

Painting errors caused by errors in compressed air generation and use



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Errors in compressed air generation, compressed air lines and filter installation

Compressor too small

- The compressed air is not sufficient, the spraying pressure drops.
- Due to the continuous operation of the compressor, the compressed air is strongly heated so that the oil and condensation water content increases.
- Continuous operation at high temperatures shortens the service life of the compressor.

Too old compressor

- The compressor is too inefficient and therefore uneconomical.
- The compressor consumes a lot of oil which, together with high abrasion, can get into the compressed air network.
- Compressed air is sucked in from a humid or dusty area.

High condensate accumulation

High condensate content in the compressed air shortens the service life of the compressed air filters.

Consequences of missing or insufficient filtration:

- Shortening the service life of the compressed air unit.
- Painting result with dust inclusions and water bubbles.

For no expansion tank

- The pressure collapses when additional consumers are switched on.
- The compressed air is too hot, causing the condensate loss to rise so high that separation in the oil/water separators is no longer guaranteed.

Missing or insufficient condensate drain at the equalizing tank of the separator

- The separated condensate is fed as „water“ into the compressed air line where it leads to deposits and corrosion.
- The oil/water separators can be overloaded by the formation of puddles of water; the condensate then penetrates into the compressed air network.
- Excessive amounts of dirt from the compressed air line can impair the function of automatic condensate drains, valves, etc. The condensate can then be discharged into the compressed air network.

Compressed air line is too small in relation to cross section to length

- Pressure loss leads to a high waste of energy.
- When compressed air is removed, the pressure collapses, which can lead to an unsatisfactory painting result.

Compressed air lines without „slope, gooseneck“ and/or condensate drain installed at end of pressure line

- The condensate is dragged into the drain lines.
- The condensate remains in the pipes and leads to deposits and corrosion.

Insufficient filtration and separation

- The condensate and unfiltered particles shorten the life of compressed air equipment and lead to dust inclusions and water bubbles in the paint.

More frequent pressure drop

Too many or too strong air consumers for grinding or injection processes etc. are operated at the same time.

Solution:

- Install additional compressor.
- Organize work in such a way that such peaks do not occur or are softened.
- Install an additional pressure compensation tank to buffer the air volume.

Use of an absorption dryer; due to the self-regeneration of the absorption dryer, cold regenerated, approx. 10 % of the compressed air quantity is permanently blown off into the atmosphere - even if no compressed air is taken.

- Take the absorption dryer out of operation again.
- Use a heat-regenerated absorption dryer - please also note the next point!
- Instead of an absorption dryer, use a refrigerant dryer that does not consume air.
- Use a new, larger compressor.

Use of a heat-generated absorption dryer. Even with the warm regenerated absorption dryer, 2 - 3 % of the supplied compressed air quantity is blown off into the atmosphere - even if no compressed air is removed.

- Take the absorption dryer out of operation.
- Enlarge compressor unit, insert new compressor.

Use of a membrane dryer. By using a membrane dryer (high-tech), approx. 20 - 30 % of the air flow is permanently blown into the atmosphere, even if no compressed air is extracted.

- Shut down the membrane dryer.
- Increase compressor and compressed air system accordingly.
- Use appropriate filtering.

Constriction of the air line cross-section due to dirt.

- Rinse and dry compressed air lines sufficiently, replace if necessary.

Excessive amounts of dirt from and in the compressed air line can impair the function of the automatic condensate drain valve.

- Replace valves

Clean spray air

The safest way is to use a combination fine filter with integrated pressure regulator for coarse adjustment of the spray pressure. Due to the high pressure loss in the air hose / coupling, the flow pressure at the spray gun should be checked if necessary.

- Suction filter of the compressor overgrown.
- Clean or replace the intake filter according to the operating instructions of the compressor and observe maintenance intervals or shorten them as necessary.

Insufficient quantity of compressed air in spite of a sufficiently designed compressed air system (compressor, compressed air lines, refrigerant dryer), high condensate loss and the compressed air filters become clogged very quickly

Compressed air suction from a very humid or dusty area.

- Clean or replace the suction filter regularly.

Suction of compressed air from an insufficiently ventilated compressor room.

- Enlarge air inlet and outlet openings, install fan if necessary.
- Lay the suction pipe to the outside.

Compressed air suction is installed too close to the floor to the outside. This will suck in dust, moisture and possibly CO exhaust gases close to the floor.

- Lay the suction pipes upwards, possibly to the rear of the building, where dust and humidity are lower; observe the wind direction.

Suction filters of the compressor are overgrown.

- Clean or replace the intake filter according to the operating instructions of the compressor and observe maintenance intervals or shorten them as necessary.

Sufficient air volume

Compressor performance must be in proportion to the required air demand and large air duct cross-sections. To avoid excessive pressure loss, the inner diameter of the air hoses should be at least 9 mm. The hose material should be antistatic, silicone-free and pressure-resistant.

Compressed air, the driving force behind paint atomization

Compressed air is often the cause of paint faults.

