DMI-65

Dissolved Oxygen Rejuvenation & Backwash Specification

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Contents

1. Purpose & Scope

This specification sets out the role of dissolved oxygen (DO) relative to chlorine in DMI-65 operation, the media's initial activation requirement, and its backwash/DO-generator integration requirements. DMI-65 is architecturally different from the two aeration-regenerated media covered in the companion documents **SPEC-KL-DO-01** (Katalox Light) and **SPEC-BIRM-DO-01** (Birm): for DMI-65, **continuous chlorine dosing is the required primary oxidant, and dissolved oxygen plays a supporting, not primary, role.** This distinction has direct consequences for how a Runxin-platform auto backwash valve (**SPEC-RXN-B0102-01**) should be programmed for this media — see §7.

2. Operating Principle — Continuous Chlorine as the Primary Oxidant, DO as a Supporting Contributor

Like Katalox Light and Birm, DMI-65 uses a permanent catalytic surface (manufacturer-described as "Infusion Technology") that is **not consumed** by the oxidation reaction and does not require chemical regeneration in the ion-exchange-resin sense. Where DMI-65 differs is what drives the reaction day to day: a continuous, low-level chlorine residual is required for normal operation, and dissolved oxygen — while genuinely beneficial — is not a substitute for it. The table below distinguishes the three operational states in which this matters:

Operational Aspect	DMI-65 Requirement	Role of a High-DO Water Stream
Normal operation	Continuous low-level chlorine injection (0.1-0.3 ppm free residual) is required.	Beneficial as a supporting oxidant — contributes to the oxidation process, but is less reactive than the chlorine used and cannot carry the reaction alone.
Initial activation	A mandatory initial chlorine soak and chlorine-assisted backwash is required to build and cure the catalytic surface before the media is placed in normal service.	Not a substitute for the chlorine activation process. DO alone cannot perform the initial chemical curing of the media.
Regeneration	None required in the chemical-resin sense — the continuous chlorine feed maintains the media's active state on an ongoing basis.	Helps maintain a high-oxidation environment but does not itself regenerate the media. The chlorine feed is what keeps the catalytic surface clean and active.

3. The Chemistry: Why Chlorine, Not DO, Is the Required Driver

DMI-65 needs an oxygen source to drive the oxidation of dissolved ferrous iron and manganese at the catalytic surface. Chlorine is used because it is a **substantially more reactive source of oxidizing potential than molecular dissolved oxygen** — it drives the reaction faster and more completely. Dissolved oxygen still contributes: it participates in the production of hydroxide ions that help drive the oxidation and precipitation of iron and manganese, an effect that is most useful near the neutral pH range where DMI-65 is most effective. In practice this means a high-DO feed water stream genuinely assists overall performance, but it is additive to the chlorine requirement, not a replacement for it.

Chlorine has a second function that DO cannot replicate: it keeps the catalytic surface free of biofilm and bacterial slime growth. A biofouled catalytic surface loses effective oxidation capacity even if DO levels are otherwise adequate, which is why the chlorine residual must be continuous rather than intermittent or backwash-only.

4. Initial Activation / Conditioning — A One-Time, Mandatory Step

> ■ **Do not substitute DO (or skip this step) for initial activation**
>
> New or freshly-charged DMI-65 media requires a dedicated chlorine soak and chlorine-assisted backwash before being placed into normal service, to chemically build and cure the catalytic surface. This is a distinct, one-time commissioning step — separate from the continuous low-level chlorine dosing used in normal operation (§5) and from routine backwashing (§6). A high-DO water stream cannot perform this curing process; running the media on DO/aeration alone from first start-up, without the chlorine activation step, risks a media bed that never reaches full catalytic capacity.

This document does not reproduce exact activation chlorine concentrations, soak duration, or step sequence, because the source material available for this specification described the requirement in principle rather than as a step-by-step procedure, and an attempt to independently re-verify the exact figures against DMI-65's own activation guide could not be completed in this session (see §9). **Obtain the current official DMI-65 activation/commissioning procedure before first start-up** and follow it exactly — do not infer soak concentration or duration from the operating parameters in §5 or §6, which apply to normal service, not activation.

5. Continuous Chlorine Dosing Requirement — Normal Operation

Parameter	Requirement	Source
Free chlorine residual	0.1 - 0.3 ppm, continuous	dmi65.com — How DMI-65 Works
Preferred oxidant	Sodium hypochlorite (NaOCl / bleach, ~12.5%) — inexpensive, widely available, effective	dmi65.com — How DMI-65 Works
Dosing pattern	Continuous, via metering pump — not intermittent, not gated to the backwash cycle only	dmi65.com — How DMI-65 Works; see §7 caution
Function 1	Oxidation catalyst — provides more reactive oxidizing potential than dissolved oxygen alone	dmi65.com — How DMI-65 Works
Function 2	Surface protection — prevents bacterial growth / biofilm ("slime") formation that would blind the catalytic surface	dmi65.com — How DMI-65 Works
Media consumption	Manganese oxide catalyst is not consumed in the reaction — it is a permanent catalytic structure, unlike greensand's permanganate-regenerated coating	dmi65.com — How DMI-65 Works

6. Backwash Cycle Requirements

Backwashing remains a required physical maintenance step for DMI-65, distinct from both the continuous chlorine dosing (§5) and the one-time activation soak (§4) — it clears accumulated oxidized solids from the bed, the same role it plays for Katalox Light and Birm.

