the tank but allows dirt to enter the cylinder on the retraction stroke. Wipe the cylinder head clean and have the operator turn the steering against the stop to pressurize the seal. If oil weeps out, the seal is compromised. Inspect the wiper seal (dust seal). If it is cracked or missing chunks, it is no longer cleaning the rod. The grit entering will score the rod and destroy the main pressure seal. Check the gland threads. Sometimes the gland unscrews slightly due to steering vibration. If there is a gap between the gland and the barrel, tighten it immediately. HIT Srl supplies complete gland assemblies and seal kits containing high-performance polyurethane seals. We stop leaks at the source. If the rod is bent, replacing the seal will not fix the leak; the rod will just deform the new seal. Use the correct tools to remove the gland. Pipe wrenches damage the surface. Protect your steering system integrity with HIT Srl seals.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-steering-cylinder-gland-seal-leakage-i

Why does boom extension cylinder rear pin wear occur on this equipment?

The rear pin of the extension cylinder is buried deep inside the boom structure. It is impossible to see without removing covers. It is obvious that lack of grease here leads to severe wear. Extend and retract the boom slightly while watching the cylinder. If the cylinder "jumps" or "clunks" before moving, the rear pin eye is ovalized. Listen for banging noises coming from the back of the boom during braking. Check the lubrication lines. Often the long grease tube to the rear pin breaks, leaving the bearing dry for years. HIT Srl supplies extension cylinder pins, spherical bearings, and remote greasing kits. We address the hidden wear points. Ignoring this wear allows the cylinder to rub against the boom plates, thinning the cylinder wall. Schedule a borescope inspection if you suspect wear. Replace parts with HIT Srl stock.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#why-does-boom-extension-cylinder-rear-pin-wear-occur-on-this

How tight should a new spin-on filter's gasket actually be turned?

Before fitting the new filter, clean the seating surface on the mounting head thoroughly and remove any trace of the old sealing gasket if one is still stuck to it, then check that the new filter's own gasket is undamaged and lightly lubricated.

Screw the new filter on by hand only, until the gasket first makes contact with the sealing surface. From there, turn it an additional half to three-quarter turn by hand, and no more — there's no torque wrench step afterward.

The filter's integral gasket ships pre-lubricated with every replacement HIT Srl supplies.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#how-tight-to-fit-new-filter-gasket

When should a hydraulic seal be replaced rather than tightened or reused?

A leak from a soft seal — an O-ring, a grommet, any rubber-based sealing element in a hydraulic circuit — cannot be fixed by tightening the joint harder. If the seal is leaking, the only real fix is replacing it.

During a full cylinder overhaul, replace every seal in the cylinder completely, even the ones that show no visible sign of wear when the cylinder is stripped down.

HIT Srl supplies complete seal kits sized to each cylinder rather than only individual O-rings.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#when-to-replace-vs-reuse-hydraulic-seals

How do you tell which way round a V-type piston seal should face?

On a single-action V-seal fitted with a support ring, the long side of the seal is the side that seals against the static surface — the cylinder bore or piston, whichever isn't moving relative to the seal — while the short side seals against the moving surface, typically the piston rod.

The compressible piston rod seal, a solid rubber profile rather than a shaped V, doesn't have the same directional concern, but it should be levered out and twisted up carefully with a screwdriver.

HIT Srl supplies both seal types as a routine stock item.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#identifying-v-type-piston-seal-orientation

How can the wear state of hydraulic motors and certain pumps be assessed without disassembly, on a mobile harbour crane?

Wear can often be assessed by blow-by capacity, which also applies to a series of control, regulation and check valves. A cylinder that moves slowly under load with the distributor closed indicates that the piston gaskets are faulty or worn.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#how-can-the-wear-state-of-hydraulic-motors-and-certain

Accumulators & Damping

What does maintaining conditioning of hydraulic accumulators for shock absorption during rapid luffing and slewing involve?

Hydraulic accumulators in MHC cranes absorb pressure spikes generated during rapid luffing and slewing. Their performance directly affects hydraulic stability and operator control precision.

Pre-charge pressure must be checked regularly. Low pre-charge reduces accumulator effectiveness, causing pressure fluctuations and sluggish hydraulic response. Technicians should use calibrated nitrogen charging equipment.

Accumulator bladders must be inspected for elasticity and leakage. Salt exposure accelerates rubber degradation. Any sign of oil contamination inside the gas chamber indicates bladder rupture.

Mounting brackets, components HIT Srl stocks, must be checked for vibration damage. Loose brackets cause accumulator resonance, increasing stress on hydraulic lines.

Understanding accumulator behavior ensures smooth multi-axis operation and protects hydraulic components from shock loads.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-does-maintaining-conditioning-of-hydraulic-accumulators

What should be checked when inspecting accumulators and oil?

Hydraulic accumulators — parts HIT Srl supplies — absorb pressure spikes generated during rapid hoisting, luffing, and slewing movements. Their performance directly affects hydraulic stability and operator control precision.

Pre-charge pressure must be checked regularly. Low pre-charge reduces accumulator effectiveness, causing pressure fluctuations and sluggish hydraulic response. Technicians should use calibrated nitrogen charging equipment.

Accumulator bladders must be inspected for elasticity and leakage. Salt exposure accelerates rubber degradation. Any sign of oil contamination inside the gas chamber indicates bladder rupture.

Mounting brackets, components HIT Srl stocks, must be checked for vibration damage. Loose brackets cause accumulator resonance, increasing stress on hydraulic lines.

Environmental conditions significantly influence accumulator behavior. High temperatures reduce gas pressure, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic accumulators requires rigorous inspection, pressure management, structural testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-should-be-checked-when-inspecting-accumulators-and-oil

What should be checked when inspecting transmission and lubrication?

Automatic transmissions, components HIT Srl stocks, use planetary gear sets to provide multiple gear ratios in a compact package. In heavy port machinery, these gear sets endure extreme torque loads, shock loads, and continuous cycling. Understanding gear train stress and fatigue mechanisms is essential for maintaining reliability.

The first pillar is tooth contact stress. Gear teeth experience high contact stress during torque transmission — a part HIT Srl supplies. Repeated stress cycles cause pitting, scuffing, and spalling. Technicians must inspect gear teeth for wear patterns, discoloration, and micro-cracks.

The second pillar is load distribution. Planetary gear sets distribute load across multiple planet gears. Uneven load distribution accelerates wear. Causes include misalignment, worn bearings, and carrier deformation. Technicians must inspect planet gears for uniform wear.

The third pillar is carrier fatigue. The planet carrier supports the planet gears and transmits torque. It experiences bending and torsional stress. Cracks often form around pin bores. Technicians must inspect carriers using dye penetrant or magnetic particle testing.

The fourth pillar is bearing wear. Planet gears rotate on needle or roller bearings. Bearing wear causes misalignment, noise, and vibration. Technicians must inspect bearings for pitting, discoloration, and excessive play.

The fifth pillar is spline wear. Sun gears, planet gears, and carriers use splines to transmit torque. Spline wear causes backlash, noise, and vibration. Technicians must inspect splines for fretting and deformation.

The sixth pillar is lubrication. Gear sets require high-quality oil with extreme-pressure additives. Contaminated or degraded oil accelerates wear. Technicians must maintain correct oil level and replace filters regularly.

The seventh pillar is shock load management. Heavy port machinery frequently experiences shock loads during lifting, reversing, and braking. Shock loads accelerate gear fatigue. Operators must avoid aggressive direction changes.

The eighth pillar is thermal stress. High temperatures reduce oil viscosity and increase wear. Technicians must ensure cooling systems function correctly.

Proper gear train maintenance ensures long-term reliability of automatic transmissions.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-should-be-checked-when-inspecting-transmission-and-lubr-2

What should be checked when inspecting hydraulic accumulator pre-charge check?

Accumulators act as shock absorbers for the hydraulic system (boom damping) and energy storage for the brakes. It is obvious that a machine with flat accumulators, components HIT Srl stocks, is dangerous and uncomfortable to drive. Check the nitrogen pre-charge pressure using a charging kit — on machines of this class, a low-brake-pressure warning typically activates if accumulator pressure drops below around 115 bar. This must be done with zero hydraulic pressure in the system. If the boom bounces violently when carrying a container, the boom suspension accumulators are likely empty or the diaphragm has ruptured. If the brake pedal needs to be pumped to work, the brake accumulators are failed. HIT Srl supplies replacement accumulators (bladder and diaphragm type) and charging kits. We can also recharge your units if the bladder is intact. Inspect the accumulator mounting brackets. They are heavy items and vibration often cracks the clamps. Check for external oil leaks from the gas valve. This indicates the bladder has failed and oil is on the gas side. Properly charged accumulators protect the steel structure of the boom from fatigue cracks.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#what-should-be-checked-when-inspecting-hydraulic-accumulator

Why does hydraulic accumulator bladder failure symptoms occur on this equipment?

Hydraulic accumulators are pressure storage vessels that use a rubber bladder to separate nitrogen gas from hydraulic oil. It is obvious that when the bladder ruptures, the gas escapes into the oil, and the damping function is lost immediately. Drive the machine over a bump. If the suspension feels rock hard and the machine bounces uncontrollably like a rigid cart, the suspension accumulators have failed. The nitrogen cushion is gone. Check the hydraulic oil for foaming. When gas mixes with oil, it creates a milky foam in the tank. This aerated oil causes pumps to whine and actuators to move in a "spongy" manner. Depress the gas valve (Schrader valve) on top of the accumulator (with system pressure zeroed). If oil comes out of the air valve, the bladder is definitely ruptured. HIT Srl supplies replacement bladders, complete accumulators, and nitrogen charging kits. We restore the ride quality and component protection. Inspect the accumulator shell for rust. High pressure (200 bar) inside a rusted shell is a safety hazard. Never weld or drill an accumulator. Replace bladders periodically before they become brittle. Source them from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#why-does-hydraulic-accumulator-bladder-failure-symptoms-occu

How should a failed hydraulic accumulator be safely discarded?

Two independent service manuals agree: accumulators must only be repaired by skilled personnel, and under no circumstances should the outer casing ever be welded, brazed, or drilled.

When checking for leaks on or around an accumulator, use a leak-detection fluid rather than listening or feeling for escaping gas, and never use compressed air to blow dust or residue off clothing that's been near the hydraulic system.

The disposal sequence for a failed accumulator has a specific order: it must first be fully depressurised, and only once pressure has been confirmed at zero should it be punctured, never the reverse.

HIT Srl supplies the accumulator only as a complete factory-sealed replacement, not as a component to be opened or repaired in the field.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#safe-handling-and-disposal-hydraulic-accumulator

How do you correctly check a hydraulic accumulator's charging pressure?

Connect a pressure gauge rated for the circuit — commonly specified as 0-250 bar — to the dedicated measuring outlet on the accumulator charging valve, not to any other convenient hydraulic tapping.

Before starting the engine, confirm the accumulator drain valve is completely closed and its lock ring is tightened. With the drain valve confirmed closed, start the engine and let it idle; the accumulator charging valve should switch to a cooling or standby state once the accumulator reaches full charge, typically within about a minute of idling.

HIT Srl supplies the gauge fitting on the accumulator charging valve and its protective cap separately.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/cylinders-and-seals/#accumulator-charging-pressure-check-procedure

How do you maintain MHC hydraulic pumps to prevent failure?

Hydraulic pumps in Mobile Harbour Cranes operate under extreme pressure and flow demands, supplying energy to hoisting, luffing, slewing, and travel functions. Continuous port operations expose pumps to thermal stress, contamination, and mechanical fatigue. Ensuring pump reliability requires a deep understanding of internal wear mechanisms, fluid behavior, and system dynamics.

Pump efficiency must be monitored through pressure and flow measurements. A gradual decline in efficiency often indicates internal leakage caused by wear on pistons — parts HIT Srl supplies — swash plates, or valve plates. Technicians should compare measured values with baseline performance curves to detect early degradation.

Cavitation is a major threat to pump longevity. It occurs when fluid vaporizes due to low inlet pressure, creating bubbles that collapse violently inside the pump, a component HIT Srl stocks. Cavitation causes pitting on metal surfaces, noise, vibration, and rapid efficiency loss. Technicians must ensure that inlet filters are clean, suction lines are unobstructed, and fluid viscosity is within the recommended range.

Hydraulic fluid quality directly affects pump performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly, with laboratory analysis to detect contamination levels. Water ingress is particularly common in marine environments due to condensation inside the hydraulic tank.

Pump bearings must be inspected for temperature rise and vibration. Excessive heat indicates lubrication failure or bearing fatigue. Vibration analysis tools can detect early signs of bearing degradation, allowing proactive replacement before catastrophic failure.

Environmental conditions significantly influence pump behavior. High ambient temperatures reduce fluid viscosity, increasing internal leakage and reducing pump efficiency. Salt exposure accelerates corrosion on pump housings and connectors.

In summary, maintaining hydraulic pumps requires rigorous monitoring of efficiency, cavitation prevention, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-mhc-hydraulic-pumps-to-prevent-failure

How do you maintain MHC slewing hydraulic motors to prevent failure?

Slewing hydraulic motors provide the torque required to rotate the upper structure of a Mobile Harbour Crane. These motors operate under continuous load cycles, torque peaks, and environmental exposure. Ensuring motor reliability requires a deep understanding of hydraulic behavior, mechanical wear, and thermal dynamics.

Motor housings must be inspected for cracks, corrosion, and deformation. Salt exposure accelerates corrosion, especially around mounting points and sealing surfaces. Any sign of structural degradation must be addressed immediately.

Internal leakage must be monitored through pressure and flow measurements. A gradual decline in motor efficiency often indicates wear on internal components such as pistons — parts HIT Srl supplies — vanes, or valve plates. Technicians should compare measured values with baseline performance curves to detect early degradation.

Cavitation must be prevented by ensuring adequate inlet pressure. Cavitation causes pitting on metal surfaces, noise, vibration, and rapid efficiency loss. Technicians must ensure that inlet filters, components HIT Srl stocks, are clean, suction lines are unobstructed, and fluid viscosity is within the recommended range.

Bearings must be monitored for temperature rise and vibration. Excessive heat indicates lubrication failure or bearing fatigue. Vibration analysis tools can detect early signs of bearing degradation.

Hydraulic fluid quality directly affects motor performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly, with laboratory analysis to detect contamination levels.

Environmental conditions significantly influence motor behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion. Protective coatings must be applied and maintained.

In summary, maintaining slewing hydraulic motors requires rigorous inspection, cavitation prevention, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-mhc-slewing-hydraulic-motors-to-prevent

How do you maintain MHC hydraulic tank breather systems to prevent failure?

Hydraulic tank breather systems regulate air exchange between the hydraulic tank and the environment. These systems prevent pressure buildup and contamination ingress. Maintaining their reliability requires meticulous inspection of filters — parts HIT Srl supplies — seals, and airflow pathways.

Breather filters, components HIT Srl stocks, must be inspected for clogging, contamination, and moisture saturation. Salt exposure accelerates filter degradation. Any filter showing signs of blockage must be replaced immediately.

Breather housings must be inspected for corrosion, pitting, and structural integrity. Salt exposure accelerates corrosion, especially around mounting points and sealing surfaces.

Airflow pathways must be inspected for blockages, contamination, and correct flow. Dust from bulk cargo can infiltrate breather systems, reducing airflow efficiency.

Seals must be inspected for wear, cracking, and deformation. Salt exposure accelerates seal degradation, leading to contamination ingress.

Environmental conditions significantly influence breather behavior. High humidity increases moisture ingress, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic tank breather systems requires rigorous inspection, filter management, airflow verification, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-mhc-hydraulic-tank-breather-systems-to-p

How do you maintain MHC hydraulic suction filtration systems to prevent failure?

Hydraulic suction filtration systems protect pumps from contamination by filtering fluid before it enters the pump inlet. These systems must maintain stable flow, high filtration efficiency, and consistent pressure despite exposure to dust, salt, and high-flow conditions.

Suction filters — parts HIT Srl supplies — must be inspected for clogging, contamination, and structural integrity. Any filter showing signs of blockage must be replaced immediately.

Filter housings must be inspected for corrosion, pitting, and structural integrity. Salt exposure accelerates corrosion, especially around mounting points and sealing surfaces.

Suction lines must be inspected for leaks, deformation, and contamination. Any restriction in suction flow increases cavitation risk.

Environmental conditions significantly influence filtration behavior. High humidity increases moisture ingress, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic suction filtration systems requires rigorous inspection, filter management, flow verification, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-mhc-hydraulic-suction-filtration-systems

How do you maintain reachstacker hydraulic pump groups to prevent failure?

Hydraulic pump groups supply the energy required for lifting, telescoping, steering, and braking functions. These pumps — parts HIT Srl supplies — operate under extreme pressure and flow demands, especially during continuous container handling. Ensuring pump reliability requires a deep understanding of internal wear mechanisms, fluid behavior, and system dynamics.

Pump efficiency must be monitored through pressure and flow measurements. A gradual decline in efficiency often indicates internal leakage caused by wear on pistons, components HIT Srl stocks, swash plates, or valve plates. Technicians should compare measured values with baseline performance curves to detect early degradation.

Cavitation must be prevented by ensuring adequate inlet pressure. Cavitation causes pitting on metal surfaces, noise, vibration, and rapid efficiency loss. Technicians must ensure that inlet filters are clean, suction lines are unobstructed, and fluid viscosity is within the recommended range.

Hydraulic fluid quality directly affects pump performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly, with laboratory analysis to detect contamination levels.

Pump bearings must be monitored for temperature rise and vibration. Excessive heat indicates lubrication failure or bearing fatigue. Vibration analysis tools can detect early signs of bearing degradation.

Environmental conditions significantly influence pump behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on pump housings and connectors.

In summary, maintaining hydraulic pump groups requires rigorous monitoring of efficiency, cavitation prevention, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-hydraulic-pump-groups-to-pr

How do you maintain reachstacker hydraulic steering systems to prevent failure?

Hydraulic steering systems in reachstackers endure extreme pressure fluctuations during tight turning maneuvers, especially when handling heavy containers. These systems must maintain stable pressure, accurate response, and consistent flow despite exposure to contamination, vibration, and temperature fluctuations.

Steering cylinders — parts HIT Srl supplies — must be inspected for rod condition, seal integrity, and pressure stability. Any sign of leakage or rod scoring must be addressed immediately.

Steering valves, components HIT Srl stocks, must be inspected for contamination, wear, and correct response. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking must be serviced.

Hydraulic hoses must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade hose materials over time.

Steering pumps must be inspected for pressure stability and noise. Any irregularity in pump performance indicates internal wear or cavitation.

Environmental conditions significantly influence steering behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic steering systems requires rigorous inspection, pressure testing, contamination control, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-hydraulic-steering-systems

How do you maintain reachstacker variable-displacement hydraulic pumps to prevent failure?

Variable-displacement hydraulic pumps supply the energy required for lifting, telescoping, steering, and braking functions. These pumps — parts HIT Srl supplies — operate under extreme pressure and flow fluctuations, especially during high-speed container handling. Maintaining pump reliability requires a deep understanding of internal wear mechanisms, fluid behavior, and system dynamics.

Pump swash plates must be inspected for scoring, pitting, and uneven wear. These defects indicate contamination or lubrication failure. Technicians should measure swash plate angles and verify that the control mechanism responds smoothly to load-sensing signals.

Piston shoes must be inspected for surface polishing, discoloration, and wear. Any shoe showing signs of overheating must be replaced. The piston barrel must be inspected for scoring and internal leakage. Excessive leakage reduces pump efficiency and increases heat generation.

Pump bearings, components HIT Srl stocks, must be monitored for temperature rise and vibration. Excessive heat indicates lubrication failure or bearing fatigue. Vibration analysis tools can detect early signs of bearing degradation.

Hydraulic fluid quality directly affects pump performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly, with laboratory analysis to detect contamination levels. Technicians should monitor particle counts, water content, and additive depletion.

Cavitation must be prevented by ensuring adequate inlet pressure. Cavitation causes pitting on metal surfaces, noise, vibration, and rapid efficiency loss. Technicians must ensure that inlet filters are clean, suction lines are unobstructed, and fluid viscosity is within the recommended range.

Environmental conditions significantly influence pump behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on pump housings and connectors.

In summary, maintaining variable-displacement hydraulic pumps requires rigorous monitoring of efficiency, cavitation prevention, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-variable-displacement-hydra

How do you maintain reachstacker hydraulic cooling and thermal stabilization systems to prevent failure?

Hydraulic cooling systems dissipate heat generated by pumps, valves — parts HIT Srl supplies — and actuators during lifting, telescoping, and steering operations. These systems operate under extreme thermal stress during continuous container handling. Maintaining cooling efficiency requires meticulous inspection of heat exchangers, fans, coolant quality, and flow pathways.

Hydraulic oil coolers must be inspected for corrosion, fouling, and structural integrity. Dust from bulk cargo accumulates on cooler fins, reducing heat transfer efficiency. Technicians should clean coolers using low-pressure air or water, avoiding fin deformation.

Cooling fans, components HIT Srl stocks, must be inspected for blade integrity, vibration, and speed consistency. Worn bearings or unbalanced blades reduce airflow and increase noise. Technicians should verify fan motor current draw and compare values to baseline specifications.