To ensure an error-free painting result, the compressed air must be available at air atomizing paint spray guns of the highest purity, with sufficient and constant pressure and sufficient volume. If only one of these criteria is not or only insufficiently fulfilled, matting, cloud formation and fisheye are the result.

In order to obtain 100% technically clean air, it is recommended to use the appropriate SATA filters and to maintain them regularly.

Hint:

The criteria listed above must also be met if, for example, you wish to operate paint pressure tanks, paint pumps and automatic spray gun washers with compressed air.

Leaks cost real money

Permanent leaks, even with the smallest holes in the compressed air system, lead to considerable costs. A hole with a diameter of only approx. 1 mm costs you around Euro 1,000 per year for a system that is constantly under pressure with 13 bar - a repair quickly pays for itself.

An additional consumption of compressed air for HVLP pistols, on the other hand, is insignificant.

The additional consumption of compressed air for a high-quality HVLP paint spray gun of approx. 100 NI/min leads to additional costs of only about Euro 0.02 - 0.05 for partial painting. The saving of expensive paint material by using a HVLP paint spray gun far exceeds these low additional costs!

Coarse surface structure

orange peel effect, runner, color changes and cloud formation

Possible causes and remedies:

The compressor is too small or too many consumers are used at the same time.

- Replace compressor
- Reduce the number of consumers

The air duct cross-sections are too small

- Replace compressed air line, pay attention to larger cross-section; rule of thumb: The longer the compressed air line, the larger its cross-section must be.
- Install larger expansion tank for larger air reserve.
- Too many leaks in the air network.
- Eliminate leaks or replace lines.
- Disconnect leaking consumers.

Refrigeration dryer or filter designed too small in air flow rate

- Adapt the performance data of the refrigeration dryer or filter to the compressor or the consumers.

The compressed air hose does not let enough air through.

- Use compressed air hoses with a cross-section of at least 9 mm.
- Do not connect hoses together, but always use a hose of the correct length.
- Druckluftkupplungen an den Schlauchenden mit einem freien Durchmesser von mindestens 5.5 mm

- Use hose nozzles with a diameter of at least 5.5 mm.

Pistol soiled in the air through holes or in the orifice insert

- Clean pistol and check internal nozzle pressure
- pistol must be replaced if necessary, clean pistols correctly in future

Air nozzle blocked or damaged

- Clean air nozzle
- Renew nozzle set

Insufficient pressure at pistol entrance

- Attach a pressure control valve with pressure gauge to the pistol so that pressure can be read off and adjusted at the pistol; alternatively: Attach the pressure gauge to the gun inlet and adjust the pressure via the pressure reducer on the filter; see also: How to adjust the pressure correctly

Painting errors caused by the compressed air supply

Surface structure coarsens during painting

The hue changes and/or the cloud formation increases.

Possible causes and remedies:

Pressure reducer not available

- Use a suitable filter pressure reducer.

Pressure reducer does not control or controls only unreliably

- Repair or replace pressure reducer

Filter cartridges added

- Replace or clean filter cartridges

Cross-section constriction due to Teflon tape/hemp etc. used for sealing fittings/connections or torn off sections thereof

- Seal with sealing rings or liquid sealing compound such as Loctite, etc.
- If Teflon tape is unavoidable, it should be applied carefully to prevent narrowing of the cross section and loose parts.

Silicone particles, oil droplets

or condensate droplets in the paintwork cause matting, adhesion problems, etc.

Possible causes and remedies:

Condensate in the compressed air is not separated or separated only insufficiently.

- Use a suitable water separator with particulate filter and fine filter from SATA.

Compressed air filters are installed in the wrong place in the compressed air network.

A compressed air filter consisting of a water separator and a fine filter must be installed at each tap. The compressed air temperature is too high; the condensate is dragged along (entrained) despite the filter.

- Insert aftercooler
- Enlarging the pressure compensation tank
- Compressor is too small and running hot. Recognizable by the continuous running of the compressor. Use an additional or larger compressor.

Outlet at the compressed air main line does not have a „gooseneck“ upwards, condensate is always carried away in batches from sinks; Attention: Hose outlets via hose reels on the main air line also lead to sinks.

- Lay compressed air lines with a gradient of 1 - 2 % and install a condensate drain with

- water bag at the end of the line.
- Install outlets on compressed air lines via gooseneck to the top.
- Eliminate lowering or install a condensate drain valve and condensate collector in the lowering.
- Install a water separator upstream of the hose reel to prevent condensate from accumulating in these sinks.

The condensate is not drained continuously from the oil/water separator, the filter is overfilled and the condensate is carried along in batches.

- If there is no condensate drain, install a SATA oil/water separator immediately.
- If only a manual drain is fitted to the filter, which is not drained continuously, SATA oil/water separators must be installed. These must be fitted with an automatic condensate drain valve as standard or must be organised to ensure that the condensate is regularly drained „manually“.
- If the automatic condensate drain valve does not work properly, clean or replace it.

Laying of plastic pipes in heat-stressed areas. Due to the high thermal expansion of the plastic (at 20°C approx. 10% change in length), depressions occur between the holding clamps (cable is hanging through).

