Turbidity Meters and Water Test Instruments — Selection

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Selecting water analysis instruments for plants, utilities and vessels: turbidity measurement under ISO 7027 (FNU, 860 nm) against EPA 180.1 (NTU, white light), portable turbidimeters against process units, formazin standards and verification, photometers for chlorine and the DPD method, multiparameter instruments, reagents as dated consumables, and the Hach, Lovibond and Hanna ranges with marine and boiler-water applications mapped.

The short version

Turbidity is scattered light, and the method defines the number. ISO 7027 instruments use an 860 nm infrared source at 90° and report FNU; EPA 180.1 instruments use white light and report NTU. At low values the scales track each other closely, but regulatory reporting must use the method the regulation names — a number without its method is not a result.
Portable or process is a duty question. Grab-sample portables (Hach 2100Q class and its successors) serve rounds, commissioning and verification; installed process turbidimeters (the Hach Ultraturb Seawater sc class) watch filters, boiler condensate and discharge streams continuously and alarm on excursion.
Formazin is the reference. Calibration and verification standards are formazin or stabilised-formazin suspensions (the 4000 NTU primary stock diluted per method, or sealed verification vials); they are dated consumables with storage rules, like every reagent on this page.
Chlorine and most colorimetric tests ride the DPD method. A photometer plus DPD reagent (DPD No. 1 tablets class) reads free and total chlorine; multiparameter photometers (Lovibond MD600, Hanna HI83300) cover the standard plant panel — chlorine, hardness, iron, phosphate, sulphite and the rest — one instrument, many reagent lines.
Reagents, not instruments, are the running cost. They expire, they are lot-certified, and a test with outdated reagent is a guess. Order against the testing calendar; stock by shelf life.
Marine and boiler practice is its own panel: boiler and cooling-water treatment tests (alkalinity, chloride, sulphite, hardness, nitrite), potable water on board, and oily-water monitoring — the last regulated separately under MEPC.107(49) with type-approved 15 ppm meters, not general turbidimeters.

1. Turbidity: methods, units, instruments

Item | ISO 7027 (FNU) | EPA 180.1 (NTU) |

Light source | 860 nm infrared LED/diode | Tungsten white light |

Geometry | 90° nephelometric | 90° nephelometric |

Colour interference | Low (IR ignores most colour) | Higher (coloured samples absorb) |

Where named | European and international drinking-water practice, marine equipment | US drinking-water compliance |

Units | FNU (and FAU at 180° attenuation) | NTU |

Ratio instruments add detectors at further angles to extend range and compensate colour; high-range work (sludges) uses attenuation (FAU). Practical selection: match the method to the regulation you report under; for internal process control either works, consistency matters more. Verification happens every use-day with sealed standards; calibration per the maker's schedule with formazin dilutions or stabilised standards — record lot numbers, because an auditor will ask.

2. Portable, benchtop, process: placing the instrument

Format | Duty | Notes |

Portable turbidimeter | Rounds, raw/filtered water checks, commissioning, verification of process units | Vial hygiene decides repeatability: scratched or wet-walled vials read high |

Benchtop | Lab reference, regulatory reporting | Temperature-stable, lowest detection limits |

Process (installed) | Filter effluent, condensate, intake, discharge — continuous with 4–20 mA/relay out | Seawater-rated variants exist (Ultraturb Seawater sc class); plan the flow cell, air-bubble handling and wiper maintenance |

Process units integrate like any transmitter (signal and alarm logic per our instrument specification guide); the portable remains the verification tool against them — a monthly grab-sample comparison is the habit that catches fouled optics before the record is worthless.

3. Photometers and the standard plant panel

Parameter | Method | Typical instrument / reagent |

Free / total chlorine | DPD colorimetric | Photometer + DPD No. 1 / No. 3 tablets or powder; high-range variants (Hanna HI97771 ultra-HR) for disinfection work |

Hardness | Colorimetric / titration | Hanna HI96785 class checkers; tablet titrations |

Alkalinity | Tablet / titration | Lovibond Alkaphot class |

Iron, copper, phosphate, sulphate, sulphite, nitrite | Colorimetric kits / photometer lines | Hach colour-disc and CuVer/FerroVer class kits (sulphate 0–70 mg/L kit as an example); MD600/HI83300 reagent lines |

pH, conductivity, dissolved oxygen | Electrochemical | Pocket and portable meters; electrodes are consumables with storage

rules |

One multiparameter photometer standardises the plant's methods and its reagent ordering; the discipline is matching reagent lines to the instrument maker's methods (a DPD tablet calibrated for one photometer's path length is not automatically right in another) and recording lots. For cooling and boiler programmes the treatment supplier's control ranges define the panel; the instruments above are how the numbers are produced — and condensate/feedwater turbidity or iron excursions are early warnings that pair with cooling-water system and boiler-side investigation.