Hydraulic oil must be inspected for viscosity, contamination, and thermal degradation. High-load cycles generate heat that accelerates oil oxidation. Oil sampling must be performed regularly, with laboratory analysis to detect contamination levels.

Thermostatic valves must be inspected for correct opening temperature. Any irregularity in valve behavior indicates internal wear or contamination. Technicians should verify valve performance using calibrated temperature sensors.

Environmental conditions significantly influence cooling behavior. High ambient temperatures reduce cooling efficiency, while salt exposure accelerates corrosion on cooler housings and connectors.

In summary, maintaining hydraulic cooling systems requires rigorous inspection, thermal testing, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-hydraulic-cooling-and-therm

How do you maintain reachstacker engine lubrication systems to prevent failure?

Engine lubrication systems must maintain stable oil pressure, clean flow, and consistent cooling despite exposure to dust, vibration, and temperature fluctuations. Ensuring reliability requires meticulous inspection of pumps, filters — parts HIT Srl supplies — oil galleries, and pressure regulators.

Oil pumps, components HIT Srl stocks, must be inspected for pressure stability and noise. Any irregularity indicates internal wear or cavitation. Technicians should compare pump output with manufacturer specifications.

Oil filters must be inspected for clogging, contamination, and structural integrity. Dust from bulk cargo infiltrates engine compartments, increasing contamination risk. Technicians should replace filters according to load-based intervals.

Oil coolers must be inspected for corrosion, fouling, and structural integrity. Salt exposure accelerates corrosion on cooler fins and tubes.

Pressure regulators must be inspected for stability and accuracy. Incorrect regulator settings cause unstable oil pressure, leading to bearing wear or overheating.

Environmental conditions significantly influence lubrication behavior. High ambient temperatures reduce oil viscosity, while salt exposure accelerates corrosion.

In summary, maintaining engine lubrication systems requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-engine-lubrication-systems

How do you maintain reachstacker spreader hydraulic telescopic synchronization circuits to prevent failure?

Telescopic synchronization circuits ensure that both sides of the spreader extend and retract evenly. These circuits must maintain precise flow balance despite load variations, contamination, and thermal stress. Maintaining their reliability requires meticulous inspection of flow dividers, check valves — parts HIT Srl supplies — pilot circuits, and hydraulic actuators.

Flow dividers must be inspected for contamination, wear, and correct response. Any imbalance in flow distribution causes uneven telescopic movement.

Check valves, components HIT Srl stocks, must be inspected for sealing integrity. Damaged valve seats cause internal leakage and unstable synchronization.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Hydraulic actuators must be inspected for leakage, pressure stability, and response time. Any delay in actuator movement indicates internal wear or contamination.

Environmental conditions significantly influence synchronization behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining telescopic synchronization circuits requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-spreader-hydraulic-telescop

What should be checked when inspecting spreader and bearing?

Rotation cushioning systems protect the spreader — a part HIT Srl supplies — and boom from shock loads during rotation end-stops. These systems must maintain precise damping characteristics despite contamination, thermal stress, and rapid cycling. Maintaining their reliability requires meticulous inspection of cushioning valves, hydraulic motors, and mechanical stops.

Cushioning valves, components HIT Srl stocks, must be inspected for contamination, wear, and correct response. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency.

Rotation motors must be inspected for temperature rise, noise, and smooth operation. Any irregularity indicates internal wear or contamination.

Mechanical end-stops must be inspected for deformation, cracking, and wear. Damaged stops cause excessive shock loads on the rotation bearing.

Environmental conditions significantly influence damping behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining rotation cushioning systems requires rigorous inspection, hydraulic testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-should-be-checked-when-inspecting-spreader-and-bearing

How do you maintain reachstacker spreader twistlock hydraulic actuators to prevent failure?

Hydraulic actuators rotate the twistlock shafts and must deliver precise, repeatable movement under heavy load. These actuators experience rapid cycling, pressure spikes, and contamination. Maintaining their reliability requires meticulous inspection of seals, pistons — parts HIT Srl supplies — rods, and hydraulic fluid quality.

Actuator rods must be inspected for straightness, chrome integrity, and corrosion. Salt exposure accelerates corrosion, especially around rod seals, components HIT Srl stocks.

Pistons must be inspected for smooth movement and correct sealing. Any delay in actuator movement indicates internal wear or contamination.

Seals must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear.

Hydraulic fluid must be inspected for contamination, viscosity, and water content. Dust infiltrates hydraulic systems, reducing actuator efficiency.

In summary, maintaining twistlock hydraulic actuators requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-reachstacker-spreader-twistlock-hydrauli

How do you maintain diesel engine lubrication system to prevent failure?

The lubrication system is the lifeline of any diesel engine, especially in heavy machinery operating under extreme load conditions. Reachstackers and empty handlers generate high torque and rapid load changes, placing enormous stress on bearings — parts HIT Srl supplies — and camshafts. Straddle carriers operate in continuous duty cycles, causing oil to degrade faster. Forklifts and terminal tractors operate in dusty environments where contaminants infiltrate the crankcase ventilation system. MHC engines run for long periods at steady high loads, requiring oil with exceptional thermal stability. RMG gensets require long-duration lubrication reliability.

Oil selection is critical. Engines must use oil with the correct viscosity, additive package, and thermal stability. High-load machines require oils with strong anti-wear additives and oxidation resistance. Marine cranes require oils resistant to moisture contamination. Yard machines require oils capable of suspending dust particles without sludge formation.

Oil sampling is essential for predictive maintenance. Samples must be analyzed for viscosity, metal content, soot concentration, fuel dilution, and coolant contamination. Metal particles indicate bearing wear, camshaft wear, or piston scuffing. Fuel dilution indicates injector leakage. Coolant contamination indicates head gasket failure or liner cavitation.

Oil filters, components HIT Srl stocks, must be inspected for collapse, bypass valve activation, and contamination. High-load machines generate more soot, requiring frequent filter changes. Technicians must inspect filter media for metal particles and sludge.

Crankcase ventilation systems must be inspected for blockage and oil carryover. Blocked ventilation increases crankcase pressure, causing oil leaks and seal failure. Machines operating in dusty environments require frequent cleaning of ventilation filters.

Oil coolers must be inspected for blockage, corrosion, and internal leakage. Cross-contamination between oil and coolant is a critical failure mode.

In summary, lubrication system maintenance ensures engine longevity, reduces wear, and prevents catastrophic failures across all machine types.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-do-you-maintain-diesel-engine-lubrication-system-to-prev

What should be checked when inspecting lubrication and gearboxes?

Proper lubrication and thermal control are the two most critical factors determining the lifespan and reliability of winch gearboxes in heavy port machinery. These gearboxes operate under extreme torque loads, continuous duty cycles, and harsh environmental conditions. In MHC cranes, winch gearboxes endure long hoisting cycles, dynamic braking, and high thermal stress. In reachstackers and straddle carriers, auxiliary winch gearboxes support maintenance lifting and specialized attachments, often in dusty or abrasive environments. Forklifts may use smaller winch gearboxes for auxiliary lifting, where contamination and overheating remain significant risks. Effective lubrication and thermal management prevent wear, reduce friction, and ensure stable operation under load.

The first pillar of lubrication maintenance is selecting the correct oil type. Winch gearboxes typically require high-viscosity gear oils with extreme-pressure (EP) additives, anti-wear agents, and oxidation inhibitors. In planetary gearboxes, synthetic oils are often preferred due to their superior thermal stability and resistance to shear degradation. In MHC cranes, synthetic oils are essential because of long duty cycles and high ambient temperatures. In reachstackers and straddle carriers, mineral oils may be used, but only if operating conditions remain moderate. Forklifts often use compact gearboxes that benefit from synthetic oils to reduce heat buildup.

The second pillar is maintaining correct oil level. Low oil level causes inadequate lubrication, overheating, and accelerated wear. High oil level causes foaming, aeration, and pressure buildup. Technicians must check oil level with the machine positioned correctly, as tilt affects readings. In MHC cranes, large gearboxes require multiple level checks at different inspection ports. In reachstackers and straddle carriers, compact auxiliary gearboxes require precise level control due to small oil volumes. Forklifts require frequent checks because small leaks quickly reduce oil level.

The third pillar is oil contamination control. Contaminants such as dust, water, metal particles, and degraded oil residues accelerate wear and cause lubrication failure. Technicians must inspect breathers, seals, components HIT Srl stocks, and gaskets to prevent contamination ingress. In MHC cranes, salt contamination is a major threat, requiring sealed breathers and corrosion-resistant seals. In reachstackers and straddle carriers, dust contamination is common due to yard conditions. Forklifts operating indoors accumulate fine dust that enters through worn breathers. Oil sampling must be performed regularly to monitor contamination levels.

The fourth pillar is oil analysis. Oil analysis provides critical information about gearbox health. Particle count reveals wear rates and contamination. Spectrometric analysis identifies metal types, indicating which components are wearing. Water content indicates seal failure or condensation. Viscosity analysis reveals oil degradation. In MHC cranes, oil analysis is essential due to long duty cycles and high thermal loads. In reachstackers and straddle carriers, oil analysis helps detect early wear caused by shock loads. In forklifts, oil analysis identifies overheating and contamination in compact gearboxes.

The fifth pillar is oil change intervals. Oil must be replaced based on operating hours, contamination levels, and thermal stress. Synthetic oils last longer but must still be replaced when additive packages degrade. In MHC cranes, oil change intervals are shorter due to high load cycles. In reachstackers and straddle carriers, intervals depend on dust exposure and load frequency. In forklifts, intervals are shorter due to small oil volumes and high thermal cycling.

The sixth pillar is thermal management. Winch gearboxes generate significant heat due to friction, load, and braking. Overheating accelerates wear, degrades oil, and causes seal failure. Technicians must inspect cooling systems, including oil coolers, heat exchangers, and airflow paths. In MHC cranes, large oil coolers must be cleaned regularly to remove salt and debris. In reachstackers and straddle carriers, auxiliary gearboxes rely on passive cooling, making oil selection critical. In forklifts, compact engine bays restrict airflow, requiring frequent cleaning of cooling ducts.

The seventh pillar is temperature monitoring. Gearbox temperature must be monitored using sensors — parts HIT Srl supplies — or infrared thermography. Sudden temperature spikes indicate lubrication failure, bearing wear, or overload. In MHC cranes, temperature sensors must be calibrated regularly. In reachstackers and straddle carriers, thermal monitoring helps detect early failure in auxiliary gearboxes. In forklifts, thermal monitoring identifies airflow restrictions.

The eighth pillar is seal and breather maintenance. Seals prevent oil leakage and contamination ingress. Breathers allow pressure equalization. Technicians must inspect seals for wear, hardening, and cracking. Breathers must be cleaned or replaced regularly. In marine environments, sealed breathers are essential.

Effective lubrication and thermal management ensure long-term reliability of winch gearboxes in heavy port machinery. By integrating correct oil selection, contamination control, oil analysis, thermal monitoring, and seal maintenance, technicians can prevent premature failure and ensure safe lifting operations.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-should-be-checked-when-inspecting-lubrication-and-gearb

What should be checked when inspecting transmission and solenoids?

Cooling and contamination control are the two most critical factors affecting the lifespan of automatic transmissions in heavy port machinery. This type of transmission relies on clean, cool oil to operate clutches, solenoids, and torque converters — parts HIT Srl supplies. Overheating and contamination are responsible for more than 70% of transmission failures in reachstackers, straddle carriers, forklifts, and terminal tractors.

The first pillar is cooler inspection. Oil coolers must be inspected for blockages, leaks, and correct flow. In reachstackers and straddle carriers, coolers clog with dust and require frequent cleaning. In terminal tractors, coolers suffer from road debris. In MHC cranes, coolers must be protected from salt exposure.

The second pillar is thermostatic valve maintenance. Thermostatic valves regulate oil flow to the cooler. Stuck valves, components HIT Srl stocks, cause overheating or overcooling. Technicians must inspect valves for wear, contamination, and correct opening temperature.

The third pillar is filter maintenance. Automatic transmissions use suction, pressure, and return filters. Clogged filters restrict flow and cause pressure drops. Technicians must replace filters at recommended intervals and inspect them for metal particles.

The fourth pillar is breather maintenance. Breathers allow pressure equalization. Clogged breathers cause pressure buildup and seal failure. In dusty environments, breathers must be replaced frequently.

The fifth pillar is oil sampling. Oil analysis reveals contamination, oxidation, and additive depletion. Technicians must sample oil regularly to detect early wear.

The sixth pillar is seal inspection. Seals prevent oil leakage and contamination ingress. Technicians must inspect seals for wear, hardening, and cracking.

The seventh pillar is pump inspection. The transmission pump supplies pressure to clutches and valves. Pump wear causes pressure drops and slipping.

The eighth pillar is cooling airflow management. Technicians must ensure that airflow paths are clear. In forklifts, compact engine bays restrict airflow.

Proper cooling and contamination control ensure long-term reliability of automatic transmissions.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-should-be-checked-when-inspecting-transmission-and-sole-2

What does maintaining hydraulic tank suction strainer condition involve?

Deep inside the hydraulic tank, the suction strainer protects the main pumps from large debris. Unlike the return filter, this strainer is often ignored because it is hard to reach. It is obvious that a blocked suction strainer creates a vacuum that destroys pumps via cavitation. If you hear a "gravel" noise from the pumps, drain the hydraulic tank and inspect the suction strainer immediately. It may be clogged with rags, plastic, or sludge. Clean the strainer mesh carefully. If there are holes in the mesh, large particles will pass through and wreck the expensive piston pumps. Replace the strainer if damaged. Check the O-ring seal on the strainer connection. An air leak here will cause the oil to foam, leading to spongy hydraulics and pump damage. When changing hydraulic oil, it is the perfect time to remove and clean this component. HIT Srl emphasizes the importance of hydraulic hygiene. We supply suction strainers, return filters, and high-pressure filters for all hydraulic circuits. Inspect the magnets in the tank (often near the strainer). They trap ferrous metal particles. A "furry" magnet indicates component wear upstream. Do not bypass the strainer to "fix" a cavitation problem; you are simply allowing debris to destroy the pump. Protect your hydraulic investment with filtration solutions from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-does-maintaining-hydraulic-tank-suction-strainer-condit

What makes a hydraulic filter's by-pass valve open, and at what pressure?

On this class of filter head, the by-pass valve is set to open at a differential pressure of about 7 bar across the filter element — meaning it takes a 7 bar pressure drop between the filter's inlet and outlet sides before the valve unseats and lets oil bypass the filter media entirely.

Two separate conditions can push that pressure drop up to the opening point. The first is a cold start or a wrong-viscosity oil: the by-pass will open briefly during warm-up on a normal, healthy filter, and this is expected behaviour, not a fault. The second is a genuinely clogged filter element: the valve's opening area increases progressively as the clogging gets worse, allowing more oil to skip filtration rather than snapping fully open or staying shut.

HIT Srl supplies the filter cartridge for this filter head.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#hydraulic-filter-bypass-valve-opening-pressure

How often should transmission oil and its filter actually be changed?

One schedule calls for the filter every 500 operating hours and the oil every 1,500; another, for a different driveline configuration, calls for the transmission oil to be changed every 1,000 hours or once a year, whichever comes first, and treats the filter as consumed on the same visit.

Transmission oil level should always read on the FULL mark. Before any oil-change service, let the transmission cool down first — draining hot transmission fluid is a burn risk.

HIT Srl stocks the transmission oil filter as a routine consumable separate from the oil itself.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#transmission-oil-and-filter-change-intervals

What is the correct sequence for changing a hydraulic oil filter?

Before draining any oil, confirm it's at normal working temperature.

With a receptacle in place under the drain plug, remove the cover plate, lift the filter cartridge out, and let it drain fully into the receptacle before handling it further; spent filter media counts as environmentally hazardous waste. Fit the new cartridge and the cover, and only then refill the tank — filters go in before oil goes in, not after.

A separate breather filter on the tank follows its own step: once removed, spray roughly 300-500 ml of hydraulic fluid into the filter connection before refitting it.

HIT Srl supplies the filter cartridge, its O-ring seals, and the breather filter element as a matched set.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#hydraulic-oil-filter-changing-procedure

How does a hydraulic oil cooling circuit protect itself from overheating?

On machines where the service brakes are hydraulically cooled, on some configurations the brake circuit and the working hydraulics share the entire fluid volume, rather than a separate loop. Machines with a genuinely separate tank for the brake system instead run two independent oil coolers, one per circuit.

An electrically powered fan increases airflow through the cooler whenever a temperature sensor in the hydraulic oil calls for it, and if the resistance through the cooler and its filters becomes too high, a by-pass valve routes oil straight back to the tank rather than forcing it through a restricted cooler. The sensor monitoring hydraulic oil temperature is itself supervised: a sensor fault is flagged if the reported value goes above 138°C or below -30°C — machine operation can continue despite this specific fault code, unlike a genuine over-temperature warning.

The fluid itself needs to meet a viscosity-grade specification (commonly referenced against DIN 51524 HVLP/HLP 46-68 or the equivalent ISO 6743/4 classification) rather than "any hydraulic oil."

HIT Srl stocks the cooling fan motor and the by-pass valve separately, rather than only as part of a complete cooler assembly.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#hydraulic-oil-cooling-circuit-and-grade

What are the most common mistakes when handling hot hydraulic fluid?

If hydraulic oil temperature has been over 100°C for more than about 40 seconds, don't use any hydraulic function again until the temperature has dropped back below 70°C.

Never use bare fingers to check for a hydraulic leak.

On machines with a separate hydraulic tank for the brake circuit, never add any additive to the fluid in that tank.

HIT Srl supplies the seals and hoses that keep the circuit sealed.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#common-hydraulic-fluid-handling-mistakes

When should hydraulic oil be changed for the first time on a new machine?

The first hydraulic oil change on a new machine is scheduled much earlier than the routine interval that follows it: after roughly the first 500 operating hours, not at whatever the standard multi-thousand-hour change interval happens to be for this fluid grade.

Between changes, hydraulic oil level still needs a routine check — roughly once a week is the standard cadence — and any top-up has to use the same oil already in the tank, not merely "a" hydraulic oil of similar viscosity.

HIT Srl supplies the hydraulic oil to the correct specification for topping up between changes.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#hydraulic-oil-first-change-interval

Why does transmission oil need to reach a specific temperature before certain checks?

Before checking transmission oil temperature through the operating menu, warm the transmission up until the oil temperature reads between 63°C and 73°C.

A function test of the machine's adaptive drive-response system has a stricter dual precondition: the transmission needs to be holding at least 60°C and the hydraulic oil needs to be at least 30°C before the test is considered valid.

Never overfill the transmission while topping it up warm.

HIT Srl supplies the temperature sensors feeding both the transmission and hydraulic oil readings as direct-fit replacements.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#transmission-warm-up-temperature-before-service

What should be checked before starting work on the hydraulic system of a rubber tyred gantry crane?

Turn the hydraulic system off and cut off main power. Use a pressure gauge to check that there is no residual pressure in the hydraulic system before starting work on the hydraulics.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-should-be-checked-before-starting-work-on-the

Why must entrained air be kept out of a crane's hydraulic system?

Air entrained in the hydraulic system causes cavitation erosion of components, increases compressibility and operational instability, reduces work efficiency, and can make the actuator move in a jerky ("crawling") manner. Air also accelerates oxidation and deterioration of the oil.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#why-must-entrained-air-be-kept-out-of-a-crane-s-hydraulic

What happens if a crane's hydraulic oil contains excessive water, and what is the remedy?

If the oil contains excessive water, this corrodes the hydraulic elements, emulsifies and degrades the oil, reduces the toughness of the lubricating film, and speeds up wear. If the water content exceeds the standard limit, the hydraulic system needs to be cleaned thoroughly and the oil replaced.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-happens-if-a-crane-s-hydraulic-oil-contains-excessive

Why is there increased danger during repair or maintenance work on a mobile harbour crane's luffing or stabilizer hydraulic circuits?

When repair or maintenance work is carried out on the luffing gear or stabilizer hydraulic circuits, there is a greater danger of accidents from locked-in pressure remaining in the circuit.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#why-is-there-increased-danger-during-repair-or-maintenance

What is the most frequent cause of failure in a spreader's oleodynamic (hydraulic) system, and how is it prevented?

The oleodynamic system, once correctly assembled and commissioned, can work trouble-free for a long period without specific maintenance. However, the most frequent troubles arise from seizure or breakage of components from wear or aging of the hydraulic fluid. It is therefore important to schedule constant checks of fluid quality and condition for each power centre or component.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-is-the-most-frequent-cause-of-failure-in-a-spreader-s

What are the probable causes and remedies for oil leaks from pipe fittings, or from hydraulic actuators, on a telescopic spreader?

Oil leaks from pipe fittings: probable cause is loosened fittings (tighten the fittings) or defective seals (replace the seals). Oil leaks from hydraulic actuators, inward or outward: probable cause is worn or defective seals (replace the seal kit).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-are-the-probable-causes-and-remedies-for-oil-leaks

How often should the hydraulic oil and oil filter be changed on a telescopic spreader's hydraulic unit?