Parameter	Requirement	Source
Backwash trigger	Pressure-drop rise of 50 kPa from the initial clean-bed state (maximum 100 kPa total across the bed)	dmi65.com Technical Datasheet
Backwash velocity	40-50 m³/m²/hr (approximately 2x normal service filtration velocity)	dmi65.com Technical Datasheet
Backwash duration	Typically several minutes, up to 15 minutes	dmi65.com Technical Datasheet
Bed expansion	20-50%	dmi65.com Technical Datasheet
Service flow — Fe duty (1-5 ppm)	10-15 m³/m²/hr linear velocity	dmi65.com Technical Datasheet
Service flow — Mn duty (0.5-1 ppm)	8-10 m³/m²/hr linear velocity	dmi65.com Technical Datasheet
Service flow — combined (Fe 2 / Mn 1 ppm)	8-9 m³/m²/hr linear velocity	dmi65.com Technical Datasheet
pH range — Fe removal	5.8 - 8.6 (optimal 7 - 7.5)	dmi65.com Technical Datasheet
pH range — Mn removal	As close to pH 8 as possible (optimal ≈7.5 - 8)	dmi65.com Technical Datasheet
Fe capacity	Up to 20 ppm influent, reducible to <0.3 ppm (often non-detect, ≈0.001 ppm)	dmi65.com Technical Datasheet
Mn capacity	2-3 ppm removable through a single filter pass under optimal pH	dmi65.com Technical Datasheet

7. Integrating a DO Generator — Design Considerations Specific to DMI-65

■ The Katalox Light / Birm backwash-trigger architecture is NOT sufficient as DMI-65's primary control

SPEC-KL-DO-01 and SPEC-BIRM-DO-01 recommend triggering a DO generator from the Runxin valve's b-01/b-02 auxiliary output specifically during the backwash phase (see SPEC-RXN-B0102-01), because those two media rely on DO as their primary or sole oxidant and backwash-phase re-oxygenation is what "resets" the tank between service runs. **DMI-65 is different: its required chlorine residual (§5) must be present continuously during service, not only during backwash.** If a DMI-65 train's chlorine dosing pump were wired to run only when the Runxin valve's backwash-phase relay is active — the same architecture recommended for the other two media — the media would receive no chlorine at all during normal service, undermining both its oxidation performance and its biofouling protection (§5, Function 2).

- **Primary chlorine dosing must run independently of the backwash cycle.** Size and control the NaOCl metering pump to maintain the 0.1-0.3 ppm continuous residual on its own dosing controller/timer (e.g. flow-proportional or time-proportional dosing tied to system flow, not to the Runxin valve's regeneration state) — this is a separate, always-on control loop from anything described in SPEC-RXN-B0102-01.
- **A supplementary DO generator can still be added**, using the same Runxin b-01/b-02 relay + solenoid + Auto Controller bridge architecture described in SPEC-RXN-B0102-01, to provide the additional hydroxide-ion-driven oxidation boost described in §3 during backwash specifically. This is a genuine enhancement — consistent with the source material's own framing that a fully oxygenated contact tank during backwash "would effectively [assist]" the media — but it augments the chlorine system, and must never be wired as a replacement for it.
- **Do not use DO generator run-time as a proxy for chlorine dosing verification.** Because DO and chlorine serve different, only partially overlapping roles here, confirming the DO generator cycles correctly during backwash (per SPEC-RXN-B0102-01 §7's commissioning checklist) does not confirm the continuous chlorine residual is present and correct — verify chlorine residual separately with a test kit or continuous chlorine analyzer at the point of application.

8. Operational Parameter Summary

Item	Value
Regeneration type	Permanent catalytic surface — not chemically regenerated; requires continuous low-level chlorine feed to remain active, plus periodic physical backwash
Primary oxidant	Continuous chlorine residual, 0.1-0.3 ppm free Cl_2 (mandatory)
Role of dissolved oxygen	Supporting/additive only — assists oxidation near neutral pH, cannot replace the chlorine requirement
Initial activation	Mandatory one-time chlorine soak + chlorine-assisted backwash before normal service — verify current procedure with DMI-65 documentation
Fe / Mn capacity	Fe up to 20 ppm (to <0.3 ppm effluent); Mn 2-3 ppm per pass
pH range	5.8-8.6 for Fe (optimal 7-7.5); ≈7.5-8 for Mn
Backwash trigger	50 kPa pressure-drop rise (max 100 kPa)
Backwash velocity / duration	40-50 $m^3/m^2/hr$, several minutes up to 15 minutes
DO generator role if added	Supplementary boost during backwash only — never a substitute for the continuous chlorine dosing loop

Sources & Documentation Referenced

- Project chat transcript supplied for this document ("Yes, a high dissolved oxygen (DO) water stream is beneficial..."): normal operation vs. initial activation vs. regeneration distinction, DO's hydroxide-ion mechanism near neutral pH, chlorine's greater reactivity vs. molecular DO.
- dmi65.com — Technical Datasheet (dmi65.com/technical/technical-datasheet/): Fe/Mn capacity, pH ranges, service flow velocities, backwash trigger/velocity/duration/bed-expansion figures.

- dmi65.com — "How DMI-65® Filtration Media Works" (dmi65.com/technical/how-dmi-65-works/): continuous 0.1-0.3 ppm free chlorine requirement, NaOCl as preferred oxidant, chlorine's dual oxidation-catalyst / biofouling-prevention role, permanent (non-consumed) catalytic structure.

■ Verify before commissioning

The exact initial-activation chlorine concentration and soak/backwash sequence (§4) were not independently re-verified against DMI-65's own step-by-step activation guide in this session — obtain and follow the current official procedure before first start-up. All other figures should be confirmed against the current DMI-65 datasheet and your vessel's engineering sizing before finalizing dosing pump and valve programming.