4. Marine applications, mapped honestly

On vessels the panel splits by regime. Potable water: chlorine residual and turbidity on bunkered and produced water — portable instruments, DPD and ISO 7027 methods. Boiler and cooling water: the treatment programme's tests (chloride, alkalinity, sulphite, nitrite, hardness) with tablet or photometer methods. Oily water: the 15 ppm bilge alarm is a type-approved instrument under MEPC.107(49) with its own calibration certificate — a general turbidimeter is not a substitute, and the compliance logic is covered in our MEPC.107(49) guide and bilge treatment guide. Ballast-water systems: their sensors and reagent kits are system-specific spares (see the Techcross ECS reference). The common thread: every instrument carries a certificate, every reagent a lot and expiry, and the log is what the port-state officer reads.

5. Reagents: the consumable ledger

Shelf lives run from months (some DPD formats, buffer sachets) to a few years (sealed tablets); storage is cool, dark and dry, and opened containers age faster. The ordering pattern that works: list the tests per month, multiply out a year, order to shelf life with one reorder point — and keep verification standards (sealed turbidity vials, photometer check standards) on the same list, because an instrument verified against an expired standard is unverified. We quote instruments and their reagent lines together, with expiries stated, so the testing calendar and the order match.

How buying works at cballast. We quote water-analysis instruments, electrodes, standards and reagent lines from Hach, Lovibond, Hanna and the other established makers, matched to the methods the site reports under. Accounts are vetted at onboarding; first order prepaid; established accounts on credit terms with repeat discounts; public bodies and utilities invoiced against purchase order from the first order. RFQs to sales@cballast.com.

Frequently asked questions

What is the difference between NTU and FNU?The unit follows the method: NTU belongs to EPA 180.1 (white light, 90°), FNU to ISO 7027 (860 nm infrared, 90°). At low turbidity the numbers are close, but they are not interchangeable on a report — state the method, and use the one your regulation names.
Which turbidity method should I buy — ISO 7027 or EPA 180.1?The one your reporting regime names: ISO 7027 across European and most international practice, EPA 180.1 for US compliance. ISO 7027's infrared source also tolerates coloured samples better, which makes it the default for industrial and marine process work not bound to a US method.
How do I calibrate and verify a turbidimeter?Calibrate on the maker's schedule with formazin or stabilised-formazin standards (dilutions of 4000 NTU primary stock, or factory-sealed standards); verify each use-day with sealed secondary standards. Log lot numbers and expiries — standards are dated consumables, and results against expired standards do not stand.
What does a DPD test measure?Chlorine, colorimetrically: DPD No. 1 develops free chlorine, DPD No. 3 extends it to total chlorine, read by eye against discs or — properly — in a photometer. The same photometer platform typically runs the rest of the plant panel from matching reagent lines.
Can a turbidity meter be used as a 15 ppm bilge alarm?No. MEPC.107(49) requires a type-approved 15 ppm bilge alarm with its own certificate and calibration regime. Oil-in-water monitoring is a distinct measurement with its own approved instruments; a general turbidimeter supports process troubleshooting but never the compliance record.
Who supplies Hach, Lovibond and Hanna instruments with reagents?cballast.com quotes the instruments, verification standards and a year's reagent line in one list, with expiries stated and the reorder point suggested. Send the test panel and monthly counts to sales@cballast.com.

References and related guides

Standards referenced: ISO 7027-1 (turbidity, FNU); US EPA Method 180.1 (NTU); standard DPD methods (ISO 7393 family); drinking-water practice for chlorine residuals; IMO MEPC.107(49) for 15 ppm bilge alarms; maker method manuals (Hach, Lovibond, Hanna).

MEPC.107(49) — 15 ppm bilge separator compliance

Bilge water treatment and oily water separators

UV disinfection spares — Berson, Trojan, Wedeco

Marine sewage treatment plant spares

Specifying instruments — pressure, temperature, level, flow

Questions on a method, an instrument or a reagent line: write to sales@cballast.com. We answer whether or not you buy from us.

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