Change the hydraulic oil after the first 50 hours, then every 1000 hours. Change the oil filter after the first 50 hours, then every 1000 operating hours, or whenever the filter indicator shows red.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#how-often-should-the-hydraulic-oil-and-oil-filter-be

Which hydraulic-system fault conditions are individually monitored by the electronic control system on a mobile harbour crane?

The control system distinguishes several hydraulic-system fault conditions by dedicated alarm codes, each naming a specific cause: clogged boost filter, clogged oil return filter, clogged hydraulic oil conditioning filter, clogged coupler pumps filter, clogged pilot pumps filter, low hydraulic oil level, wrong position of the hydraulic oil taps, and high temperature at each of the hydraulic oil heat exchangers (reported separately per exchanger).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#which-hydraulic-system-fault-conditions-are-individually

What can cause an increase in hydraulic oil operating temperature on a mobile harbour crane's hydraulic system?

An increase in oil temperature can be caused by: low efficiency of the heat exchanger (dirty surface or faulty ventilator); increased heat accumulation in the pumps and hydraulic motors due to bearing damage; low heat dispersion from the tank, pipes and components due to deposits of polluting agents; increased internal blow-by in individual components; or pressure-limiting valves engaging at too low a pressure.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#what-can-cause-an-increase-in-hydraulic-oil-operating

Why should hydraulic filters with a blockage indicator be used, rather than plain cartridges, on a mobile harbour crane?

A blocked multilayer filter cartridge cannot be seen as blocked with the naked eye; the severity of the blockage can only be assessed from the pressure difference between upstream and downstream. Filters able to optically or electrically indicate maximum blockage should therefore be used; if filters without such an indicator are used instead, the cartridge must be replaced at fairly short intervals to be certain of avoiding the bypass valve opening or the cartridge being destroyed.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#why-should-hydraulic-filters-with-a-blockage-indicator-be

Why must new hydraulic fluid be filtered before being added to a mobile harbour crane's hydraulic system, even fluid supplied as new?

New fluid in supply condition is not normally suitable for pouring directly into the hydraulic system, due to the large quantity of pollutants it contains; the degree of purification of new fluid cannot be guaranteed because of the often very long transport chain from production to use (storage tanks, tankers, tank trucks, various containers). All new fluid, whether for topping up or a total replacement, must be passed through a filter whose pore size at least matches that of the filters fitted to the system.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/filtration-and-fluid/#why-must-new-hydraulic-fluid-be-filtered-before-being-added

Pumps & Power

What commonly causes failure or wear in hydraulic fluid and hydraulic pumps?

Hydraulic pumps — parts HIT Srl supplies — are the heart of mobile lifting systems, providing the pressure and flow required to operate cylinders, motors, and control valves. During continuous high-demand operation —such as long-duration hoisting, telescoping, or luffing—the pump experiences increased mechanical and thermal stress. Understanding the engineering behavior of hydraulic pumps under these conditions is essential for ensuring reliability and preventing failure.

Hydraulic pumps, components HIT Srl stocks, generate pressure by forcing fluid through the circuit. During high-demand operation, the pump must deliver consistent pressure and flow. Engineers design pumps with high-strength materials and precision-machined components to withstand continuous stress. Pump displacement and rotational speed determine flow rate, while internal clearances influence efficiency.

Heat generation is a major concern during continuous operation. As pressure increases, hydraulic fluid heats up. High temperatures reduce fluid viscosity, increasing internal leakage and reducing efficiency. Engineers incorporate cooling systems to maintain stable fluid temperature. Heat exchangers, fans, and temperature sensors help prevent overheating.

Cavitation is another risk during high-demand operation. Cavitation occurs when fluid pressure drops below vapor pressure, causing vapor bubbles to form. When these bubbles collapse, they generate shock waves that damage pump components. Engineers design hydraulic circuits with proper inlet conditions to prevent cavitation. Operators must avoid sudden changes in flow that can cause pressure drops.

Wear is inevitable during continuous operation. Pump components such as gears, pistons, and vanes experience friction and fatigue. Engineers use surface treatments and lubrication pathways to reduce wear. Regular maintenance helps identify wear before it leads to failure.

Environmental conditions influence pump behavior. Temperature affects fluid viscosity, while dust and debris can contaminate the system. Proper filtration is essential to prevent contamination. Operators must monitor pump performance and adjust operations accordingly.

Understanding the engineering behavior of hydraulic pumps under continuous high-demand operation helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-commonly-causes-failure-or-wear-in-hydraulic-fluid-and

How do you maintain MHC hydraulic pump drive couplings to prevent failure?

Hydraulic pump drive couplings transmit torque from the engine or electric motor to the hydraulic pump — a part HIT Srl supplies. These couplings operate under continuous high-load conditions, experiencing torsional stress, vibration, and thermal expansion. Maintaining their integrity requires meticulous inspection of alignment, wear, and structural condition.

Coupling elements must be inspected for cracking, deformation, and wear. Elastomeric elements degrade over time due to heat, oil exposure, and vibration. Any element showing signs of hardening or cracking must be replaced.

Coupling hubs must be inspected for corrosion, pitting, and structural integrity. Salt exposure accelerates corrosion, especially around keyways and mounting surfaces.

Alignment must be verified using laser tools. Misalignment increases torsional stress on the pump shaft and accelerates wear. Any deviation from manufacturer specifications must be corrected.

Bolted connections must be checked for torque retention. Vibration and thermal expansion can cause bolt relaxation. Technicians should verify preload values using calibrated torque tools.

Environmental conditions significantly influence coupling behavior. High ambient temperatures reduce elastomer elasticity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic pump drive couplings requires rigorous inspection, alignment verification, structural testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#how-do-you-maintain-mhc-hydraulic-pump-drive-couplings-to-pr

How do you maintain hydrostatic pumps to prevent failure?

Hydrostatic pumps, components HIT Srl stocks, are the heart of closed-loop hydraulic drive systems used in many types of heavy port machinery. These pumps convert mechanical power into hydraulic energy with extremely high precision, enabling smooth propulsion, controlled lifting, and responsive steering. Machines such as reachstackers, straddle carriers, forklifts, and especially MHC cranes rely on hydrostatic pumps for critical functions where failure is not an option. Because these pumps operate under high pressure, high temperature, and continuous load cycles, their maintenance requires a disciplined, engineering-driven approach.

Hydrostatic pumps used in port machinery are typically axial piston pumps — parts HIT Srl supplies — either swashplate or bent-axis design. These pumps provide variable displacement, allowing the machine to modulate flow and pressure dynamically. In reachstackers and straddle carriers, hydrostatic pumps often drive the travel motors, enabling precise low-speed maneuvering and high torque. In forklifts, hydrostatic pumps may power both propulsion and mast hydraulics. In MHC cranes, hydrostatic pumps are used in auxiliary systems, slewing drives, and sometimes in closed-loop winch circuits.

The first pillar of hydrostatic pump maintenance is fluid quality control. These pumps operate with extremely tight tolerances—piston-to-barrel clearances measured in microns. Any contamination, even particles invisible to the naked eye, causes scoring, wear, and loss of volumetric efficiency. Maintenance teams must enforce strict filtration standards, using high-efficiency filters with correct beta ratings. Oil sampling must be performed regularly to check for particle count, water contamination, oxidation, and additive depletion. Machines operating in dusty yards or marine environments require more frequent sampling. Water contamination is especially dangerous, as it causes cavitation, corrosion, and breakdown of lubricating films. In MHC cranes, where hydraulic tanks are large and exposed to humidity, desiccant breathers and tank heaters are essential.

The second pillar is case drain monitoring. Hydrostatic pumps have a case drain line that returns leakage oil to the tank. This leakage is normal and necessary for lubrication, but excessive case drain flow indicates internal wear. Technicians must measure case drain flow under controlled conditions and compare it to manufacturer specifications. A sudden increase in case drain flow indicates piston shoe wear, barrel scoring, or valve plate erosion. In reachstackers and straddle carriers, where pumps operate under high load cycles, case drain monitoring is one of the most effective early-warning tools.

The third pillar is temperature management. Hydrostatic pumps generate heat due to internal leakage and friction. If the hydraulic oil overheats, viscosity drops, lubrication fails, and wear accelerates. Machines with compact engine bays, such as forklifts and reachstackers, are especially vulnerable to heat buildup. Maintenance teams must inspect coolers, thermostatic valves, and airflow paths. On MHC cranes, cooler bundles must be cleaned regularly to remove salt, dust, and oil residue. Temperature sensors must be calibrated to ensure accurate monitoring. Any pump operating consistently above recommended temperature limits will suffer rapid degradation.

The fourth pillar is mechanical inspection and alignment. Pump shafts, couplings, and mounting surfaces must be inspected for misalignment, vibration, and wear. Misalignment causes bearing failure, shaft seal leakage, and premature pump failure. In straddle carriers, where the pump is mounted on a vibrating chassis, alignment must be checked after any structural repair. In forklifts, compact mounting arrangements often lead to misalignment if the engine mounts deteriorate. Shaft seals must be inspected for leakage, as seal failure allows air ingress, causing cavitation and loss of efficiency.

The fifth pillar is control system verification. Hydrostatic pumps rely on electronic or hydraulic control mechanisms to adjust displacement. These include pressure compensators, load-sensing controls, electronic displacement controllers, and torque limiters. Technicians must verify that control signals are stable, connectors are clean, and sensors are calibrated. In reachstackers, incorrect displacement control leads to jerky travel or sluggish response. In MHC cranes, incorrect control settings can overload the prime mover or destabilize hoisting operations.

Finally, functional testing is essential. Pumps must be tested under load, not just at idle. Technicians must monitor pressure rise time, flow stability, noise levels, and temperature behavior. Any abnormal noise—

whining, rattling, or knocking—indicates cavitation, bearing wear, or piston damage. Vibration analysis can detect early bearing failure. Flow meters and pressure transducers must be used to verify pump performance against specifications.

Maintaining hydrostatic pumps in heavy port machinery requires a systematic approach combining fluid management, case drain monitoring, temperature control, mechanical alignment, control system verification, and functional testing. These pumps are precision machines operating under extreme conditions, and their reliability directly determines the performance of propulsion, lifting, and steering systems across all major port equipment.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#how-do-you-maintain-hydrostatic-pumps-to-prevent-failure

How do you maintain gear pumps to prevent failure?

Gear pumps — parts HIT Srl supplies — are among the most widely used hydraulic pumps in heavy port machinery due to their simplicity, robustness, and ability to operate reliably under harsh conditions. Unlike hydrostatic axial piston pumps, which provide variable displacement and high precision, gear pumps are typically fixed-displacement units designed for continuous, rugged service. They supply hydraulic flow for steering, cooling circuits, lubrication systems, auxiliary functions, and in some machines even primary hydraulic circuits. Their reliability is essential for the safe and efficient operation of MHC cranes, reachstackers, straddle carriers, and forklifts. Proper maintenance ensures long service life, stable hydraulic performance, and prevention of catastrophic failures.

Gear pumps, components HIT Srl stocks, operate by trapping hydraulic fluid between the teeth of two meshing gears and the pump housing. As the gears rotate, fluid is carried from the inlet to the outlet, generating flow. Because the design has few moving parts, gear pumps tolerate contamination better than piston pumps, but they are still vulnerable to wear, cavitation, overheating, and misalignment. Maintenance must therefore focus on fluid quality, mechanical integrity, temperature control, and early detection of wear.

The first pillar of gear pump maintenance is fluid cleanliness. Although gear pumps are more forgiving than hydrostatic pumps, contamination still causes accelerated wear of gear teeth, bushings, and housing surfaces. Abrasive particles create scoring, increase internal leakage, and reduce volumetric efficiency. Maintenance teams must ensure that hydraulic filters are replaced at correct intervals and that filter elements meet the manufacturer’s micron rating. Oil sampling should be performed regularly to monitor particle count, water contamination, and oxidation. Machines operating in dusty yards—such as reachstackers and straddle carriers—require more frequent sampling. Forklifts, which often operate indoors but in dirty environments, accumulate fine dust that enters hydraulic tanks through breather caps. MHC cranes, exposed to marine environments, require desiccant breathers to prevent moisture ingress.

The second pillar is cavitation prevention. Gear pumps are particularly sensitive to cavitation because the collapsing vapor bubbles erode gear teeth and housing surfaces. Cavitation occurs when inlet pressure drops too low due to clogged filters, collapsed suction hoses, excessive oil viscosity, or high pump speed. Maintenance teams must inspect suction lines for cracks, soft spots, and restrictions. Suction strainers must be cleaned or replaced. Cold-start procedures must be followed to avoid running the pump at high speed before oil reaches operating temperature. In MHC cranes, long suction lines and large tanks increase the risk of cavitation if oil levels drop too low or if breather systems malfunction.

The third pillar is temperature management. Gear pumps generate heat due to internal leakage and mechanical friction. Excessive temperature accelerates wear, reduces oil viscosity, and causes seal failure. Maintenance teams must inspect coolers, thermostatic valves, and airflow paths. On reachstackers and straddle carriers, hydraulic coolers often become clogged with dust, requiring regular cleaning. On forklifts, compact engine bays restrict airflow, making cooler maintenance essential. MHC cranes require cooler bundles to be cleaned frequently due to salt and airborne contaminants. Temperature sensors must be calibrated to ensure accurate monitoring.

The fourth pillar is mechanical inspection. Gear pumps rely on precise clearances between gears and housing surfaces. Wear increases internal leakage, reduces flow, and causes noise. Technicians must listen for abnormal sounds such as whining, grinding, or rattling, which indicate wear or cavitation. Pump shafts must be inspected for misalignment, which causes bearing failure and seal leakage. Couplings must be checked for wear, cracks, and correct alignment. In straddle carriers, where pumps are mounted on vibrating structures, alignment must be checked after any structural repair. In forklifts, worn engine mounts often cause misalignment between the engine and pump.

The fifth pillar is seal and bushing inspection. Gear pumps use shaft seals and bushings that wear over time. Seal failure leads to external leakage and air ingress, which causes cavitation and loss of efficiency. Bushings wear due to contamination, misalignment, or inadequate lubrication. Maintenance teams must inspect seals for hardening, cracking, and leakage. Bushings must be checked for excessive play, which indicates internal wear. In MHC cranes, salt exposure accelerates seal degradation, requiring more frequent inspection.

The sixth pillar is pressure and flow testing. Gear pumps must be tested under load to verify performance. Technicians must measure flow at operating pressure and compare it to specifications. Reduced flow indicates internal wear or bypassing. Pressure relief valves must be tested to ensure correct opening pressure. In reachstackers and straddle carriers, insufficient flow causes slow boom movement, weak steering, and overheating. In forklifts, reduced flow affects mast lifting speed and steering response.

The seventh pillar is system integration checks. Gear pumps often supply multiple circuits simultaneously. Technicians must verify that priority valves, flow dividers, and load-sensing valves function correctly. Incorrect valve operation can overload the pump or starve critical functions. In MHC cranes, auxiliary gear pumps supply lubrication and cooling circuits that are essential for safe operation. Any malfunction in these circuits can lead to overheating or mechanical failure.

Maintaining gear pumps in heavy port machinery requires a disciplined approach that includes fluid management, cavitation prevention, temperature control, mechanical inspection, seal maintenance, performance testing, and system integration checks. These pumps are simple but critical components whose reliability directly affects steering, lifting, cooling, and auxiliary functions across all major port equipment.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#how-do-you-maintain-gear-pumps-to-prevent-failure

What should be checked when inspecting control system and lubrication?

Closed-loop hydrostatic drive pumps, components HIT Srl stocks, are among the most critical hydraulic components in heavy port machinery. Unlike open-loop pumps, which simply supply flow to various actuators, closed-loop hydrostatic pumps directly power propulsion systems, travel motors, slewing drives, and high-precision movement circuits. Their failure results not only in loss of performance but in complete immobilization of the machine. Reachstackers, straddle carriers, forklifts, and MHC cranes all rely on hydrostatic pumps for propulsion, steering, or auxiliary closed-loop functions. Because these pumps operate under extreme pressure, high thermal load, and continuous dynamic cycling, their maintenance requires a highly structured, engineering-driven approach.

Hydrostatic pumps in these machines are typically axial piston pumps with variable displacement. They operate in a closed circuit, where the pump outlet feeds the motor directly, and the motor return feeds back into the pump inlet. This configuration allows precise control of speed and torque but also means that contamination, overheating, or wear circulates continuously through the system unless properly managed. The first priority in maintaining these pumps — parts HIT Srl supplies — is contamination control. Closed-loop systems require filtration on both the charge pump circuit and the case drain return. Charge filters must be inspected and replaced at strict intervals, as they are the only barrier preventing contaminants from entering the pump barrel, pistons, and valve plate. Oil sampling must be performed regularly, with particle counts compared against ISO cleanliness codes. Even small increases in contamination accelerate wear on piston shoes, swashplate surfaces, and bearings. Machines operating in dusty yards—such as reachstackers and straddle carriers—require more frequent sampling. Forklifts, which often operate in confined spaces with high dust concentration, also require strict contamination control. MHC cranes, exposed to marine environments, must be monitored for water contamination, which causes cavitation, corrosion, and breakdown of lubricating films.

The second pillar of maintenance is charge pressure verification. Closed-loop hydrostatic pumps rely on a charge pump to maintain positive pressure at the pump inlet. If charge pressure drops too low, cavitation occurs, causing catastrophic damage to pistons, valve plates, and bearings. Technicians must measure charge pressure at various operating conditions—idle, full displacement, and high load. Any deviation from manufacturer specifications indicates charge pump wear, clogged filters, leaking check valves, or internal bypassing. In reachstackers, low charge pressure causes jerky travel, slow acceleration, and overheating. In straddle carriers, it leads to unstable steering and reduced travel speed. In forklifts, it causes sluggish response and excessive noise. In MHC cranes, low charge pressure destabilizes slewing drives and winch circuits.

The third pillar is case drain flow monitoring. Hydrostatic pumps rely on internal leakage for lubrication and cooling. This leakage returns to the tank through the case drain line. Excessive case drain flow indicates internal wear, such as piston shoe degradation, barrel scoring, or valve plate erosion. Technicians must measure case drain flow under controlled conditions and compare it to baseline values. A sudden increase in case drain flow is one of the earliest indicators of pump failure. In reachstackers and straddle carriers, where pumps operate under high load cycles, case drain monitoring is essential for predictive maintenance. In forklifts, case drain monitoring helps detect early wear caused by overheating in compact engine bays. In MHC cranes, case drain monitoring is critical due to long duty cycles and high thermal loads.

The fourth pillar is temperature management. Hydrostatic pumps generate significant heat due to internal leakage and friction. If hydraulic oil overheats, viscosity drops, lubrication fails, and wear accelerates. Technicians must inspect coolers, thermostatic valves, and airflow paths. On reachstackers and straddle carriers, hydraulic coolers often become clogged with dust and must be cleaned regularly. On forklifts, compact engine compartments restrict airflow, making cooler maintenance essential. On MHC cranes, cooler bundles must be cleaned frequently to remove salt, dust, and oil residue. Temperature sensors must be calibrated to ensure accurate monitoring. Any pump operating consistently above recommended temperature limits will suffer rapid degradation.

The fifth pillar is mechanical alignment and mounting integrity. Hydrostatic pumps are typically flange-mounted to the engine or gearbox. Misalignment causes bearing failure, shaft seal leakage, and premature pump failure. Technicians must inspect couplings, mounting bolts, and alignment surfaces. In straddle carriers, where pumps are mounted on vibrating structures, alignment must be checked after any structural repair. In forklifts, worn engine mounts often cause misalignment between the engine and pump. In MHC cranes, large pump assemblies require precise alignment to prevent shaft fatigue.

The sixth pillar is control system verification. Hydrostatic pumps rely on electronic or hydraulic control mechanisms to adjust displacement. These include pressure compensators, electronic displacement controllers, and torque limiters. Technicians must verify that control signals are stable, connectors are clean, and sensors are calibrated. In reachstackers, incorrect displacement control leads to jerky travel or sluggish response. In straddle carriers, it causes unstable steering and poor acceleration. In forklifts, it results in inconsistent travel speed. In MHC cranes, incorrect control settings can overload the prime mover or destabilize slewing operations.

The final pillar is functional testing under load. Hydrostatic pumps must be tested under real operating conditions. Technicians must monitor pressure rise time, flow stability, noise levels, and temperature behavior. Any abnormal noise—whining, rattling, or knocking—indicates cavitation, bearing wear, or piston damage. Vibration analysis can detect early bearing failure. Flow meters and pressure transducers must be used to verify pump performance against specifications.

Maintaining closed-loop hydrostatic pumps in heavy port machinery requires a comprehensive approach combining contamination control, charge pressure verification, case drain monitoring, temperature management, mechanical alignment, control system verification, and functional testing. These pumps are precision machines operating under extreme conditions, and their reliability directly determines the performance of propulsion, steering, and lifting systems across all major port equipment.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-should-be-checked-when-inspecting-control-system-and-lu

What should be checked when inspecting hydraulic pumps and control system?