Insert galvanized steel pipes

Insert stainless steel pipe

Attention:

Never use copper, as air and condensate cause corrosion (verdigris can lead to colour changes)!

Particles in the paint

which leads to expensive rework.

Possible causes and remedies:

No fine filter in use

- Oil/water separator is not sufficient. Always use fine filters with 0.01 µm (SATA 0/444). If this is not sufficient, connect an additional super fine filter.

Filter quality not sufficient - Filter too small, resulting in too high air velocity in the filter cartridge and particles „ripped through

- Use SATA filter

Filters are „closed“, particles can „pass through“ the filters in the course of time.

- Replace fine filter cartridge regularly (at least once a year), wash out sinter bronze filter (observe differential pressure).

The filter is installed in the wrong place in the compressed air line.

- Install a suitable compressed air filter at each outlet.

Crater in the paintwork due to considerable condensate or oil failure

despite the use of modern compressors.

Possible causes and remedies:

In an old compressor, a lot of oil is pumped into the compressed air via the piston rings, which cannot be removed from the compressed air by filters.

- Replace piston rings and piston sleeves or replace complete compressor.

When using a screw compressor: The oil separator cartridge of the compressor has overflowed, which can lead to „breakdowns“ (overloading of the compressed air filters).

- Service the oil separator cartridge at regular intervals according to the operating instructions.
- Attach automatic filter status indicator to the compressor.

Hint:

In the event of „breakdowns“, the air supply network must be flushed very carefully with solvent and blown dry. In the case of long and very angled lines, the flushing measure is generally unsuccessful - the compressed air network must be renewed.

The refrigerant dryer is not installed at the correct point in the compressed air network or is overloaded.

- Install the refrigerant dryer in front of the pressure equalisation tank (please note the next point).
- Enlarge refrigerant dryer.

If the compressor runs continuously, the air flowing into the refrigerant dryer may be too hot for the refrigerant dryer.

- Enlarge refrigerant dryer
- Arrange the refrigerant dryer after the expansion tank if there are no large instantaneous peaks.
- Install aftercooler

Prerequisites for a flawless commissioning of paint spray guns

Material quantity regulation

The material quantity regulation must be adjusted according to the viscosity and the desired material flow and secured by the lock nut on the setting wheel of the spray gun. Usually the material quantity control is full-open.



Picture 2-001
The be-all and end-all before any painting:
Checking and adjusting the spray gun

Round / wide jet regulation

Round and wide jet regulation for stepless adjustment of the spray jet to the object to be painted:

- The pressure is set on the pressure reducer in such a way that the necessary inlet pressure is achieved for each gun type (see technical data of the guns).
- Gun without pressure gauge:
- Not suitable for professionals. The pressure can also be roughly adjusted without a pressure gauge: The pressure at the pressure reducer must then be set so that the pressure per 10 m hose (inside diameter 9 mm) is 0.6 bar above the recommended gun inlet flow pressure.
- Rotation to the left - wide jet
- Rotation to the right - Round jet

Nozzle set

The nozzle set is a completely tested unit consisting of paint needle, paint nozzle and air nozzle. The air nozzle should be fixed so that the inscription is on top. Only original spare parts guarantee highest quality and durability.

Hint:

The nozzle sets are subject to a certain amount of wear depending on the amount of used paint material. In order to avoid painting errors, they must be checked at certain intervals and usually replaced after 12 to 24 months at the latest.

Injection distance

To avoid overspray and surface problems, the distance between air nozzle and paint object (spray distance), which is dependent on gun type and material, should be maintained.

Inappropriate or damaged nozzle set

In order to achieve an optimum painting result, the choice of the nozzle set must depend on the spray material (viscosity etc.). Clogged or damaged holes in the air nozzle lead to unfavourable spray patterns.

Error when adjusting the paint spray gun

Hint:

The nozzle sets are subject to a certain amount of wear depending on the amount of used paint material. In order to avoid painting errors, they must be checked at certain intervals and usually replaced after 12 to 24 months at the latest.

An uneven spray pattern leads to an insufficient painting result.

The spray pressure is too high or too low. The nozzle set was not adjusted by the manufacturer (with SATA each nozzle set is adjusted - with complete guns as with spare parts).

Spray jet with excessive spray mist content

The material is applied too „dry“ with poor flow. Insufficient atomization at too low pressure with strong orange peel formation. Always set the spray pressure to the optimum value when the gun is pulled off.

Injection viscosity incorrectly adjusted

Insufficient atomization when viscosity is too high.
Rotor formation if viscosity is too low.

Injection distance not optimal

Too high material application with too small spraying distance leads to „runners“. Too high paint mist backstroke with too small spraying distance. Spray decay or no opaque spray pattern if the spray distance is too large. Danger of cloud formation with metallic paints and a too large spraying distance.

Compressed air micrometer not correctly adjusted on the pistol

The spray pressure in the air nozzle is not correct despite the correct setting of the spray pressure on the compressed air regulator. This means that colour deviations are pre-programmed.

Hint:

During „normal“ work, always leave the compressed air micrometer fully open.

Round/broad jet control not correctly adjusted

The jet width is too large or too small for an optimal working speed.