PRECISION ACOUSTICS

Water treatment kit (WTK)

Water that is free from impurities is essential for accurate measurement of acoustic fields and IEC TR62781 provides many recommendations on this matter. Whilst being cheap and readily available, tap water is not ideal for conducting acoustic measurements and should be conditioned before being used for this purpose. The Water treatment kit (WTK) is designed to provide users with a method to address these issues. The kit provides the means to output water that has been subject to:

- Degassing
- Two-stage particulate filtration
- UV sterilisation

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INTRODUCTION

Many ultrasonic measurements require that water is processed to remove water-borne sources of experimental uncertainty. This is discussed at length in IEC TR 62781 ed1.0. Ultrasonics – Conditioning of water for ultrasonic measurements, Geneva Switzerland: International Electrotechnical Commission.

Dissolved gasses can be a significant cause of cavitation, and this is the biggest single risk to equipment when measuring high amplitude/high intensity ultrasound fields. Particulates can act as scatterers, as food sources for water-borne biological contaminants or as nucleation sites for cavitation. Biological activity within water tank can lead to build up of contaminant on any item placed within the tank and, in extreme cases, are a health risk to the operator. Means to address all these issues are included within the Water treatment kit (WTK).

Many customers already have a source of de-ionised/de-mineralised water on-site. Therefore the Water treatment kit (WTK) from Precision Acoustics Ltd does not include de-ionisation capability. If this is required, customers are recommended to source a supply or de-ionised water locally and alternatives include the use of either ion-exchange resins, reverse-osmosis systems or double/triple distillation of water.

The Water treatment kit (WTK) is supplied in kit form and is designed to be plumbed in line with a water tank system. It is recommended to use a plug-in timer to allow water to be automatically treated at a time convenient to the user (for example, in the early hours of the morning when the remainder of the ultrasonic test facility is not in use).

TECHNICAL SPECIFICATION

UV sterilisation	Power: 14W Wavelength: 253.7 nm Dosage: >16 mJ/cm^2 Lamp lifetime: ≈ 9000 hours
Particulate filtration	Stage 1: 25 micron Stage 2: sub 1micron
Degassing	Membrane degassing contactor capable of achieving dissolved O_2 as low as 2.5 ppm (typical profile shown below)
Maximum operation temperature	40 °C
Water treatment rate	5-6 litres/minute

DEGASSING RATE

The solubility of gasses in water is a function of temperature and pressure. Furthermore, re-absorption of gasses into water only occurs in the vicinity of any water surface that is exposed to air. Consequently, exposed surface area and volume of water in the tank are also important considerations. Finally, if the surface layer is subject to agitation or mixing, re-gassed water is drawn down into the tank and dissolved gasses are distributed throughout the body of water.

Figure 1 shows the degassing profile for a body of water with the following parameters:

Volume of water	480 litres
Exposed surface area	0.8 m^2
Environmental conditions	21 °C at 1030 mbar
Mixing/Agitation	None

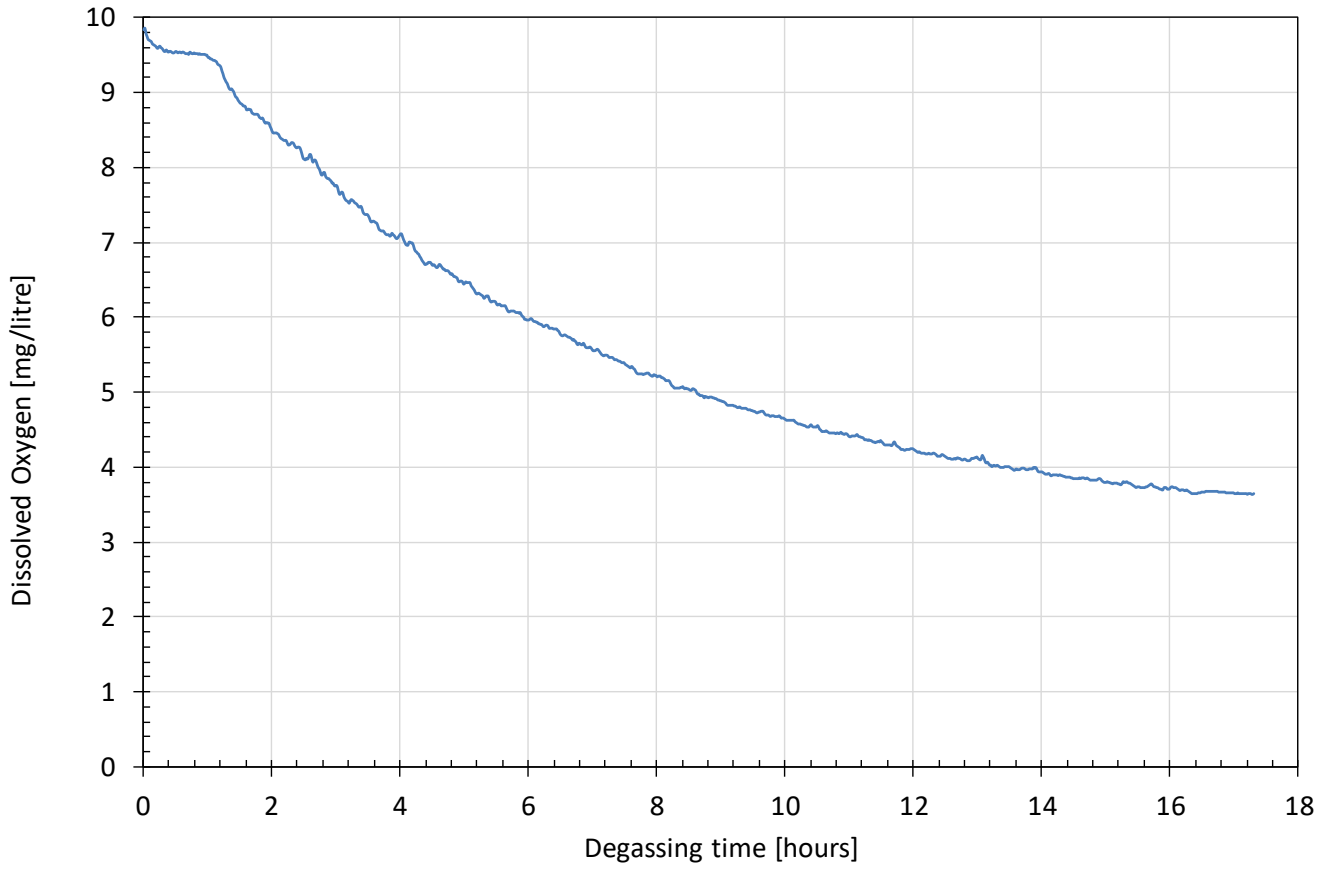

Figure 1 – Sample water degassing profile as a function of time

CONSUMABLES

A consumables kit is available from Precision Acoustics Ltd and includes replacement particulate filters and sterilisation. The rate at which filters become clogged is entirely dependent upon the quality of incoming water. Highly contaminated water may require much more replacement of filter cartridges than cleaner (e.g. distilled) water sources.

All information is based on results gained from experience and tests, and is believed to be accurate but is given without acceptance of liability for loss or damage attributable to reliance thereon as conditions of use lie outside the control of Precision Acoustics Ltd.