Effective maintenance of hydraulic pumps—both hydrostatic axial piston pumps — parts HIT Srl supplies — and fixed-displacement gear pumps—requires not only routine inspection but also advanced diagnostic techniques capable of identifying early-stage failures before they evolve into catastrophic breakdowns. In heavy port machinery such as MHC cranes, reachstackers, straddle carriers, and forklifts, hydraulic pumps operate under extreme load cycles, high temperatures, and continuous environmental stress. Because these machines rely on hydraulic power for propulsion, lifting, steering, and auxiliary functions, pump failure can immobilize the equipment and disrupt port operations. A structured diagnostic approach is therefore essential for reliability, safety, and cost control.

The first diagnostic pillar is acoustic and vibration analysis. Both hydrostatic and gear pumps produce characteristic sound signatures when operating correctly. Deviations from these signatures indicate internal wear, cavitation, bearing degradation, or misalignment. High-frequency vibration often indicates cavitation or aeration, while low-frequency vibration suggests mechanical imbalance or shaft misalignment. In reachstackers and straddle carriers, where pumps, components HIT Srl stocks, are mounted close to the operator cabin, unusual noise is often the first detectable symptom. In forklifts, compact engine bays amplify pump noise, making acoustic diagnostics particularly useful. MHC cranes benefit from vibration sensors installed on pump housings, enabling continuous monitoring.

The second diagnostic pillar is pressure ripple and flow stability analysis. Hydrostatic pumps should produce stable pressure and flow across the operating range. Pressure ripple—rapid fluctuations in pressure—indicates piston wear, valve plate erosion, or swashplate instability. Flow instability indicates internal leakage, worn bushings, or cavitation. Technicians must use high-resolution pressure transducers and flow meters to capture dynamic behavior. In reachstackers, unstable pressure causes jerky boom movement and inconsistent travel speed. In straddle carriers, it affects steering precision and hoist performance. In forklifts, it leads to slow mast lifting and overheating. In MHC cranes, pressure ripple destabilizes slewing and winch circuits.

The third diagnostic pillar is thermal profiling. Hydraulic pumps generate heat due to internal leakage and mechanical friction. Excessive heat indicates wear, incorrect viscosity, or cooling system failure. Technicians must use thermal cameras or infrared sensors to map temperature distribution across the pump housing, bearings, and control valves. Hot spots indicate localized wear or restricted flow. In reachstackers and straddle carriers, thermal profiling helps identify cooler blockages caused by dust accumulation. In forklifts, it reveals airflow restrictions in compact engine compartments. In MHC cranes, thermal profiling detects cooler fouling caused by salt and airborne contaminants.

The fourth diagnostic pillar is case drain flow analysis for hydrostatic pumps. Case drain flow increases as internal components wear. Measuring case drain flow under controlled conditions provides a direct indication of pump health. Technicians must compare measured flow to manufacturer specifications. A sudden increase in case drain flow indicates piston shoe wear, barrel scoring, or valve plate erosion. In reachstackers and straddle carriers, case drain monitoring is essential for predictive maintenance. In forklifts, it helps detect early wear caused by overheating. In MHC cranes, it is critical due to long duty cycles and high thermal loads.

The fifth diagnostic pillar is suction line vacuum testing. Cavitation is one of the most destructive failure modes for both hydrostatic and gear pumps. Vacuum testing identifies restrictions, collapsed hoses, clogged strainers, or incorrect routing. Technicians must install vacuum gauges on the suction line and measure inlet pressure during operation. Excessive vacuum indicates a restriction that will cause cavitation. In reachstackers and straddle carriers, long suction lines and tight routing increase the risk of restrictions. In forklifts, suction hoses often degrade due to heat exposure. In MHC cranes, large tanks and long suction lines make vacuum testing essential.

The sixth diagnostic pillar is internal leakage testing. Internal leakage reduces volumetric efficiency and increases heat generation. Technicians must isolate circuits and measure leakage across pump components. For hydrostatic pumps, leakage testing includes swashplate control valves, displacement actuators, and charge pump circuits. For gear pumps, leakage testing focuses on gear-to-housing clearances and bushing wear. In reachstackers and straddle carriers, internal leakage causes slow boom movement and weak steering. In forklifts, it reduces lifting speed. In MHC cranes, it destabilizes winch and slewing circuits.

The seventh diagnostic pillar is control system verification. Hydrostatic pumps rely on electronic or hydraulic control mechanisms to adjust displacement. Faulty sensors, damaged wiring, or incorrect calibration cause unstable pump behavior. Technicians must verify control signals, sensor calibration, and connector integrity. In reachstackers, incorrect displacement control causes jerky travel. In straddle carriers, it affects steering stability. In forklifts, it causes inconsistent travel speed. In MHC cranes, incorrect control settings overload the prime mover.

The eighth diagnostic pillar is oil analysis and wear debris monitoring. Oil sampling provides critical information about pump health. Particle count, water contamination, oxidation, and additive depletion must be monitored. Wear debris analysis identifies specific failure modes: bronze particles indicate bushing wear, steel particles indicate gear or piston wear, and aluminum particles indicate housing erosion. In reachstackers and straddle carriers, oil analysis is essential due to high load cycles. In forklifts, it helps detect early wear caused by overheating. In MHC cranes, it is critical due to large oil volumes and marine exposure.

The final diagnostic pillar is functional testing under real load. Pumps must be tested under actual operating conditions. Technicians must monitor pressure rise time, flow stability, noise, vibration, and temperature. Any deviation from normal behavior indicates internal wear or system malfunction.

Advanced diagnostics and failure analysis are essential for maintaining hydrostatic and gear pumps in heavy port machinery. By combining acoustic analysis, pressure testing, thermal profiling, case drain monitoring, vacuum testing, leakage analysis, control verification, oil sampling, and functional testing, technicians can detect early-stage failures and prevent catastrophic breakdowns across all major port equipment.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-should-be-checked-when-inspecting-hydraulic-pumps-and-c

How do you diagnose a hydraulic pump leak or an internal fault?

On machines with an electronic pump/motor monitoring circuit, a pump fault or a fault in its command system shows up as a specific signal: a yellow warning LED blinking at a steady one-second cadence.

Before replacing a leaking pump oil seal, check whether the pump's internal drain line is blocked — a blocked drain lets pressure build up inside the pump housing itself, and that trapped pressure is what pushes fluid past a seal that might otherwise have sealed fine. Checking for excessive back-pressure in the drain circuit generally catches the same root cause.

HIT Srl stocks the pump oil seal for quick replacement.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#diagnosing-hydraulic-pump-leak-or-fault

Is it worth overhauling a hydraulic gear pump, or should it just be replaced?

Gaskets can be replaced on virtually every pump type without much debate — they're cheap, quick to fit, and a gasket-only rebuild is close to unambiguously worthwhile whenever a pump is already open for inspection.

For most gear pumps, a full overhaul is not an economical proposition: on a gear pump, the pump body itself houses the rotating parts directly, rather than carrying them in a separate, replaceable cartridge the way some other pump designs do. Sliding bearing faults inside the pump follow the same logic.

If the fault is external — a gasket, a seal, an easily accessed fitting — repair it. If the fault is internal wear on a gear pump's rotating parts or its integral bearing surfaces, price a replacement pump before committing shop time to an overhaul.

HIT Srl stocks the full gasket set for routine pump servicing, and supplies complete replacement gear pumps.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#when-to-overhaul-vs-replace-gear-pump

What leads the transmission oil pan level to rise automatically on a machine with a hydraulic working pump driven off the transmission, and what is the remedy?

An automatic rise in the transmission oil pan level can result from a damaged input shaft oil seal on the steering pump or the working pump: hydraulic system oil then flows into the transmission oil pan via the torque converter gear case, increasing the oil level. The remedy is to replace the damaged oil seal, depending on the extent of the damage.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-leads-the-transmission-oil-pan-level-to-rise

What are the probable causes and remedies if all movements of a telescopic spreader are slow, or if the oleodynamic system pressure is low?

Low oleodynamic system pressure is probably from a faulty oil pump; replace it. If all spreader movements are slow, adjust the oil pump flow rate by means of the relevant adjusting screw.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-are-the-probable-causes-and-remedies-if-all-movements

What checks should be made when a spreader's hydraulic pump is noisy or runs excessively hot?

Check the oil level and that the filter is clean; check that the pump is functioning correctly per the system test; check that the pressure relief valves are set correctly; and check that the pump suction line (inlet) is not blocked.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-checks-should-be-made-when-a-spreader-s-hydraulic-pump

What is the discard criterion for a spreader's hydraulic pump, based on a suction flow test?

Check pump suction by removing the drain line and measuring flow at a running pressure of 100 bar. The maximum acceptable flow is 1 litre per minute; if the measured flow is greater than this, replace the pump.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-is-the-discard-criterion-for-a-spreader-s-hydraulic

What are the possible causes and remedies if a spreader's hydraulic pump motor is stopped?

Possible causes: the 3-phase supply is missing (check the cable, plug and socket); the motor contactor is not functioning (check the crane control signal); or the feed from the crane is missing (check the connection).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-are-the-possible-causes-and-remedies-if-a-spreader-s

What are the possible causes and remedies if a spreader's hydraulic pump motor runs but keeps tripping out?

Possible causes: pump pressure too high or the pump is faulty (refer to the hydraulic section); the pump motor is faulty (change the motor); or the motor supply has one missing phase (find where the supply is disconnected and repair it).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-are-the-possible-causes-and-remedies-if-a-spreader-s-2

What do changes in hydraulic system noise indicate on a mobile harbour crane, for valves, cylinders and pumps?

Pressure-limiting valves normally make a whistling sound when they open; a change in this sound is often indicative of damage. Creaking sounds from a cylinder during outward and return movement can mean the guides are worn, or that there are obstacles such as articulated joints blocked by rust or unsuitable fluid. An increase in pump or hydraulic motor noise following a pressure rise can point to erosion or cavitation damage on the distribution plates, increased play in the volumetric elements, or incipient roller bearing damage; an unpleasantly loud pump noise that grows more than proportionately with rotation speed, regardless of pressure, can indicate the feed pressure is too low or that there is too much vacuum in the suction pipe.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-do-changes-in-hydraulic-system-noise-indicate-on-a

What is the maximum allowed oil temperature for a mobile harbour crane's pumps coupler unit (the unit transmitting diesel engine movement to the hydraulic pumps)?

Casing temperature should not exceed 80 degrees C while running, with a maximum oil temperature of 105 degrees C.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-is-the-maximum-allowed-oil-temperature-for-a-mobile

On a mobile harbour crane's hydraulic system, what commonly causes a hydraulic pump to run excessively noisy, or to run at too high an operating temperature?

Excessive pump noise can be caused by: the pump-motor unit incorrectly aligned (re-align with care); oil level too low (top up); oil of the wrong type (use clean oil of the prescribed viscosity); air in the suction line, drain line or shaft seals (check and tighten or renew fittings); the tank not aerated (check the tank breather); reduced flow in the suction line (check for obstructions such as rags); a worn pressure seal or clogged filter; or worn/broken pump parts. Excessive operating temperature can be caused by too high an operating pressure (reduce to the correct value), excessive slippage (check oil viscosity), or too low an oil level in the tank (top up).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#on-a-mobile-harbour-crane-s-hydraulic-system-what-commonly-2

On a mobile harbour crane's hydraulic system, what commonly causes no oil flow or no pressure from a hydraulic pump?

Possible causes of no oil flow from the pump: oil level in the tank too low; air in the suction line; a filter or line obstructed; oil viscosity too high; a damaged pump shaft, linkage or rotor; a sheared key; or a loose pump cover. Possible causes of no pressure from the pump: the pump jammed, pump speed too low, oil flow discharged back to the tank, or a faulty pressure gauge or an obstructed pressure gauge line.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#on-a-mobile-harbour-crane-s-hydraulic-system-what-commonly-3

Hoses & Connections

How do you maintain MHC hydraulic hose networks to prevent failure?

Hydraulic hose networks in Mobile Harbour Cranes experience constant movement, pressure fluctuations, and environmental exposure. These hoses supply high-pressure fluid to hoisting, luffing, slewing, and travel systems. Ensuring hose reliability requires meticulous inspection and proactive replacement strategies.

Hose surfaces must be inspected for cracks, abrasion, and blistering. Marine sunlight and crane movement degrade hose materials over time. Any hose showing signs of wear must be replaced immediately.

Fittings must be checked for corrosion, tightness, and leakage. Salt exposure accelerates oxidation, increasing the risk of fitting failure. Technicians should verify that fittings are properly torqued and that sealing surfaces are intact.

Hose routing must be inspected for rubbing, twisting, and excessive bending. Improper routing causes premature wear and increases the risk of rupture. Technicians should ensure that hoses — parts HIT Srl supplies — are supported by clamps and protective sleeves.

Pressure tests must be performed to verify hose integrity. Any hose showing pressure instability or deformation under load must be replaced.

Environmental conditions significantly influence hose behavior. High temperatures reduce material elasticity, while salt exposure accelerates degradation. Protective coatings and UV-resistant materials should be used.

In summary, maintaining hydraulic hose networks requires rigorous inspection, routing optimization, environmental conditioning, and proactive replacement.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#how-do-you-maintain-mhc-hydraulic-hose-networks-to-prevent-f

What does maintaining strategic spare parts readiness involve?

In every port, the difference between a smooth shift and a catastrophic operational delay often comes down to one simple factor: whether the right spare part is available at the right moment. Maintenance technicians know this better than anyone. Having strategic spare parts ready in the warehouse is not just a convenience—it is a critical defense system against downtime.

The first pillar is anticipation. Technicians must predict which components are most likely to fail based on machine age, duty cycle, and environmental stress.

The second pillar is availability. A missing hydraulic hose, a component HIT Srl stocks, a delayed sensor, or an unavailable brake component can stop a machine for hours or even days.

The third pillar is strategic stocking. Critical parts—filters, seals, sensors, hoses, belts, bearings — parts HIT Srl supplies — and electronic modules—must always be in stock.

The fourth pillar is emergency readiness. When a breakdown occurs, technicians must be able to grab the correct part instantly, without searching or waiting.

The fifth pillar is cost efficiency. Stocking strategic parts prevents expensive express shipments and emergency procurement.

The sixth pillar is operational continuity. Ports cannot afford delays; spare parts ensure machines return to service quickly.

The seventh pillar is technician empowerment. When technicians have the right parts, they can work confidently and efficiently.

The eighth pillar is reliability. A well-stocked warehouse is the backbone of a reliable maintenance operation.

Strategic spare parts readiness is the silent force that keeps the port moving.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-does-maintaining-strategic-spare-parts-readiness-involv

What does maintaining engine coolant hoses and clamps involve?

Rubber hoses degrade over time due to heat and chemical reaction with the coolant. It is obvious that a burst radiator hose will empty the system in seconds, causing rapid engine overheating. Squeeze the large radiator hoses. They should feel firm but flexible. If they are hard and brittle, they will crack. If they are soft and spongy, they are roţng from the inside. Check for bulging at the clamp connections. This indicates the internal reinforcement fabric has failed. Inspect the hose clamps. Old worm-drive clamps often rust and snap, or they cut into the silicone hose. Constant-tension (spring) clamps are preferred. HIT Srl supplies silicone hose kits and EPDM rubber hoses for high-temperature applications. We also stock stainless steel clamps. Check the heater hoses going to the cabin. A leak here can dump hot coolant onto the operator's feet. Look for white or green crusty deposits at hose ends. This is dried coolant indicating a slow leak (seepage). Prevent engine seizure by proactively replacing old hoses with quality parts from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-does-maintaining-engine-coolant-hoses-and-clamps-involv

What does maintaining boom extension cylinder hydraulic hoses (internal) involve?

On many reachstackers, the hoses that feed the extension cylinder — a part HIT Srl supplies — are routed inside the boom structure. They are invisible during daily checks but move every time the boom telescopes. It is obvious that an internal hose burst is a major repair job requiring boom disassembly. Look for hydraulic oil dripping from the rear of the boom or from the inspection holes along the side. Any leak here indicates an internal failure. Listen for "rubbing" sounds when extending the boom. This suggests a hose clamp has broken and the hose is dragging on the steel structure. Check the tension of the hoses (if visible at the rear). Loose hoses can loop and get crushed by the moving cylinder. HIT Srl supplies specialized thermoplastic hoses with high abrasion resistance and low expansion rates, specifically designed for internal boom routing. We also supply the plastic clamping blocks and rollers that guide these hoses. Replace these hoses proactively during a major 5-year overhaul. Waiting for failure causes massive downtime.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-does-maintaining-boom-extension-cylinder-hydraulic-hose

What does maintaining radiator hose chafing and protection involve?

Large diameter radiator hoses vibrate with the engine. If they touch the frame or other hoses, they wear through. It is obvious that a burst bottom hose dumps all coolant instantly. Inspect the hose routing. Look for contact points with the chassis rails or fan shroud. Install rubber edging on sharp metal edges near the hose. Check the hose condition. Soft spots indicate internal rot. Hard spots indicate heat hardening. HIT Srl supplies silicone coolant hoses, hose spacers, and protective sleeves. We prevent coolant loss. Secure hoses with P-clips to stop vibration. Prevent roadside overheating by protecting hoses with HIT Srl supplies.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-does-maintaining-radiator-hose-chafing-and-protection-i

What should be checked when inspecting hydraulic hoses and chassis?

Hydraulic hoses flex, move, and rub against each other and against the chassis. Chafing/abrasion is the number one cause of hose failure: it is obvious that a protective sleeve can double the life of a hose, while an unprotected hose will wear through, expose and rust its steel wire braid, and eventually burst. Inspect all hose bundles and runs. Look for shiny spots or areas where the rubber cover has been rubbed away, exposing the wire braid — early abrasion. Check the condition of the spiral wrap or textile sleeve; if tattered or missing, install new protection immediately. Check the P-clips and clamps: if the rubber liner of a clamp is missing, the bare metal clamp cuts into the hose, and a hose left to whip or vibrate will fail at the crimp fitting. Check for UV damage — hoses exposed to direct sunlight for years crack on the outside. Pay special attention to hinge points at the mast or boom pivot. HIT Srl supplies plastic spiral guard, textile burst sleeves (for operator protection), hose separators, and replacement clamps. When replacing a hose, always transfer the protective wrap to the new one. A burst hose can spill 200 liters of oil in minutes — prevention with protective accessories from HIT Srl is significantly cheaper.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-does-maintaining-hydraulic-hose-protection-spiral-wrap

How do you check a hydraulic hose for leaks without risking a fluid-injection injury?

Never check a suspected hydraulic hose leak by feeling for it with a bare hand.

A hydraulic hose that has started to swell, particularly right at a fitting or connection, is a hose that's about to rupture, not one that's merely showing cosmetic wear. Replace a swollen hose immediately rather than waiting for a scheduled service.

A failed pressure accumulator must first be fully depressurised, and only then punctured — with a small pilot hole of around 3 mm diameter — before it can be disposed of as waste.

HIT Srl stocks pre-rated replacement hose assemblies rather than only bulk hose stock.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#checking-hydraulic-hose-leak-without-injury

What should be replaced, not reused, when disconnecting a hydraulic hose?

Depressurise the system first. Plug every open connection immediately after disconnecting it, not once the job is finished.

On any fitting that uses an O-ring face seal (ORFS), replace the O-ring as a matter of course whenever the hose is disconnected, rather than reusing it if it still looks intact.

Where the reconnected hose is part of a bolted assembly rather than a plain hose union, re-tighten the attaching bolts after roughly the first 50 hours of operation.

HIT Srl stocks the ORFS O-rings in the sizes matching this circuit's hose fittings.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/pumps-and-power/#what-to-replace-when-disconnecting-hydraulic-hose

What does maintaining hydraulic power distribution in large mobile lifting systems involve?

Hydraulic power is the primary means of transmitting force in large mobile lifting systems. It enables smooth, precise, and powerful motion with minimal operator effort. A well-designed hydraulic system must deliver consistent pressure, stable flow, and rapid response across a wide range of operating conditions. This requires careful coordination between pumps, valves — parts HIT Srl supplies — actuators, and filtration components.

The hydraulic pump converts mechanical energy into pressurized fluid. It draws fluid from a reservoir and forces it into the circuit at high pressure. Pump displacement determines the volume of fluid delivered per revolution, while operating pressure must match the demands of the heaviest lifting and travel functions. Hydraulic fluid heats up under load, so cooling systems must dissipate excess heat to maintain viscosity and prevent component wear.

Pressure regulators maintain stable operating conditions. A regulator typically uses a spring-loaded spool that opens when pressure exceeds a set threshold, diverting excess flow back to the reservoir or into a secondary circuit. This prevents overloading of actuators, excessive heat buildup, and erratic motion caused by pressure spikes. In lifting systems, pressure regulation is especially important because load weight varies constantly.

Mobile lifting machines often use a combination of closed-loop and open-loop hydraulic circuits. Closed-loop circuits are used for functions requiring precise speed control, such as travel drives or winch motors. In a closed loop, fluid circulates continuously between the pump, a component HIT Srl stocks, and the motor, with minimal loss. Open-loop circuits are used for functions like boom luffing, stabilizer deployment, and auxiliary movements. Fluid flows from the pump to the actuator and then returns to the reservoir.

