METHOD STATEMENT

Determinand:
Manual determination of Electrical Conductivity.

Matrix:
Sample Types: Raw and Potable waters.

Principle of Method:
Electrical Conductivity is a measure of a solution's ability to conduct electricity. An AC bridge measures the resistance of the solution between two electrodes. The resistance is converted to Specific conductance by the use of a constant for the electrodes.
Electrical conductivity is dependent on temperature. For drinking water samples Electrical Conductivity will normally decrease with a decrease in temperature and increase with an increase in temperature as the higher the temperature, the less viscous the water. This allows ions to move around more freely at higher temperatures and thus less freely at lower temperatures. Although the meter used in this method features a temperature compensation facility it is important that samples are analysed at room temperature. Room temperature is normally considered to be 20°C.

Sampling and Sample Preparation:
Samples are normally collected in 500 ml PET bottles. Other size PET bottles are also suitable.
No special preservation is required.
If analysis cannot be immediately undertaken, samples should be stored at a temperature of 3±2°C until the day of analysis. Samples should be allowed to equilibrate to room temperature prior to analysis and analysed within 23 days of sampling.

Interferences
If oil or grease is present in the sample the electrode may become coated, this could cause measurement errors.
Temperature significantly effects Conductivity measurement. Although the instrument compensates for temperature by automatic adjustment, all samples and standards should be analysed at room temperature.
Air bubbles caused by carbonated samples will cause measurement issues. Carbonated samples must be de-carbonated (where possible) before analysis, if this is not possible then the sample is unsuitable for conductivity analysis and the sample should have an anomaly form logged to cancel the analysis.

Performance of Method:

Range of Application:
The range of application is routinely LOQ to 1276 µS/cm, however this range may be extended by the use of appropriate check standards e.g. up to 6000 µS/cm if this check standard shows satisfactory performance.

Limit of Quantification:

Asset No. 0206	4.16 µS/cm.
Asset No. 1121	2.82 µS/cm.
Asset No. 1114	0.84 µS/cm.
Asset No. 3036	7.6621 µS/cm.
Asset No. 3392	3.93 µS/cm

As all assets are the same specification the method reporting limit is 7.66 µS/cm.

Recoveries of Compounds and Uncertainty of measurement:

CONDUCTIVITY METER 1 (Asset No 0206)

Sample type	Mean sample result (µS/cm)	Mean sample spike result (µS/cm)	Conc. of spike (µS/cm)	Spike recovery (%)	% uncertainty
Soft-Bridgend	129	261	133	99.15	±2.74
Medium-Coventry	332	966	654	96.93	± 4.34
Hard-Elvington	576	1201	654	95.51	±5.44
Cowick BH No1	544	1170	654	95.78	±6.11
Elvington WTW Raw.	429	1064	654	97.02	± 5.33

CONDUCTIVITY METER 2 (Asset No 1121)

Sample type	Mean sample result (µS/cm)	Mean sample spike result (µS/cm)	Conc. of spike (µS/cm)	Spike recovery (%)	% uncertainty
Soft-Bridgend	129	260	133	98.09	± 3.64
Medium-Coventry	329	965	654	97.24	± 4.48
Hard-Elvington	573	1196	654	95.20	±6.62
Cowick BH No1	542	1167	654	95.47	±5.97
Elvington WTW Raw.	428	1057	654	96.21	± 5.52

CONDUCTIVITY METER 3 (Asset No 1114) – single matrix validation

Sample type	Mean sample result (µS/cm)	Mean sample spike result (µS/cm)	Conc. of spike (µS/cm)	Spike recovery (%)	% uncertainty
Medium-Wakefield	318	N/A	N/A	N/A	N/A

CONDUCTIVITY METER 4 (Asset No 3036)

Sample type	Mean sample result (µS/cm)	Mean sample spike result (µS/cm)	Conc. of spike (µS/cm)	Spike recovery (%)	% uncertainty
Medium-Wakefield	615	1246	650	97.15	±0.92

CONDUCTIVITY METER 5 (Asset No 3392) – single matrix validation

Sample type	Mean sample result (µS/cm)	Mean sample spike result (µS/cm)	Conc. of spike (µS/cm)	Spike recovery (%)	% uncertainty
Medium-Wakefield	331	2761	2500	97.20	±1.41

References:

The Measurement of Electrical Conductivity and the Laboratory Determination of the pH Value of Natural, Treated and Waste Waters 1978. Methods for the Examination of Waters and Associated materials. (HMSO). ISBN 0117514284

Jenway Conductivity meter model 4510 instruction manual

Metrohm Monograph. Conductometry-Conductivity Measurement - Peter Bruttel, revised by Lucia Meier, Dr. Sabrina Gschwind and Iris Kalkman