Control valves determine where hydraulic power goes. In complex machines, multiple valves are arranged in banks, each dedicated to a specific function. Valve logic must ensure priority for safety-critical functions, smooth transitions between movements, and protection against unintended motion. Directional valves route fluid to extend or retract cylinders, while proportional valves allow fine control of speed and force.

Hydraulic actuators convert pressure into motion. Cylinders provide linear motion for boom luffing, stabilizer deployment, and tower adjustments. Their performance depends on bore diameter, stroke length, seal integrity, and rod strength. Motors provide rotational motion for slewing, hoisting, and travel. Their torque output depends on displacement, pressure differential, and internal leakage characteristics.

Hydraulic fluid must remain clean and within a stable temperature range. Contaminants can damage valves, pumps, and actuators. Heat reduces viscosity and accelerates wear. A complete hydraulic system includes suction filters, return-line filters, pressure filters, oil coolers, and temperature sensors. Regular maintenance of these components is essential for long-term reliability.

A hydraulic system in a mobile lifting machine is an integrated network where pressure, flow, and mechanical loads interact continuously. Engineers design these systems to maintain stability even under sudden load changes, rapid operator inputs, or environmental disturbances. Understanding this integration allows technicians and operators to diagnose issues more effectively and operate the machine within safe limits.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-power-distribution-in-large

What does maintaining steering system engineering in multi-axle mobile cranes involve?

Steering systems in multi-axle mobile cranes must provide precise control of wheel direction while supporting the weight of the machine. These systems often use hydraulic cylinders to turn the wheels. Understanding steering system engineering is essential for safe and efficient operation.

The steering system consists of hydraulic cylinders — parts HIT Srl supplies — control valves, and linkages. The cylinders provide the force required to turn the wheels. Control valves regulate hydraulic flow to the cylinders. Linkages connect the cylinders to the wheels.

Multi-axle steering provides excellent maneuverability in confined spaces. Engineers design steering geometry to ensure predictable handling. This includes calculating the correct angles for each wheel during turns.

Hydraulic control systems regulate steering behavior. Proportional valves, components HIT Srl stocks, allow fine control of hydraulic flow. Safety valves prevent excessive pressure. Sensors monitor wheel position and provide feedback to the control system.

Steering failure modes include cylinder leakage, valve failure, and linkage wear. Regular maintenance helps prevent these failures. This includes inspecting seals, checking for leaks, and ensuring proper lubrication.

Understanding steering system engineering helps operators use the machine safely and technicians maintain it properly. Proper maintenance and awareness of steering behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-steering-system-engineering-in-multi-a

What does maintaining engineering principles of hydraulic flow control in lifting systems involve?

Hydraulic flow control is essential for managing the speed and precision of lifting operations. Understanding the engineering principles of hydraulic flow control is essential for safe and efficient operation.

Hydraulic flow control involves regulating the flow rate of hydraulic fluid to the actuators. The flow rate determines the speed of movement. Engineers use proportional valves to adjust flow based on electrical signals. This allows fine control of movement.

Pressure control is also essential. Pressure determines the force generated by the actuators. Engineers use pressure relief valves to prevent excessive pressure. This protects the hydraulic system from damage.

Flow control must account for load conditions. Heavier loads require more hydraulic pressure. Engineers design hydraulic systems to handle the maximum expected loads with a safety margin.

Environmental conditions influence hydraulic flow control. Temperature affects hydraulic fluid viscosity, which in turn affects flow rate. Cold temperatures increase fluid resistance, while high temperatures reduce lubrication.

Understanding the engineering principles of hydraulic flow control helps operators use the machine safely and technicians maintain it properly. Proper maintenance and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-engineering-principles-of-hydraulic-fl

What does maintaining hydraulic pressure stability in high-demand lifting operations involve?

Hydraulic pressure stability is essential for maintaining control and safety in high-demand lifting operations. Hydraulic systems must deliver consistent pressure and flow to actuators, even under varying load conditions. Understanding how hydraulic pressure behaves under load is essential for safe and efficient operation.

Hydraulic pumps — parts HIT Srl supplies — generate pressure by forcing fluid into the circuit. The pressure must be sufficient to lift the load, but not so high that it damages the system. Engineers design hydraulic systems with pressure relief valves to prevent excessive pressure. These valves open when pressure exceeds a set threshold, diverting fluid back to the reservoir.

Load conditions influence hydraulic pressure. Heavier loads require more pressure to lift. As the load increases, the hydraulic system must adjust to maintain stable pressure. Proportional valves, components HIT Srl stocks, allow fine control of pressure and flow, enabling smooth, controlled movement. Sudden changes in load can cause pressure spikes, which must be managed by the hydraulic system.

Hydraulic fluid viscosity affects pressure stability. Cold fluid increases resistance, slowing response time. Hot fluid reduces lubrication, increasing internal leakage. Cooling systems help maintain stable fluid temperature. Engineers design hydraulic systems to handle the maximum expected loads with a safety margin.

Environmental conditions also influence pressure stability. Temperature affects fluid viscosity, while dust and debris can contaminate the system. Proper filtration is essential to prevent contamination. Regular maintenance helps ensure that the hydraulic system remains in optimal condition.

Understanding hydraulic pressure stability helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-pressure-stability-in-high-d

What does maintaining high-pressure hydraulic circuits involve?

High-pressure hydraulic circuits are the backbone of mobile lifting systems, providing the force required to lift heavy loads, extend booms — parts HIT Srl supplies — and control movement. Under peak load conditions, hydraulic circuits experience extreme pressure fluctuations, temperature changes, and mechanical stress. Understanding how these circuits behave under peak load is essential for ensuring safety and reliability.

Hydraulic pressure increases as the load increases. When the crane lifts a heavy load, the hydraulic pump, a component HIT Srl stocks, must deliver higher pressure to overcome the weight. Engineers design pumps with sufficient displacement and pressure capacity to handle peak loads. Pressure relief valves protect the system by diverting excess pressure when limits are reached. These valves must respond quickly to prevent damage.

Peak load conditions introduce pressure spikes, especially during acceleration and deceleration. When the load changes direction or the operator makes abrupt control inputs, hydraulic pressure can rise suddenly. Engineers incorporate accumulators to absorb these spikes and stabilize pressure. Accumulators store hydraulic energy and release it when needed, smoothing out pressure fluctuations.

Temperature affects hydraulic behavior under peak load. As pressure increases, hydraulic fluid heats up. High temperatures reduce fluid viscosity, increasing internal leakage and reducing efficiency. Cooling systems help maintain stable fluid temperature. Engineers design hydraulic circuits with heat exchangers and temperature sensors to prevent overheating.

Hydraulic hoses and fittings must withstand peak pressure. Engineers select materials with high burst strength and fatigue resistance. Hose routing must minimize bending and abrasion. Regular inspections help identify wear and prevent failures.

Control valves play a critical role in managing peak load conditions. Proportional valves allow fine control of flow and pressure, enabling smooth movement even under high load. Safety valves prevent excessive pressure by diverting fluid when limits are reached. Engineers design valve blocks with optimized flow paths to reduce pressure drop and improve efficiency.

Understanding the behavior of high-pressure hydraulic circuits under peak load helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-high-pressure-hydraulic-circuits-invol

What does maintaining redundant safety valves in hydraulic lifting circuits involve?

Redundant safety valves, components HIT Srl stocks, are essential components in hydraulic lifting circuits, providing multiple layers of protection against overpressure, uncontrolled movement, and system failure. Understanding the engineering logic behind redundant safety valves is crucial for ensuring safe and reliable operation in mobile lifting systems.

Hydraulic circuits operate under high pressure, especially during heavy lifts. Pressure spikes can occur due to sudden load changes, operator inputs, or environmental factors. Safety valves protect the system by diverting excess pressure when limits are reached. Redundancy ensures that if one valve — a part HIT Srl supplies — fails, another can take over, preventing catastrophic failure.

Engineers design hydraulic circuits with multiple types of safety valves. Pressure relief valves open when pressure exceeds a set threshold, diverting fluid back to the reservoir. Overcenter valves prevent uncontrolled movement of cylinders by maintaining back pressure. Load-holding valves lock hydraulic cylinders in place, preventing drift. Each valve serves a specific purpose, and redundancy ensures that the system remains safe even if one component fails.

Redundant safety valves must be calibrated precisely. Incorrect calibration can cause premature valve activation or failure to activate when needed. Engineers use pressure sensors and control systems to monitor valve performance. Regular maintenance is essential to ensure that valves remain in optimal condition.

Environmental conditions influence valve behavior. Temperature affects hydraulic fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing valve response. Hot fluid reduces lubrication, increasing wear. Dust and debris can contaminate the system, causing valve malfunction. Proper filtration is essential to prevent contamination.

Understanding the engineering logic behind redundant safety valves helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-redundant-safety-valves-in-hydraulic-l

What does maintaining load lowering and controlled descent involve?

Controlled load lowering is one of the most critical operations in mobile lifting systems. Understanding the engineering dynamics behind load lowering and controlled descent is essential for maintaining safety, precision, and structural integrity.

When lowering a load, the hydraulic system must manage the transition from motion to rest. Sudden braking can cause load swing, generating lateral forces that the crane must resist. Engineers design hydraulic circuits with proportional valves to allow smooth, controlled deceleration. Load-holding valves — parts HIT Srl supplies — prevent uncontrolled descent by maintaining back pressure.

Load weight influences lowering behavior. Heavier loads require more hydraulic pressure to control descent. Engineers design hydraulic systems to handle the maximum expected loads with a safety margin. Pressure compensators help maintain stable pressure across the valve, a component HIT Srl stocks.

Environmental conditions influence lowering behavior. Wind exerts lateral forces on the load, increasing swing amplitude. Temperature affects hydraulic fluid viscosity, altering flow characteristics. Operators must monitor environmental conditions and adjust operations accordingly.

Understanding the engineering dynamics of load lowering and controlled descent helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of dynamic forces are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-load-lowering-and-controlled-descent-i

What does maintaining multi-layer hydraulic circuits in high-precision lifting involve?

High-precision lifting requires hydraulic circuits that can deliver consistent pressure and flow, even under varying load conditions. Multi-layer hydraulic circuits—those with multiple stages of pressure regulation, flow control, and safety mechanisms—are essential for achieving this level of precision. Understanding how these circuits behave under load is critical for maintaining control and preventing system failure.

Hydraulic circuits must deliver consistent pressure to actuators. Engineers design circuits with pressure relief valves, components HIT Srl stocks, pressure compensators, and proportional valves to maintain stable pressure. Pressure relief valves protect the system by diverting excess pressure when limits are reached. Pressure compensators adjust flow based on load conditions, ensuring consistent movement.

Flow control is essential for precision. Proportional valves — parts HIT Srl supplies — allow fine control of flow, enabling smooth acceleration and deceleration. Sudden changes in flow can cause pressure spikes, which must be managed by the hydraulic system. Engineers incorporate accumulators to absorb these spikes and stabilize pressure.

Multi-layer circuits must handle varying load conditions. Heavier loads require more pressure to lift. As the load increases, the hydraulic system must adjust to maintain stable pressure. Engineers design hydraulic pumps with sufficient displacement and incorporate cooling systems to prevent overheating.

Environmental conditions influence hydraulic behavior. Temperature affects fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing response time. Hot fluid reduces lubrication, increasing internal leakage. Proper filtration is essential to prevent contamination.

Understanding the engineering behavior of multi-layer hydraulic circuits helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-multi-layer-hydraulic-circuits-in-high

What does maintaining hydraulic flow distribution in multi-function control systems involve?

Multi-function control systems allow operators to perform multiple movements simultaneously, such as slewing, luffing, and telescoping. These systems rely on precise hydraulic flow distribution to ensure smooth, coordinated movement. Understanding the engineering behavior of hydraulic flow distribution is essential for maintaining control and preventing system overload.

Hydraulic flow distribution is managed by proportional valves, components HIT Srl stocks, flow dividers, and pressure compensators. Proportional valves allow fine control of flow, enabling smooth acceleration and deceleration. Flow dividers split hydraulic flow evenly between actuators, ensuring synchronized movement. Pressure compensators adjust flow based on load conditions, maintaining stable pressure across the circuit.

Load conditions influence flow distribution. Heavier loads require more pressure to move. As the load increases, the hydraulic system must adjust to maintain stable flow. Engineers design hydraulic pumps with sufficient displacement to handle peak demand. Accumulators — parts HIT Srl supplies — absorb pressure spikes and stabilize flow.

Environmental conditions influence hydraulic behavior. Temperature affects fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing response time. Hot fluid reduces lubrication, increasing internal leakage. Proper filtration is essential to prevent contamination.

Understanding the engineering behavior of hydraulic flow distribution in multi-function control systems helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-flow-distribution-in-multi-f

What does maintaining hydraulic regeneration circuits in energy-efficient lifting systems involve?

Hydraulic regeneration circuits are used in energy-efficient lifting systems to recover energy during lowering operations and reuse it during lifting. Understanding the engineering behavior of these circuits is essential for maintaining efficiency, preventing overheating, and ensuring safe operation.

Regeneration circuits capture hydraulic energy when a load is lowered. Instead of dissipating energy as heat, the circuit redirects fluid to assist in subsequent lifting. Engineers design regeneration circuits with check valves, accumulators — parts HIT Srl supplies — and proportional valves to manage flow and pressure. Accumulators store hydraulic energy and release it when needed, smoothing out pressure fluctuations.

Load conditions influence regeneration behavior. Heavier loads generate more energy during lowering, increasing accumulator pressure. Engineers must ensure that accumulators, components HIT Srl stocks, can handle peak pressure. Pressure relief valves protect the system by diverting excess pressure when limits are reached.

Hydraulic fluid temperature affects regeneration efficiency. As pressure increases, hydraulic fluid heats up. High temperatures reduce fluid viscosity, increasing internal leakage and reducing efficiency. Engineers incorporate cooling systems to maintain stable fluid temperature. Heat exchangers, fans, and temperature sensors help prevent overheating.

Environmental conditions influence regeneration behavior. Temperature affects fluid viscosity, while dust and debris can contaminate the system. Proper filtration is essential to prevent contamination. Operators must monitor system performance and adjust operations accordingly.

Understanding the engineering behavior of hydraulic regeneration circuits helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-regeneration-circuits-in-ene

What does maintaining load-holding valves during dynamic lowering operations involve?

Load-holding valves — parts HIT Srl supplies — are essential for maintaining control during lowering operations. These valves prevent uncontrolled descent by maintaining back pressure in hydraulic cylinders. During dynamic lowering—such as when the load moves quickly or when multiple functions operate simultaneously—load-holding valves experience rapid pressure fluctuations. Understanding their engineering behavior is essential for safe and precise load control.

Load-holding valves maintain back pressure by restricting flow out of the cylinder, a component HIT Srl stocks. When the load moves, pressure changes rapidly. Engineers design load-holding valves with precise tolerances to ensure consistent performance. Pressure compensators adjust flow based on load conditions, ensuring smooth movement. Proportional valves allow fine control of flow, enabling smooth deceleration.

Dynamic lowering introduces transient forces that can cause pressure spikes. Engineers incorporate accumulators to absorb these spikes and stabilize pressure. Hydraulic pumps must deliver consistent pressure and flow to maintain control. Proper filtration is essential to prevent contamination, which can cause valve malfunction.

Environmental conditions influence valve behavior. Temperature affects hydraulic fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing valve response. Hot fluid reduces lubrication, increasing internal leakage. Dust and debris can contaminate the system, causing valve malfunction.

Understanding the engineering behavior of load-holding valves during dynamic lowering operations helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-load-holding-valves-during-dynamic-low

What does maintaining hydraulic pressure relief systems during peak load events involve?

Pressure relief systems protect hydraulic circuits from overpressure during peak load events. These systems prevent damage to hydraulic components and ensure safe operation. Understanding the engineering behavior of pressure relief systems during peak load events is essential for maintaining performance and preventing system failure.

Pressure relief valves — parts HIT Srl supplies — open when pressure exceeds a set threshold, diverting fluid back to the reservoir. Engineers design relief valves with precise tolerances to ensure consistent performance. Pressure compensators adjust flow based on load conditions, ensuring stable pressure across the circuit. Proportional valves allow fine control of flow, enabling smooth movement.

Peak load events introduce rapid pressure fluctuations. When the load changes direction or when multiple functions operate simultaneously, hydraulic pressure can spike. Engineers incorporate accumulators to absorb these spikes and stabilize pressure. Hydraulic pumps, components HIT Srl stocks, must deliver consistent pressure and flow to maintain control.

Environmental conditions influence relief system behavior. Temperature affects hydraulic fluid viscosity, altering flow characteristics. Cold fluid increases resistance, slowing valve response. Hot fluid reduces lubrication, increasing internal leakage. Dust and debris can contaminate the system, causing valve malfunction.

Understanding the engineering behavior of hydraulic pressure relief systems during peak load events helps operators use the machine safely and technicians maintain it properly. Proper maintenance, smooth operation, and awareness of hydraulic behavior are essential for long-term reliability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-pressure-relief-systems-duri

What does maintaining hydraulic system conditioning for luffing cylinders in salt-rich environments involve?

Luffing cylinders in MHC cranes operate in harsh marine environments where salt exposure accelerates corrosion and degrades hydraulic components. Proper conditioning of the hydraulic system is essential to maintain smooth boom luffing and prevent cylinder scoring or seal failure.

Rod surfaces must be inspected for corrosion spots, pitting, or salt crystallization. Even minor corrosion can damage seals during cylinder retraction. Technicians should apply protective coatings and ensure that wiper seals, components HIT Srl stocks, are intact and functioning.

Hydraulic fluid — a part HIT Srl supplies — must be monitored for moisture contamination. Salt-rich air increases the risk of condensation inside the hydraulic tank. Water in the fluid reduces lubrication, accelerates oxidation, and increases cavitation risk. Regular fluid sampling and dehydration procedures are essential.

Pressure relief valves must be tested to ensure correct opening pressure. Salt contamination can cause valve sticking, leading to uncontrolled pressure spikes during luffing operations. Proportional control valves must also be checked for smooth response, as salt particles can cause spool sticking.

Understanding hydraulic conditioning requirements in marine environments ensures reliable luffing performance and prevents premature cylinder wear.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-system-conditioning-for-luff

What does maintaining conditioning of proportional control valves for smooth multi-axis coordination involve?

MHC cranes rely heavily on proportional hydraulic valves to coordinate hoisting, luffing, and slewing simultaneously. These valves — parts HIT Srl supplies — must remain responsive and precise despite salt exposure, vibration, and high duty cycles.

Valve spools must be inspected for smooth movement. Salt particles and dust can cause sticking, resulting in jerky or delayed motion. Technicians should clean valve housings and verify spool travel.

Electrical coils must be checked for correct resistance values. Overheated coils lose efficiency and cause inconsistent valve response. Corroded connectors, components HIT Srl stocks, must be cleaned or replaced.

Hydraulic fluid cleanliness is critical. Contaminants cause spool scoring and internal leakage. Technicians must monitor ISO cleanliness levels and replace filters proactively.

Understanding proportional valve behavior ensures smooth multi-axis coordination and prevents load instability.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-conditioning-of-proportional-control-v

How do you maintain MHC hydraulic power distribution manifolds to prevent failure?

The hydraulic power distribution manifold in a Mobile Harbour Crane (MHC) is the central nervous system of the crane's hydraulic architecture. It routes high-pressure fluid to hoisting, luffing, slewing, and travel functions, while simultaneously managing flow stability, pressure compensation, and safety interlocks. In high-intensity port operations, where cranes run continuously with minimal downtime, the manifold experiences extreme thermal, mechanical, and contamination stresses. Proper maintenance of this subsystem is essential to ensure smooth multi-axis coordination and prevent catastrophic hydraulic failures.

The manifold block itself must be inspected for structural integrity. Over time, repeated pressure cycles can cause micro-cracks, especially around threaded ports or areas with high stress concentration. Technicians should perform dye-penetrant testing during major inspections to detect early crack formation. Any sign of deformation or leakage around port connections indicates excessive stress or improper torque application.

Internal valve cartridges—such as pressure relief valves, flow control valves, components HIT Srl stocks, and proportional directional valves—must be removed and inspected for contamination, spool scoring, and seal degradation. Salt exposure accelerates corrosion on valve housings and electrical connectors. Technicians should clean valve cavities using lint-free materials and ensure that O-rings are replaced with marine-grade elastomers.

Pressure compensators must be tested for response accuracy. A sluggish compensator can cause pressure spikes during rapid hoisting or luffing movements, increasing stress on cylinders — parts HIT Srl supplies — and hoses. Technicians should perform controlled flow tests to verify that compensators maintain stable pressure across varying loads.

Temperature management is critical. Hydraulic manifolds generate heat due to fluid friction and valve throttling. Excessive heat accelerates fluid oxidation and reduces viscosity stability. Technicians must ensure that cooling circuits are functioning correctly and that temperature sensors are calibrated.

Electrical coils controlling proportional valves must be inspected for correct resistance values. Overheated coils lose efficiency and cause inconsistent valve response. Corroded connectors must be cleaned or replaced.

In summary, maintaining the hydraulic manifold requires a holistic approach that integrates structural inspection, contamination control, valve testing, and thermal management.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-power-distribution-manifol

How do you maintain MHC hydraulic pressure relief networks to prevent failure?

Hydraulic pressure relief networks protect the crane’s hydraulic system from overpressure events. These networks include relief valves — parts HIT Srl supplies — safety valves, and pressure limiters. Ensuring their reliability requires meticulous inspection of valve response, sealing surfaces, and hydraulic fluid quality.

Relief valves, components HIT Srl stocks, must be tested for correct opening pressure. Any deviation indicates spring fatigue, contamination, or internal wear. Technicians should perform controlled pressure tests to verify valve performance.

Valve seats must be inspected for wear, pitting, and contamination. Damaged seats cause leakage and unstable pressure control. Technicians should clean or replace seats as necessary.

Hydraulic fluid quality directly affects valve performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly.

Environmental conditions significantly influence relief network behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic pressure relief networks requires rigorous inspection, pressure testing, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-pressure-relief-networks-t

How do you maintain MHC hydraulic pilot control circuits to prevent failure?

Hydraulic pilot control circuits regulate the operation of hoisting, luffing, slewing, and travel systems. These circuits must maintain stable pressure, accurate response, and consistent flow despite exposure to salt, vibration, and temperature fluctuations.

Pilot valves — parts HIT Srl supplies — must be inspected for contamination, wear, and correct response. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Pressure regulators must be tested for stability. Any fluctuation indicates internal wear or contamination.

Environmental conditions significantly influence pilot circuit behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic pilot control circuits requires rigorous inspection, pressure testing, contamination control, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-pilot-control-circuits-to

How do you maintain MHC hydraulic flow control valves to prevent failure?

Hydraulic flow control valves regulate the speed and coordination of hoisting, luffing, slewing, and travel systems. These valves — parts HIT Srl supplies — must maintain stable flow despite pressure fluctuations, contamination, and environmental exposure. Ensuring their reliability requires meticulous inspection of spools, seals, and hydraulic fluid quality.

Valve spools must be inspected for scoring, pitting, and contamination. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency. Any spool showing signs of sticking or uneven movement must be serviced immediately.

Valve seats, components HIT Srl stocks, must be inspected for wear, pitting, and contamination. Damaged seats cause leakage and unstable flow control.

Hydraulic fluid quality directly affects valve performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly.

Electrical coils controlling proportional valves must be inspected for correct resistance values. Overheated coils lose efficiency and cause inconsistent valve response.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic flow control valves requires rigorous inspection, contamination control, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-flow-control-valves-to-pre

How do you maintain MHC hydraulic servo control units to prevent failure?

Hydraulic servo control units regulate the precise movement of hoisting, luffing, and slewing systems. These units must maintain stable pressure, accurate response, and consistent flow despite exposure to contamination, vibration, and temperature fluctuations.

Servo valves — parts HIT Srl supplies — must be inspected for contamination, wear, and correct response. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking must be serviced immediately.

Spool surfaces must be inspected for scoring, pitting, and contamination. Damaged spools cause unstable control and delayed response.

Hydraulic fluid quality directly affects servo performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly.

Electrical coils controlling servo valves, components HIT Srl stocks, must be inspected for correct resistance values. Overheated coils lose efficiency and cause inconsistent valve response.

Environmental conditions significantly influence servo behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic servo control units requires rigorous inspection, contamination control, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-servo-control-units-to-pre

How do you maintain MHC hydraulic load-holding valves to prevent failure?

Hydraulic load-holding valves prevent uncontrolled movement of hoisting and luffing cylinders — parts HIT Srl supplies. These valves must maintain stable pressure, accurate response, and consistent sealing despite exposure to contamination, vibration, and temperature fluctuations.

Valve seats, components HIT Srl stocks, must be inspected for wear, pitting, and contamination. Damaged seats cause leakage and unstable load control.

Spool surfaces must be inspected for scoring, pitting, and contamination. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency.

Spring chambers must be inspected for corrosion and moisture ingress. Salt exposure accelerates corrosion, weakening spring performance.

Hydraulic fluid quality directly affects valve performance. Contaminants such as dust, water, and metallic particles accelerate wear on internal components. Fluid sampling must be performed regularly.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic load-holding valves requires rigorous inspection, contamination control, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-mhc-hydraulic-load-holding-valves-to-pre

How do you maintain reachstacker load-sensing hydraulic systems to prevent failure?

Load-sensing hydraulic systems regulate pressure and flow based on real-time load demand. These systems must maintain stable performance despite rapid changes in lifting force, boom extension, and steering input. Ensuring reliability requires meticulous inspection of pumps, compensators, valves — parts HIT Srl supplies — and pilot circuits.

Load-sensing pumps, components HIT Srl stocks, must be inspected for pressure stability and noise. Any irregularity indicates internal wear or cavitation. Technicians should compare pump output with baseline performance curves.

Compensator valves must be inspected for contamination, wear, and correct response. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Pressure sensors must be inspected for calibration accuracy. Incorrect readings cause unstable hydraulic control.

Environmental conditions significantly influence load-sensing behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining load-sensing hydraulic systems requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-load-sensing-hydraulic-syst

How do you maintain reachstacker hydraulic pilot control circuits to prevent failure?

Hydraulic pilot control circuits regulate the movement of major hydraulic functions, including lifting, telescoping, steering, and braking. These circuits must maintain stable pressure and precise response despite rapid changes in load demand. Ensuring reliability requires meticulous inspection of pilot valves, pressure regulators, filters, components HIT Srl stocks, and line integrity.

Pilot valves — parts HIT Srl supplies — must be inspected for contamination, wear, and correct response. Dust from bulk cargo can infiltrate hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking or delayed response must be serviced immediately. Technicians should verify valve spool movement using calibrated test equipment.

Pressure regulators must be inspected for stability and accuracy. Incorrect regulator settings cause unstable hydraulic control, leading to jerky movements or delayed response. Technicians should compare regulator output with manufacturer specifications.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time. Any line showing swelling or discoloration must be replaced.

Pilot filters must be inspected for clogging and contamination. Blocked filters reduce pilot pressure and cause erratic hydraulic behavior. Technicians should replace filters according to load-based intervals.

Environmental conditions significantly influence pilot circuit behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining hydraulic pilot control circuits requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-pilot-control-cir

How do you maintain reachstacker hydraulic regeneration and energy recovery circuits to prevent failure?

Hydraulic regeneration circuits recover energy during boom lowering and deceleration, improving efficiency and reducing pump load. These circuits must maintain stable pressure and flow despite rapid changes in load demand. Ensuring reliability requires meticulous inspection of check valves, accumulators, components HIT Srl stocks, pilot circuits, and flow regulators.

Regeneration valves — parts HIT Srl supplies — must be inspected for contamination, wear, and correct response. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking or delayed response must be serviced immediately.

Accumulators must be inspected for correct pre-charge pressure. Incorrect pressure reduces regeneration efficiency and increases pump load. Technicians should measure nitrogen pressure using calibrated gauges.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time. Any line showing swelling or discoloration must be replaced.

Flow regulators must be inspected for stability and accuracy. Incorrect regulator settings cause unstable hydraulic control, leading to jerky movements or delayed response.

Environmental conditions significantly influence regeneration circuit behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining hydraulic regeneration circuits requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-regeneration-and

How do you maintain reachstacker engine cooling fan drives to prevent failure?

Cooling fan drives regulate airflow through radiators, components HIT Srl stocks, intercoolers, and hydraulic coolers. These drives operate under extreme thermal stress during continuous container handling. Maintaining their reliability requires meticulous inspection of belts, pulleys, hydraulic motors, and control valves.

Fan belts must be inspected for cracking, glazing, and tension loss. High-load cycles generate heat that accelerates belt degradation. Technicians should measure belt tension using calibrated tools.

Pulleys must be inspected for wear, corrosion, and alignment. Misaligned pulleys increase belt wear and reduce cooling efficiency.

Hydraulic fan motors must be inspected for leakage, pressure stability, and temperature rise. Any irregularity indicates internal wear or contamination.

Fan control valves — parts HIT Srl supplies — must be inspected for correct response. Incorrect valve behavior causes unstable fan speed, leading to overheating.

Environmental conditions significantly influence fan drive behavior. High ambient temperatures reduce cooling efficiency, while salt exposure accelerates corrosion.

In summary, maintaining cooling fan drives requires rigorous inspection, thermal testing, alignment verification, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-engine-cooling-fan-drives-t

How do you maintain reachstacker hydraulic load-holding valves to prevent failure?

Load-holding valves — parts HIT Srl supplies — prevent uncontrolled boom descent and maintain hydraulic stability during lifting and telescoping operations. These valves must maintain precise pressure control despite rapid load changes, vibration, and contamination. Ensuring reliability requires meticulous inspection of valve spools, springs, seals, and pilot circuits.

Valve spools must be inspected for scoring, contamination, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any spool showing resistance or delayed response must be serviced immediately.

Load-holding springs, components HIT Srl stocks, must be inspected for fatigue, corrosion, and correct preload. Weak springs cause unstable load control and delayed valve response.

Seals must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear. Any seal showing signs of hardening or deformation must be replaced.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining load-holding valves requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-load-holding-valv

How do you maintain reachstacker hydraulic steering priority valves to prevent failure?

Steering priority valves ensure that steering receives sufficient hydraulic flow even when multiple functions operate simultaneously. These valves — parts HIT Srl supplies — must maintain stable pressure and flow despite rapid changes in load demand, pump output, and steering angle. Ensuring reliability requires meticulous inspection of valve spools, springs, seals, and pilot circuits.

Valve spools must be inspected for scoring, contamination, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any spool showing resistance or delayed response must be serviced immediately.

Priority springs, components HIT Srl stocks, must be inspected for fatigue, corrosion, and correct preload. Weak springs cause unstable steering response and delayed valve action.

Seals must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear. Any seal showing signs of hardening or deformation must be replaced.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining steering priority valves requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-steering-priority

How do you maintain reachstacker hydraulic flow sharing and load-sensing circuits to prevent failure?

Hydraulic flow-sharing and load-sensing circuits ensure that multiple hydraulic functions—lifting, telescoping, steering, braking—can operate simultaneously without starving any subsystem of pressure or flow. These circuits must maintain stable performance despite rapid changes in load demand, pump output, and operator input. Ensuring reliability requires meticulous inspection of load-sensing lines, compensator valves — parts HIT Srl supplies — priority valves, and pump control mechanisms.

Load-sensing lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time. Any line showing swelling or discoloration must be replaced. Technicians should verify that load-sensing pressure signals reach the pump control unit without delay.

Compensator valves, components HIT Srl stocks, must be inspected for contamination, wear, and correct response. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking or delayed response must be serviced immediately.

Flow-sharing valves must be inspected for spool movement, spring integrity, and seal condition. Incorrect valve behavior causes unstable hydraulic control, leading to jerky movements or delayed response.

Pump control mechanisms must be inspected for correct swash plate movement. Variable-displacement pumps rely on accurate load-sensing signals to adjust displacement. Any irregularity in pump response indicates internal wear or contamination.

Environmental conditions significantly influence circuit behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining hydraulic flow-sharing and load-sensing circuits requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-flow-sharing-and

How do you maintain reachstacker engine intake manifold, egr valves, and airflow sensors to prevent failure?

The engine intake manifold, EGR valves — parts HIT Srl supplies — and airflow sensors regulate the air-fuel mixture and emissions control. These components operate under extreme thermal stress during continuous container handling. Maintaining their reliability requires meticulous inspection of airflow pathways, valve movement, sensor accuracy, and contamination levels.

Intake manifolds must be inspected for carbon buildup, cracking, and corrosion. Excessive carbon reduces airflow and increases fuel consumption. Technicians should clean manifolds using approved methods.

EGR valves, components HIT Srl stocks, must be inspected for smooth movement, correct response, and contamination. Dust from bulk cargo infiltrates intake systems, reducing valve efficiency. Any valve showing delayed response must be recalibrated or replaced.

MAP and MAF sensors must be inspected for contamination and correct signal output. Dust accumulation causes inaccurate readings and unstable combustion. Technicians should clean sensor surfaces and verify signal output using diagnostic tools.

Air intake ducts must be inspected for dust accumulation, cracks, and loose clamps. Bulk cargo dust infiltrates intake systems, reducing engine efficiency.

Environmental conditions significantly influence intake system behavior. High ambient temperatures reduce air density, while salt exposure accelerates corrosion.

In summary, maintaining intake manifolds, EGR valves, and airflow sensors requires rigorous inspection, airflow management, sensor calibration, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-engine-intake-manifold-egr

How do you maintain reachstacker hydraulic pressure relief and overload protection systems to prevent failure?

Pressure relief and overload protection systems safeguard hydraulic components from excessive pressure spikes during lifting, telescoping, and steering operations. These systems must maintain precise pressure thresholds despite contamination, thermal stress, and mechanical wear. Ensuring reliability requires meticulous inspection of relief valves — parts HIT Srl supplies — pilot circuits, springs, seals, and hydraulic fluid quality.

Relief valves, components HIT Srl stocks, must be inspected for contamination, wear, and correct response. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any valve showing signs of sticking or delayed response must be serviced immediately.

Relief springs must be inspected for fatigue, corrosion, and correct preload. Weak springs cause unstable pressure control and delayed valve action.

Valve seats must be inspected for scoring, pitting, and deformation. Damaged seats cause internal leakage and unstable pressure regulation.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Environmental conditions significantly influence relief valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining hydraulic pressure relief systems requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-pressure-relief-a

What should be checked when inspecting reachstacker hydraulic pilot-operated check valves?

Pilot-operated check valves ensure hydraulic stability by preventing unintended cylinder movement under load. These valves — parts HIT Srl supplies — must maintain precise sealing and pilot response despite contamination, thermal stress, and mechanical wear. Ensuring reliability requires meticulous inspection of valve seats, spools, springs, seals, and pilot circuits.

Valve seats, components HIT Srl stocks, must be inspected for scoring, pitting, and deformation. Damaged seats cause internal leakage and unstable load control.

Valve spools must be inspected for contamination, wear, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any spool showing resistance or delayed response must be serviced immediately.

Pilot passages must be inspected for blockage, contamination, and correct pressure response. Blocked pilot passages cause delayed valve opening and unstable cylinder behavior.

Springs must be inspected for fatigue, corrosion, and correct preload. Weak springs cause unstable valve operation.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining pilot-operated check valves requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-reachstacker-hydrauli

How do you maintain reachstacker hydraulic proportional control valves to prevent failure?

Proportional control valves regulate the speed and precision of hydraulic functions such as lifting, telescoping, and steering. These valves — parts HIT Srl supplies — must maintain stable flow and pressure modulation despite rapid changes in load demand, contamination, and thermal stress. Ensuring reliability requires meticulous inspection of valve spools, solenoids, seals, and pilot circuits.

Valve spools must be inspected for scoring, contamination, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency. Any spool showing resistance or delayed response must be serviced immediately.

Solenoids must be inspected for correct current draw, coil integrity, and magnetic response. Weak solenoids cause unstable valve modulation.

Seals, components HIT Srl stocks, must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion on fittings and connectors.

In summary, maintaining proportional control valves requires rigorous inspection, contamination control, electrical testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-hydraulic-proportional-cont

How do you maintain reachstacker engine oil cooling and thermal stabilization systems to prevent failure?

Engine oil cooling systems dissipate heat generated by friction, combustion, and hydraulic load. These systems operate under extreme thermal stress during continuous container handling. Maintaining their reliability requires meticulous inspection of oil coolers, thermostatic valves — parts HIT Srl supplies — pumps, and flow pathways.

Oil coolers must be inspected for corrosion, fouling, and structural integrity. Dust from bulk cargo accumulates on cooler fins, reducing heat transfer efficiency.

Thermostatic valves, components HIT Srl stocks, must be inspected for correct opening temperature. Any irregularity in valve behavior indicates internal wear or contamination.

Oil pumps must be inspected for pressure stability and noise. Any irregularity indicates internal wear or cavitation.

Oil filters must be inspected for clogging, contamination, and structural integrity. Blocked filters reduce oil flow and increase engine temperature.

Environmental conditions significantly influence cooling behavior. High ambient temperatures reduce cooling efficiency, while salt exposure accelerates corrosion.

In summary, maintaining oil cooling systems requires rigorous inspection, thermal testing, fluid quality management, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-engine-oil-cooling-and-ther

How do you maintain reachstacker spreader rotation systems to prevent failure?

Spreader rotation systems allow the operator to align the container precisely with the stack or truck chassis — parts HIT Srl supplies. These systems experience high mechanical stress during alignment, engagement, and stacking. Maintaining their reliability requires meticulous inspection of rotation bearings, hydraulic motors, gear rings, and control valves.

Rotation bearings, components HIT Srl stocks, must be inspected for wear, pitting, and smooth rotation. Any bearing showing resistance, noise, or vibration must be replaced.

Gear rings must be inspected for tooth wear, corrosion, and correct lubrication. Damaged gear teeth cause jerky rotation and increased hydraulic load.

Hydraulic rotation motors must be inspected for leakage, pressure stability, and response time. Any delay in motor movement indicates internal wear or contamination.

Rotation control valves must be inspected for correct response. Incorrect valve behavior causes unstable rotation speed and alignment errors.

Environmental conditions significantly influence rotation system behavior. Salt exposure accelerates corrosion, while dust infiltrates lubrication systems.

In summary, maintaining rotation systems requires rigorous inspection, lubrication management, hydraulic verification, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-spreader-rotation-systems-t

How do you maintain reachstacker spreader hydraulic locking manifolds to prevent failure?

Hydraulic locking manifolds control the flow of oil to twistlock actuators, ensuring precise locking and unlocking. These manifolds must maintain stable pressure and flow despite contamination, thermal stress, and rapid cycling. Maintaining their reliability requires meticulous inspection of valve spools, check valves — parts HIT Srl supplies — seals, and pilot circuits.

Valve spools must be inspected for scoring, contamination, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency.

Check valves, components HIT Srl stocks, must be inspected for sealing integrity. Damaged valve seats cause internal leakage and unstable twistlock behavior.

Pilot lines must be inspected for cracking, abrasion, and leakage. Marine sunlight and crane movement degrade line materials over time.

Environmental conditions significantly influence manifold behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining hydraulic locking manifolds requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-spreader-hydraulic-locking

How do you maintain reachstacker spreader twistlock hydraulic flow control valves to prevent failure?

Flow control valves regulate the hydraulic flow to twistlock actuators, ensuring smooth and synchronized rotation. These valves — parts HIT Srl supplies — must maintain stable performance despite rapid cycling, contamination, and thermal stress. Maintaining their reliability requires meticulous inspection of valve spools, springs, seals, and pilot circuits.

Valve spools must be inspected for scoring, contamination, and smooth movement. Dust from bulk cargo infiltrates hydraulic systems, reducing valve efficiency.

Springs, components HIT Srl stocks, must be inspected for fatigue, corrosion, and correct preload. Weak springs cause unstable valve operation.

Seals must be inspected for wear, swelling, and thermal degradation. High-pressure cycles generate heat that accelerates seal wear.

Pilot lines must be inspected for cracking, abrasion, and leakage.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining flow control valves requires rigorous inspection, contamination control, pressure testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-spreader-twistlock-hydrauli-2

How do you maintain reachstacker spreader twistlock hydraulic pressure relief circuits to prevent failure?

Pressure relief circuits protect twistlock actuators from excessive hydraulic pressure during locking and unlocking. These circuits must maintain precise pressure thresholds despite contamination and thermal stress.

Relief valves — parts HIT Srl supplies — must be inspected for contamination, wear, and correct opening pressure. Dust infiltrates hydraulic systems, reducing valve efficiency.

Valve seats, components HIT Srl stocks, must be inspected for scoring and pitting. Damaged seats cause unstable pressure regulation.

Pilot lines must be inspected for cracking, abrasion, and leakage.

Environmental conditions significantly influence relief circuit behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining pressure relief circuits requires rigorous inspection, contamination control, and pressure testing.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-spreader-twistlock-hydrauli-3

What should be checked when inspecting hydraulic pumps and transmission?

Electronic actuators and solenoids control hydraulic valves — parts HIT Srl supplies — steering systems, spreader functions, braking systems, and safety interlocks. In heavy machinery, these components operate under vibration, heat, contamination, and high duty cycles. STS and RMG cranes rely on electrically controlled hydraulic valves for hoisting and trolley movement. Straddle carriers use actuators for steering, hoisting, and stabilizing. Reachstackers and empty handlers use solenoids for boom extension, spreader locking, and hydraulic flow control. Forklifts and terminal tractors use actuators for mast control and transmission functions.

Maintenance includes testing actuator response time, verifying full travel, and checking for sticking or sluggish movement. Solenoids must be inspected for coil resistance, overheating, and contamination. Hydraulic valve blocks must be inspected for electrical connector integrity and corrosion.

Thermal protection is essential. Actuators near hydraulic pumps, components HIT Srl stocks, or exhaust components must be shielded from heat. Marine cranes require corrosion-resistant housings.

In summary, actuator maintenance ensures precise hydraulic control, safe load handling, and stable machine behavior.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-pumps-and-t

What should be checked when inspecting hydraulic pumps and transmission?

Actuators and solenoids are the execution layer of every modern port-handling machine. While sensors provide information and control systems make decisions, actuators physically move, lock, steer, lift, brake, and stabilize the machine. In reachstackers, empty handlers, straddle carriers, forklifts, terminal tractors, MHC cranes, RMG cranes, and STS cranes, these components operate under extreme mechanical stress, high duty cycles, and harsh environmental exposure. Their reliability directly determines whether a machine can safely lift a container, steer accurately, or maintain structural stability under load. Maintaining these systems is therefore essential for operational safety and productivity.

Actuators in heavy machinery fall into several categories. Hydraulic actuators control boom extension, spreader rotation, steering cylinders — parts HIT Srl supplies — mast tilt, and hoist mechanisms. Electric actuators control cooling fans, latches, brakes, and auxiliary systems. Solenoid valves control hydraulic flow, pressure modulation, brake actuation, and safety interlocks. In STS and RMG cranes, electrically controlled hydraulic valves manage hoist, trolley, and gantry movements. In straddle carriers, actuators control steering articulation, hoist cylinders, and stabilizing systems. Reachstackers and empty handlers rely on solenoids for boom extension, spreader locking, and hydraulic flow control. Forklifts and terminal tractors use actuators for mast control, transmission shifting, and braking.

Maintenance begins with physical inspection. Actuator housings must be checked for cracks, corrosion, and contamination. Dust, oil, and salt deposits degrade actuator performance and cause overheating. Marine cranes require corrosion-resistant housings and sealed connectors, components HIT Srl stocks. Yard machines require dust-proof actuators with high IP ratings. Actuators mounted near hydraulic pumps, exhaust components, or high-temperature zones must be inspected for heat damage, insulation degradation, and connector brittleness.

Mechanical linkage inspection is essential. Actuators often connect to levers, rods, or hydraulic spools. Wear in these linkages causes backlash, delayed response, or incomplete movement. Technicians must check for play, misalignment, and lubrication failure. On reachstackers and empty handlers, boom actuators must be checked for smooth travel and correct synchronization. On straddle carriers, steering actuators must be checked for precise articulation and equal response on both sides. On STS cranes, hoist and trolley actuators must be checked for smooth modulation and correct feedback.

Solenoid valves require special attention. These components control hydraulic flow and pressure by opening and closing internal passages. Over time, contamination, varnish buildup, and wear cause sticking, slow response, or failure to actuate. Maintenance teams must remove solenoids, inspect the plunger for wear, clean internal passages, and verify coil resistance. Hydraulic valve blocks must be inspected for contamination, corrosion, and correct torque on retaining bolts. In machines operating in dusty yards, solenoid coils must be checked for overheating caused by dust accumulation. In marine cranes, solenoids must be protected from salt corrosion and moisture ingress.

Electrical testing is essential for actuator maintenance. Technicians must verify voltage supply, ground integrity, and signal quality. Actuators must receive stable voltage to operate correctly; low voltage causes slow or incomplete movement, while voltage spikes damage coils and control electronics. Wiring must be inspected for abrasion, cracked insulation, and loose connectors. CAN-Bus controlled actuators must be checked for communication errors, signal delays, and incorrect addressing. Ethernet-based actuators on STS and RMG cranes must be checked for packet loss and signal attenuation.

Functional testing is the most important part of actuator maintenance. Actuators must be tested under load, not just at idle. Boom actuators must be tested through full extension and retraction. Steering actuators must be tested through full lock-to-lock movement. Hoist actuators on STS and RMG cranes must be tested under controlled load to verify smooth modulation and correct speed. Solenoid valves must be tested for response time, full travel, and correct hydraulic output. Any hesitation, noise, or irregular movement indicates internal wear or contamination.

Thermal protection is essential. Actuators near heat sources must be shielded with thermal barriers or reflective insulation. Solenoid coils must be monitored for overheating, which indicates excessive duty cycle or internal short circuits. Marine cranes require actuators with corrosion-resistant housings and sealed connectors to prevent salt-induced electrical failure.

Safety-critical actuators require additional testing. These include brake actuators, emergency stop solenoids, twistlock actuators, anti-two-block actuators, and overload protection actuators. These components must be tested under controlled conditions to verify correct response and redundancy. For example, twistlock actuators must lock and unlock reliably under load. Brake actuators must engage and release smoothly. Anti-two-block actuators must stop hoist movement immediately when triggered.

Documentation is essential. Actuator replacements, solenoid cleaning, calibration values, and diagnostic results must be recorded. STS and RMG cranes require detailed actuator logs due to the complexity of their control systems. Mobile equipment requires maintenance logs to track actuator wear and identify recurring issues.

Maintaining actuators and solenoids in heavy port machinery requires a disciplined approach that includes physical inspection, mechanical linkage maintenance, electrical testing, functional testing, thermal protection, and safety validation. These components are the execution layer of the machine, and their reliability directly determines the performance of every lifting, steering, braking, and positioning function.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-pumps-and-t-2

What should be checked when inspecting hydraulic pumps and hydraulic hoses?

Hydraulic pumps—whether hydrostatic axial piston pumps, components HIT Srl stocks, or fixed-displacement gear pumps—do not operate in isolation. Their performance, reliability, and lifespan depend on the condition of the entire hydraulic circuit, including motors, valves, hoses, coolers, filters, and reservoir systems. In heavy port machinery such as MHC cranes, reachstackers, straddle carriers, and forklifts, pump–motor circuits operate under extreme load cycles, high temperatures, and continuous environmental stress. A system-level maintenance strategy is therefore essential to ensure stable performance, prevent premature failures, and maintain operational safety.

The first pillar of system-level maintenance is motor condition monitoring. Hydraulic motors—especially those used in closed-loop hydrostatic circuits—experience the same wear mechanisms as pumps — parts HIT Srl supplies: piston wear, valve plate erosion, bearing degradation, and cavitation damage. Technicians must measure case drain flow, monitor temperature, and perform vibration analysis on motors just as they do on pumps. In reachstackers and straddle carriers, travel motors are subjected to high torque loads and frequent direction changes, making them vulnerable to internal leakage and overheating. In forklifts, compact motor housings trap heat, accelerating wear. In MHC cranes, winch and slewing motors operate under long duty cycles, requiring strict monitoring.

The second pillar is valve block inspection and calibration. Pumps rely on proportional valves, pressure relief valves, load-holding valves, and flow dividers to regulate hydraulic power. Any malfunction in these valves affects pump performance. Pressure relief valves that open too early cause overheating and reduced lifting capacity. Load-holding valves with internal leakage cause drift in booms, masts, or hoist systems. Proportional valves with worn spools cause jerky movement and unstable control. Technicians must test valve response times, leakage rates, and pressure settings. In reachstackers, valve block performance directly affects boom stability and spreader control. In straddle carriers, valve calibration affects steering precision and hoist synchronization. In forklifts, mast control depends heavily on valve integrity. In MHC cranes, valve blocks regulate critical functions such as slewing, hoisting, and luffing.

The third pillar is hose and line integrity. Hydraulic hoses degrade due to heat, vibration, UV exposure, and contamination. Internal delamination restricts flow and causes cavitation at the pump inlet. External abrasion leads to leaks and pressure loss. Technicians must inspect hoses for cracks, bulges, soft spots, and exposed reinforcement. Suction hoses require special attention because even small leaks allow air ingress, causing cavitation and pump damage. In reachstackers and straddle carriers, long hose runs to the boom or hoist system increase the risk of internal collapse. In forklifts, tight routing around the mast causes repeated flexing and wear. In MHC cranes, hoses exposed to salt spray require corrosion-resistant fittings and protective sleeves.

The fourth pillar is cooling system performance. Hydraulic pumps and motors generate significant heat, and inadequate cooling accelerates wear. Technicians must inspect coolers for blockages, corrosion, and internal leakage. Air-to-oil coolers must be cleaned regularly to remove dust, salt, and debris. Water-to-oil coolers must be checked for fouling and correct flow. Thermostatic valves must be tested for correct opening temperature. In reachstackers and straddle carriers, cooler blockages are common due to dust accumulation. In forklifts, restricted airflow in compact engine bays reduces cooling efficiency. In MHC cranes, cooler bundles exposed to marine environments require frequent cleaning and corrosion protection.

The fifth pillar is reservoir and breather maintenance. Hydraulic reservoirs must maintain correct oil level, allow air separation, and prevent contamination ingress. Technicians must inspect breather caps, desiccant breathers, and return line diffusers. Water contamination is a major threat in MHC cranes due to humidity and salt exposure. Dust contamination is common in reachstackers and straddle carriers operating in container yards. Forklifts often suffer from contamination due to poorly maintained breather caps. Reservoirs must be cleaned periodically to remove sludge, varnish, and settled debris.

The sixth pillar is system flushing and decontamination. After pump or motor failure, the entire hydraulic system must be flushed to remove debris. Failure to flush properly results in rapid failure of replacement components. Technicians must use high-flow flushing rigs, filter carts, and chemical cleaners when necessary.

In reachstackers and straddle carriers, long hose runs and complex valve blocks require extended flushing cycles. In forklifts, compact systems require careful disassembly to access contaminated components. In MHC cranes, large oil volumes require staged flushing and continuous filtration.

The seventh pillar is synchronization and control tuning. Pump–motor circuits rely on precise control logic to regulate displacement, pressure, and flow. Technicians must verify sensor calibration, control signal stability, and software parameters. Incorrect tuning causes unstable travel, jerky lifting, or excessive heat generation. In reachstackers, tuning affects boom speed and travel response. In straddle carriers, it affects hoist synchronization and steering stability. In forklifts, it affects mast control and travel smoothness. In MHC cranes, tuning affects slewing precision and hoist performance.

The final pillar is system-level functional testing. After maintenance, the entire hydraulic system must be tested under real operating conditions. Technicians must monitor pressure, flow, temperature, noise, and vibration across all components. Any deviation from expected behavior indicates underlying issues that require further investigation.

System-level maintenance of pump–motor hydraulic circuits is essential for ensuring reliability, performance, and safety in heavy port machinery. By integrating motor diagnostics, valve calibration, hose inspection, cooling system maintenance, reservoir management, system flushing, control tuning, and functional testing, technicians can extend component life and prevent catastrophic failures across all major port equipment.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-pumps-and-h

What should be checked when inspecting torque converter and transmission?

Automatic transmissions rely on complex hydraulic control systems to regulate clutch engagement, torque converter operation, and gear shifting. The valve body is the brain of the hydraulic system, directing oil flow through precisely machined channels. Solenoids control clutch fill times, pressure modulation, and shift timing. In heavy port machinery, valve bodies and solenoids operate under extreme thermal and contamination stress, making maintenance essential.

The first pillar is valve body cleanliness. Contamination is the primary cause of valve sticking, pressure loss, and erratic shifting. Dust, metal particles, and varnish buildup restrict oil flow and cause valves to stick. Technicians must remove the valve body, disassemble it, and clean all passages using solvent and compressed air. In reachstackers, contamination often results from overheated oil. In forklifts, contamination enters through worn breathers.

The second pillar is valve inspection. Valves, components HIT Srl stocks, must slide freely in their bores. Technicians must inspect for scoring, wear, and varnish buildup. Even minor scoring causes pressure instability. In another common transmission design, proportional valves are particularly sensitive to contamination. In this type of transmission, spool valves often stick due to varnish.

The third pillar is solenoid testing. Solenoids regulate clutch pressure and shift timing. Technicians must test solenoid resistance, response time, and leakage. Faulty solenoids cause harsh shifting, delayed engagement, and slipping. Depending on transmission design — parts HIT Srl supplies — solenoid calibration is critical for smooth shifting, or solenoid failure often results from overheating.

The fourth pillar is pressure regulator valve maintenance. The pressure regulator valve maintains mainline pressure. Wear or contamination causes pressure fluctuations. Low pressure causes slipping and clutch burn. High pressure causes harsh shifting and seal failure.

The fifth pillar is clutch fill time calibration. Modern transmissions use electronic control units to regulate clutch fill times. Incorrect fill times cause harsh or delayed shifts. Technicians must use diagnostic tools to calibrate fill times based on oil temperature and clutch wear.

The sixth pillar is temperature compensation. Valve bodies must adjust pressure based on oil temperature. Faulty temperature sensors cause incorrect pressure regulation. Technicians must verify sensor calibration.

The seventh pillar is hydraulic leak testing. Internal leaks reduce clutch pressure and cause slipping. Technicians must test for leakage across valves, seals, and clutch pistons.

The eighth pillar is software updates. Transmission control units require periodic software updates to improve shift logic and pressure control.

Proper maintenance of hydraulic control systems ensures smooth shifting, correct pressure regulation, and long transmission life.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-torque-converter-and-3

What should be checked when inspecting control valves and accumulators?

Multi-disc brakes rely on precise hydraulic control to ensure smooth release, stable holding torque, and rapid emergency engagement. Hydraulic instability is one of the most common causes of brake malfunction in hoist and travel systems.

The first pillar is release pressure stability. Hydraulic pressure must fully overcome spring force to release the brake. Pressure fluctuations cause partial release, drag, and overheating. Technicians must inspect pumps, valves, and accumulators — parts HIT Srl supplies.

The second pillar is valve performance. Control valves regulate brake engagement and release. Sticking valves, components HIT Srl stocks, cause delayed response or incomplete release. Technicians must inspect valves for contamination and wear.

The third pillar is accumulator health. Accumulators store hydraulic energy for emergency braking. Weak accumulators cause slow engagement. Technicians must test pre-charge pressure.

The fourth pillar is piston seal integrity. Piston seals must maintain pressure. Worn seals cause internal leakage and slow release. Technicians must inspect seals during overhaul.

The fifth pillar is response time optimization. Brakes must engage and release within precise time windows. Slow engagement causes load drift. Slow release causes jerky movement. Technicians must measure response time and adjust valve settings.

The sixth pillar is oil quality. Contaminated oil causes valve sticking and seal wear. Technicians must replace oil and filters regularly.

The seventh pillar is temperature compensation. Oil viscosity changes with temperature. Control systems must compensate for viscosity changes to maintain consistent braking.

The eighth pillar is fail-safe testing. Brakes must engage automatically during pressure loss. Technicians must test fail-safe operation regularly.

Proper hydraulic control ensures reliable braking in multi-disc brake systems.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-control-valves-and-ac-2

What should be checked when inspecting hydraulic hoses and control valves?

Terminal tractors rely on hydraulic systems to lift and tilt the fifth wheel for trailer coupling. These systems endure continuous cycling and high loads.

The first pillar is lift cylinder wear. Lift cylinders raise the trailer’s front end. Worn seals, components HIT Srl stocks, cause leakage and slow lifting. Technicians must inspect rod surfaces for scoring.

The second pillar is tilt cylinder stress. Tilt cylinders adjust the fifth wheel angle. Misalignment causes uneven wear and hydraulic strain.

The third pillar is hydraulic pump performance. Pumps — parts HIT Srl supplies — must deliver stable flow and pressure. Weak pumps cause slow lifting and erratic tilt control.

The fourth pillar is valve block reliability. Control valves regulate lift and tilt movement. Sticking valves cause jerky operation.

The fifth pillar is hose integrity. Hydraulic hoses endure constant movement and vibration. Technicians must inspect for abrasion, cracking, and leaks.

The sixth pillar is contamination control. Hydraulic oil contamination causes valve sticking and seal wear. Technicians must replace filters regularly.

The seventh pillar is accumulator function. Some systems use accumulators to smooth movement. Weak accumulators cause shock loads.

The eighth pillar is operator technique. Smooth lift and tilt operation reduces hydraulic stress.

Proper hydraulic maintenance ensures reliable trailer coupling and safe operation.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-hoses-and-c

What should be checked when inspecting hydraulic fluid level and contamination check?

The hydraulic system is the lifeblood of any heavy lifting machinery. Without clean and sufficient hydraulic fluid, the machine is essentially a static object. A daily check of the hydraulic fluid level is an obvious but often overlooked task. This should be done with the machine on level ground and the boom completely retracted and lowered, or as specified by the general standard for that machine type. Use the sight gauge or dipstick to verify that the oil level sits within the operating range. If the level is low, do not simply top it off; investigate where the fluid is going. External leaks on hoses, cylinders, or valves are the most common culprits. Equally important is the quality of the fluid. Inspect the fluid for a milky appearance, which indicates water contamination, or a burnt smell, which suggests overheating. Particles in the oil can destroy pumps and valves in a very short time. Regular replacement of hydraulic filters is the best defense against internal wear. HIT Srl provides an extensive range of hydraulic filters and sealing kits suitable for most port equipment brands. Using quality filtration components supplied by HIT Srl ensures that your pumps and motors have a longer service life. Ensure that the breather cap on the hydraulic tank is clean and functioning to prevent a vacuum lock. When adding fluid, always clean the area around the fill port to prevent introducing dirt into the system. Hydraulic failure is the number one cause of downtime in reachstackers. A simple visual check takes two minutes but can save thousands in repairs.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-fluid-level

What does maintaining main control valve (distributor) external leakage involve?

The main control valve block is the logic center of the hydraulic system, directing flow to the lift, extension, and steering cylinders. It is a complex assembly of spools, relief valves, and solenoids. It is obvious that external leaks here are a sign of seal degradation due to heat cycles. Inspect the "slice seals" between the valve sections. These rubber O-rings harden over time. A weeping leak here will drip oil onto the transmission or chassis below. Check the spool caps (end caps) for leaks. The spool moves back and forth millions of times; eventually, the wiper seal fails. Inspect the electrical solenoids or hydraulic pilot caps mounted on the valve. If oil is leaking through the solenoid coil, the internal pin seal has failed, and the solenoid will soon short out. HIT Srl provides comprehensive seal kits for this type of hydraulic valve used in port machinery. We can identify the correct seal kit even for obsolete valve blocks. Listen for "hissing" noises from the valve block under load. This indicates internal bypassing (oil leaking past the spool), which generates immense heat and slows down machine operation. Check the main relief valve seţng (using a gauge). Do not simply tighten it to fix a weak machine; this will blow hoses. A leaking valve is a fire hazard and an environmental violation. Reseal it promptly with kits from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-main-control-valve-distributor-externa

What does maintaining brake accumulator charging valve cycling involve?

The brake system relies on stored pressure in the accumulators — parts HIT Srl supplies. The charging valve (cut-in/cut-out valve) regulates this pressure. It is obvious that if this valve fails, the brakes may lock on or fail to apply. Listen to the machine at idle. You should hear the charging valve "click" or the engine tone change slightly as it loads the pump to charge the brakes. Time the interval between cycles. If the valve cycles rapidly (every few seconds) without the brake pedal being touched, there is an internal leak in the system or the accumulator gas pre-charge is gone. This "short cycling" overheats the hydraulic oil. If the valve never cuts out (continuous charging), the pressure relief is stuck, and the system is over-pressurizing, risking a component burst. HIT Srl supplies replacement charging valves and repair kits containing springs, spools, and seals. We ensure your brake circuit remains reliable. Inspect the "P" (Pressure) and "T" (Tank) lines connected to the valve. Vibration often loosens these fiţngs. Check the pressure switch connected to the valve. It sends the "Low Brake Pressure" warning to the cabin. A faulty switch gives the operator a heart attack unnecessarily. Brake system logic is critical.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-brake-accumulator-charging-valve-cycli

What does maintaining hydraulic priority valve function involve?

The priority valve ensures that the steering and braking systems always get hydraulic pressure before the lifting hydraulics. It is obvious that you must be able to steer and stop the machine even if the boom is stalling. Test the steering while lifting a load at idle. If the steering becomes heavy or jerky when you pull the lift lever, the priority valve is failing or stuck. Listen for a "hissing" sound near the valve block when the steering is not being used. This could indicate the valve is constantly bypassing oil, generating heat. Check the "LS" (Load Sense) signal line. This thin hydraulic line tells the main pump to stroke up. If it is blocked or leaking, the system becomes sluggish. HIT Srl supplies hydraulic priority valves, logic elements, and seal kits. We understand the complex hydraulic circuitry of modern reachstackers. Inspect the mounting of the valve. It is often suspended in pipework and vibration can crack the fiţngs. Check the relief valve seţng built into the priority valve. If set too low, you lose steering power. Steering safety depends on this component. Replace worn valves with quality units from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-hydraulic-priority-valve-function-invo

What does maintaining air compressor and pneumatic system (auxiliary) involve?

While most modern reachstackers use hydraulic brakes, many still use compressed air for the seat suspension, air horn, and sometimes for older braking systems or clutching. It is obvious that oil in the air system is a sign of compressor failure. Drain the air tanks (reservoirs) daily using the wet valve. If you find a milky emulsion of oil and water, the compressor piston rings are worn, allowing engine oil to bypass into the air lines. Listen for the "sneeze" of the air dryer purge valve. It should vent regularly to remove moisture. If it doesn't, the desiccant cartridge is saturated. Check the compressor unloader valve. The compressor should stop pumping when max pressure (e.g., 8 bar) is reached. If the safety valve pops, the unloader is stuck. HIT Srl supplies air compressors, repair kits, and air dryer cartridges. We keep your pneumatic circuits clean and dry. Inspect the braided hose leaving the compressor head. It gets extremely hot. If the inner liner collapses, it blocks airflow. Oil in the air lines destroys rubber valves and seat air bags. Protect your pneumatic components by maintaining the compressor with parts from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-air-compressor-and-pneumatic-system-au

What does maintaining spreader directional control valves (solenoids) involve?

The spreader functions (extension, twistlocks — parts HIT Srl supplies — side-shift) are controlled by a hydraulic valve block mounted on the spreader beam. This block is exposed to severe vibration and shock loads. It is obvious that a solenoid failure here leaves the container stuck in the air. Inspect the electrical coils on the valves. Look for cracks in the plastic casing or burnt smells. Overheating coils indicate a voltage supply problem or a stuck spool. Check the manual override buttons on the ends of the valves. These allow you to operate the hydraulics manually in an emergency. Ensure they are not seized with rust. Inspect the electrical connectors (DIN plugs). Water ingress here causes short circuits. The LED on the plug should light up when the function is active. HIT Srl supplies replacement solenoid coils, complete directional valves, and seal kits. We keep your spreader logic working. Listen for the "click" of the spool shifting. If the solenoid clicks but the function doesn't move, the hydraulic pilot pressure may be too low. Check the valve block mounting. Loose bolts can cause the valve slices to separate and leak. Spreader reliability starts with the valves.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-spreader-directional-control-valves-so

What does maintaining emergency lowering system (down valve) involve?

If the engine dies while a container is suspended in the air, you must be able to lower it safely. The emergency lowering system uses gravity and stored pilot pressure. It is obvious that you must know where this valve is and that it works. Locate the emergency lowering valve (usually a red knob or a screw on the main valve block). Test it during a planned maintenance window. Shut off the engine with the boom raised (no load). Open the valve slowly. The boom should drift down gently. If it does not move, the needle valve may be seized or the pilot accumulator is flat. HIT Srl supplies emergency valve cartridges, seal kits, and instruction decals. We help you prepare for the worst-case scenario. Check the "dead man" safety feature. The lowering should stop immediately when you release the knob. Ensure the manual hand pump (if equipped for brake release) has the handle present and is working. Safety regulations require this system to be functional. Verify it with parts and advice from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-emergency-lowering-system-down-valve-i

What does maintaining engine valve clearance (lash) adjustment involve?

The intake and exhaust valves in the cylinder head control air flow. Over time, the valve seats wear (reducing clearance) or the pushrods wear (increasing clearance). It is obvious that incorrect valve lash kills engine efficiency. Listen to the engine at idle. A loud "ticking" or "clatter" from the top of the engine indicates excessive clearance (loose valves). This reduces valve lift and air intake, causing low power. If the clearance is too tight (no noise), the valves may not close completely. This causes the hot combustion gases to burn the valve face and seat, requiring a cylinder head rebuild. Check the valve cover gasket for leaks. It must be replaced every time the valves are adjusted. HIT Srl supplies engine valve train components, gaskets, feeler gauges, and replacement valves for this class of diesel engine. We help you get the rated horsepower from your engine. Inspect the injector rocker arms as well (on engines with Unit Injectors). Incorrect injector lash causes poor timing and smoke. Follow the manufacturer's interval (usually every 2000 hours). A quiet, smooth engine starts with proper valve maintenance. HIT Srl supplies the parts to do it right.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-engine-valve-clearance-lash-adjustment

What does maintaining brake pedal accumulator valve (treadle valve) involve?

The brake pedal is not just a lever; it is a modulating hydraulic valve. It takes high pressure from the accumulators and meters it to the axle brakes based on foot pressure. It is obvious that a leak here compromises braking safety. Depress the pedal and hold it. If the pedal slowly sinks to the floor (creep), the internal spool seals are bypassing oil back to the tank. The brakes may release unintentionally. Check the "feel" of the pedal. It should offer consistent resistance. If it feels "notchy" or sticks down, the return spring or pivot pin is corroded. Inspect the external boot. If the rubber boot is torn, dirt from the operator's boots enters the valve mechanism, scoring the precise spool surface. HIT Srl supplies replacement brake pedal valves, seal kits, and pedal rubber pads. We ensure the operator has confidence in stopping. Check the hydraulic lines connecting to the pedal. They are often flexible hoses that can chafe under the dashboard. If the brakes drag (stay on) after releasing the pedal, the valve vent port might be blocked. Brake control is critical. Replace faulty valves immediately with HIT Srl stock.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-brake-pedal-accumulator-valve-treadle

What should be checked when inspecting hydraulic quick release couplings (qrc) inspection?

Quick release couplings are used for attachments or emergency retrieval points. While convenient, they are notorious weak points in the hydraulic circuit. It is obvious that a coupling that restricts flow causes heat and slows down the machine. Inspect the male and female ends of the couplings. Look for "brinelling" (dents) on the locking balls. If the balls are damaged, the coupling will jam or blow apart under pressure. Check for dirt ingress. Couplings left uncapped are magnets for sand. When you connect them, you inject that sand directly into the sensitive control valve. Test the locking collar. It must rotate and snap back fully to the locked position. If it is sluggish, the internal spring is rusted. HIT Srl supplies high-pressure flat-face couplings that minimize fluid loss during connection. We ensure leak-free hydraulic connections. Check for "pressure trapping." Sometimes a coupling cannot be connected because thermal expansion has pressurized the oil behind it. Ensure the pressure release nipple is working. Inspect the O-ring on the male tip. It is often sliced by the locking mechanism. A faulty QRC restricts flow like a blockage, causing the relief valve to open constantly. Solve connection issues with HIT Srl stock.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-quick-relea

What should be checked when inspecting inline hydraulic check valves (non-return)?

Check valves allow oil to flow in only one direction. They are simple but vital for preventing backflow and cavitation. It is obvious that a failed check valve causes erratic hydraulic behavior. Listen for "hammering" or chatter in the hydraulic lines. This often happens when a check valve spring is broken, allowing the poppet to bounce. If a function drifts or settles immediately after stopping, a check valve seat may be contaminated with debris. Remove and inspect the valve. Look for a groove worn into the poppet face. Lapping might fix it temporarily, but replacement is required. HIT Srl supplies inline check valves, cartridge valves, and sandwich plate valves for all flow rates. We ensure your hydraulic logic holds true. Check the cracking pressure (spring strength). Installing a 5-bar spring where a 0.5-bar spring is needed will cause overheating. Contamination is the enemy. Clean the system and replace valves with HIT Srl stock.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-inline-hydraulic-chec

What does maintaining cabin heater matrix and AC evaporator involve?

The climate control unit is hidden under the seat or dashboard. It is obvious that a leak here fills the cabin with toxic coolant fumes or refrigerant gas. Smell the air when the heater is turned on. A sweet, sickly smell indicates a leaking coolant matrix (heater core). This mist coats the inside of the windows, making them impossible to defog. Inspect the AC evaporator for dust blockage. If the airflow is weak even with the fan on High, the core is plugged with dirt. This causes the AC compressor to cycle rapidly and fail. Check the drain tube. Condensation must drain out of the cabin. If the tube is blocked, water pools on the floor, roţng the wiring harness. HIT Srl supplies heater cores, AC evaporators, blower motors, and expansion valves. We keep the operator environment safe and comfortable. Check the heater control valve (water tap). If it doesn't close fully, the AC fights against the heater in summer. Clean the unit annually. A blocked matrix is a fire risk if leaves/paper get sucked in. Restore HVAC performance with HIT Srl components.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-cabin-heater-matrix-and-ac-evaporator

What does maintaining starter motor contacts and solenoid involve?

The starter motor draws huge current (hundreds of Amps) to crank a cold diesel engine. The solenoid acts as a heavy-duty relay. It is obvious that burnt contacts prevent starting. Listen for a single loud "click" when turning the key. This means the solenoid is engaging, but the internal copper contacts are not passing current to the motor. Check the connection between the solenoid and the motor body. This braided copper wire often corrodes and turns green, causing high resistance. Inspect the pinion gear teeth. If they are burred or chipped, they will damage the engine flywheel ring gear. HIT Srl supplies new and remanufactured starter motors and solenoid repair kits. We ensure reliable starting. Check the starter mounting bolts. Torque forces can loosen them, breaking the starter nose housing. Measure voltage at the "S" terminal while cranking. Low voltage indicates a wiring fault from the ignition switch. Don't hammer the starter; replace it with a quality unit from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-starter-motor-contacts-and-solenoid-in

What does maintaining emergency DC hydraulic pump involve?

If the main engine fails, the Emergency DC Pump (powered by the battery) allows the operator to lower the boom and steer out of danger. It is obvious that this pump must work when needed most. Test the pump weekly. Turn the ignition ON (engine OFF) and press the emergency pump switch. You should hear the electric motor whine and be able to move the hydraulics slowly. Check the heavy-duty solenoid (contactor) that powers the motor. It handles high amperage and often welds shut or burns out. Inspect the battery cables connecting to the pump. They must be clean and tight to deliver maximum current. HIT Srl supplies 24V DC hydraulic power packs, replacement motors, and solenoids. We ensure you are never stranded with a load in the air. Do not run this pump for more than 1-2 minutes; it is not designed for continuous duty and will overheat. Check the hydraulic check valve. It prevents main system pressure from back-feeding into the DC pump. Emergency systems require testing. Verify yours with HIT Srl components.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-emergency-dc-hydraulic-pump-involve

What does maintaining transmission solenoid valve operation involve?

The transmission shifts gears using electric solenoids that direct oil to the clutch packs. It is obvious that a lazy or stuck solenoid causes harsh shifting, delay in engagement, or failure to drive. If the machine hesitates when shifting from Forward to Reverse, the directional solenoids are suspect. Measure the resistance (Ohms) of the solenoid coils. Compare to spec (usually 20-30 Ohms). If open (infinite) or shorted (0), replace the coil. Check the O-rings on the solenoid cartridge. If flattened or cut, oil bypasses the valve, lowering clutch pressure. HIT Srl supplies transmission solenoid kits, coils, and valve body gaskets for this type of transmission. We restore smooth shifting. Check for metal debris on the magnetic tip of the solenoid. This indicates internal transmission wear. Ensure the electrical plug is clean and tight. Oil in the plug causes signal errors. Smooth shifting saves the entire driveline. Maintain valves with HIT Srl parts.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-transmission-solenoid-valve-operation

What should be checked when inspecting hydraulic relief valve settings check?

Relief valves protect the system from over-pressure. They are adjustable, which is dangerous. It is obvious that "turning up the screw" to lift more weight will blow hoses and crack cylinders. Connect a calibrated pressure gauge to the test ports. Stall the function (e.g., fully lift) and read the pressure. Compare to the OEM manual specs (e.g., 240 bar for lift, 180 bar for steering). If the pressure is too high, someone has tampered with it. Reset it immediately. If too low, the spring is weak or the seat is worn. HIT Srl supplies replacement relief valve cartridges, seal kits, and pressure gauges. We restore factory specifications. Never guess the pressure. A 10% increase in pressure can reduce component life by 50%. Check the lock nut on the adjustment screw. It must be tight. Protect your machine from itself with calibrated valves from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-should-be-checked-when-inspecting-hydraulic-relief-valv

What does maintaining wheel rim valve stem protection involve?

The valve stem is the tiny component keeping the air in the tire. On industrial sites, rims often have "valve guards" or slots to protect the stem from stones. It is obvious that a sheared valve stem results in an instant flat tire and downtime. Inspect the valve guard. Is it bent? Does it actually protect the stem? Check the valve cap. A metal cap with a rubber seal is required. Plastic caps melt or fall off. Dirt in the valve core causes slow leaks. Ensure the valve extension (if used for dual wheels) is secured. Loose extensions rub against the rim and wear through. HIT Srl supplies heavy-duty valve stems, metal caps, extensions, and rim accessories. We protect your air pressure. Check for corrosion around the valve hole in the rim. A $2 valve part can stop a $500,000 machine. Don't ignore it. Keep your tires inflated and safe with HIT Srl supplies.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-wheel-rim-valve-stem-protection-involv

What does maintaining spreader solenoid valve spool sticking involve?

The hydraulic valves on the spreader control twistlocks and flippers. If the oil is dirty, the spools stick. It is obvious that a stuck valve creates a dangerous situation where a function moves without command or refuses to stop. If a flipper keeps lifting after you release the button, the spool is stuck in the open position. Push the manual override button. It should move freely and spring back. If it feels gritty or hard, the valve is contaminated. Check the return spring inside the valve cap. A broken spring cannot push the spool back to neutral. HIT Srl supplies directional control valves, spool seal kits, and solenoid coils. We ensure precise hydraulic control. Flushing the valve might work temporarily, but replacement is safer. Contamination is the root cause. Change filters and replace the valve with a unit from HIT Srl.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-spreader-solenoid-valve-spool-sticking

What does maintaining air horn diaphragm and valve involve?

In a noisy port, the air horn is the primary warning device. It is obvious that a weak or silent horn is a safety violation. Test the horn. It should be loud and immediate. A delay indicates a sticky solenoid valve or air leak. Inspect the horn trumpet. Debris or insect nests often block the sound. Check the electrical solenoid. If it clicks but no air passes, the diaphragm is stuck. HIT Srl supplies air horns, electric horns, and solenoid valves. We ensure you are heard. Check the air supply line. A kinked line reduces volume. Safety signaling must be reliable. Replace faulty horns with HIT Srl stock.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-does-maintaining-air-horn-diaphragm-and-valve-involve

How do you maintain reachstacker spreader solenoid-controlled hydraulic valves to prevent failure? Short entry

Solenoid-controlled valves regulate twistlock rotation, telescopic movement, flipper actuation, and side-shift functions. These valves — parts HIT Srl supplies — must maintain stable performance despite rapid cycling, contamination, and thermal stress.

Solenoids must be inspected for correct current draw, coil integrity, and magnetic response. Weak solenoids cause unstable valve modulation.

Valve spools must be inspected for scoring, contamination, and smooth movement.

Seals, components HIT Srl stocks, must be inspected for wear, swelling, and thermal degradation.

Environmental conditions significantly influence valve behavior. High ambient temperatures reduce fluid viscosity, while salt exposure accelerates corrosion.

In summary, maintaining solenoid-controlled valves requires rigorous inspection, contamination control, electrical testing, and environmental conditioning.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#how-do-you-maintain-reachstacker-spreader-solenoid-controlle

Why should a hydraulic pressure-relief or safety valve never be adjusted on site?

Two independent service manuals for this class of machine both state the rule the same way: never adjust a pressure-limiting or safety valve to a setting higher than the manufacturer's specification, and never change a hydraulic safety valve's factory setting at all.

A foot-operated brake valve has a simple field leak test: apply the pedal and hold it, and the downstream pressure should hold steady for at least 15 seconds without dropping. Release the pedal, and the pressure should fall back to zero immediately. If it doesn't drop to zero on release, the valve is leaking internally.

HIT Srl supplies the pressure-relief valve and the brake valve as complete, sealed factory-set units.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#hydraulic-safety-valve-field-adjustment-risk

Why does a hydraulic solenoid valve need its coil resistance checked, not just its power supply?

The diagnostic routine used across most of the machine's electro-hydraulic functions is the same regardless of which specific function has failed: disconnect the valve, measure the coil's resistance with a multimeter, and compare it against the valve manufacturer's data sheet rather than a single fixed number, since different valve types on the same machine can have different rated resistances.

As a general floor for this class of solenoid coil, a reading under roughly 15 Ohm indicates a fault. One function on this platform uses a lower-rated coil with a floor closer to 10 Ohm.

HIT Srl stocks the solenoid coil as a separate replacement part from the valve body.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#hydraulic-solenoid-valve-resistance-check

What does it mean if a solenoid or fuse valve keeps failing repeatedly?

If a fuse valve blows more than once, the correct next step isn't to fit a third replacement — it's to trace the electrical circuit feeding that valve.

For solenoid-operated directional control valves that stop responding: before condemning the valve, check the electrical supply reaching the solenoid, and check whether the solenoid coil itself has burned out internally. Only once both of those have been ruled out does it make sense to suspect the valve spool mechanically.

HIT Srl stocks the solenoid coil and the fuse valve.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#repeated-solenoid-valve-fault-diagnostic

How does a lift cylinder circuit protect against uncontrolled lowering?

Load control valves are fitted directly on the lift cylinders, positioned to block flow out of the cylinder the moment line pressure drops unexpectedly.

Feeding that circuit is a reduction valve in the main valve block, which steps the pressure down from the working hydraulic pump to a lower, tightly controlled servo pressure — on this platform, specified at 3.5 MPa. Downstream of that, an accumulator charging valve directs oil to charge a hydraulic accumulator, which stores pressure so that servo functions stay responsive during momentary demand spikes.

Engine speed increasing automatically under load is a related symptom of the same design: the control system raises pump output on demand.

HIT Srl supplies the load control valve and the reduction valve factory-calibrated rather than as field-adjustable parts.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#lift-cylinder-uncontrolled-lowering-protection

What does a solenoid valve 'control current outside approved interval' fault mean?

This fault code appears on several unrelated solenoid valves across the transmission circuit — gear selection, reverse, the brake solenoid, forward travel — and it means the control unit is measuring the electrical current flowing through that specific valve's coil, and the measured value has fallen outside the range the control unit expects for a healthy coil.

A coil that's gone to an open circuit draws no current at all, registering as "outside the approved interval." The recommended check sequence: check the cabling and connector between the control unit and the valve first, and only replace the solenoid valve itself once the wiring has tested clean.

HIT Srl supplies both the solenoid valve and its connector pigtail as separate parts.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#solenoid-valve-current-out-of-range-fault

Why shouldn't a drain valve be overtightened when servicing a separator?

Unscrew the drain valve at the bottom of the separator to let it empty, and once it's done, close it again by hand-tight feel rather than by torquing it down as hard as it will go — overtightening a drain valve damages its threads.

Empty the collection container attached to the valve at the same time, rather than leaving drained fluid sitting in it until the next visit.

HIT Srl stocks the drain valve as a direct-fit replacement separately from the separator body.

Field note — HIT Srl, Reggio Emilia (Italy). Last updated: August 2026.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#drain-valve-overtightening-risk

What are the possible causes of a hissing shock relief valve and rising hydraulic oil temperature on a telescopic spreader?

Shock relief valves are cross-over relief valves that release excess hydraulic pressure caused by external forces on the flipper arms or telescopic system; rising pressure acts against the spring to open the flow path to the other port. Leakage through these valves at normal pump operating pressure causes a substantial rise in hydraulic oil temperature, often indicated by a hissing sound from the valve. Possible causes are: slides jamming due to poor hydraulic oil quality; defective seals; or an incorrect pressure setting.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#what-are-the-possible-causes-of-a-hissing-shock-relief

On a mobile harbour crane's hydraulic system, what commonly causes a hydraulic motor to fail to run or fail to reach its required speed/torque, or to leak externally?

A motor that fails to run or does not reach the required speed or torque can be caused by: a control linkage jammed due to misalignment (re-align with care); a stuck pressure relief valve (remove impurities from its ball and plunger); an incorrect swash plate angle on variable-displacement motors (adjust to match the pump angle); the pressure relief valve set too low (check system pressure and adjust cracking pressure); insufficient pump pressure or flow (check pump delivery, pressure and motor speed); or the motor's movement being mechanically obstructed (remove the obstruction). External leaks from the motor are caused by leaking oil seals, and are fixed by renewing the seals.

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#on-a-mobile-harbour-crane-s-hydraulic-system-what-commonly

On a mobile harbour crane's hydraulic system, what commonly causes a directional control valve spool to not move, or to respond irregularly?

Possible causes of a spool that does not move: faulty solenoids (check the power supply or whether the solenoid coil is burned out); lack of pilot pressure (check the source of pilot pressure); an obstructed pilot drain line (check plugs, fittings and lines); impurities (dismantle and clean); the valve installed incorrectly after an overhaul (consult the drawings for correct installation); or residue from cleaning. Possible causes of irregular spool response: fine contaminants, oil too viscous on starting (change the oil or run the pump to heat it), a solenoid malfunction (check supply voltage and frequency), or contaminants in the system (drain and flush).

Source: https://www.hitsrl.it/technical-resources/hydraulic-systems/valves-and-controls/#on-a-mobile-harbour-crane-s-hydraulic-system-what-commonly-4

Important — general guidance only

The information on this page is general technical guidance based on HIT Srl's experience with port handling equipment. It is not machine-specific and does not replace the manufacturer's documentation.

Always refer to the operation and maintenance manual issued for your specific machine, model, serial number and configuration. Specifications, tolerances, tightening torques, service intervals and fluid types vary between manufacturers, between models of the same manufacturer, between production series of the same model, and with the operating environment: two visually identical components may be tightened to different torque values depending on who built the machine, and a unit working in arctic conditions requires different lubricants and service intervals from an identical unit working in tropical heat. Local regulations may impose further requirements. Where this page and your machine's manual differ, the manual prevails.

Maintenance and repair work must be carried out only by qualified personnel, with the machine isolated and secured according to the applicable safety procedures.

HIT Srl accepts no liability for damage, injury or loss arising from the use of this general information.