gPIMS® Installation Quick Reference

For the comprehensive gPIMS® deployment procedure with more details on each of the following steps, please refer to "GUL 204:2019 Standard Practice for the Deployment of gPIMS® using the Wavemaker® Pipe Screening System".

1 Pre-installation Guided Wave Test - A GW test using Wavemaker® equipment must be conducted immediately before gPIMS® installation, the result from which informs whether to proceed with the installation. The transducer spacing should be selected to match that of the gPIMS®.

2 Prepare Pipe Surface - A 200 mm (8 inch) wide band around the full pipe circumference must be prepared for the gPIMS®. The surface must be clean and dry. The surface should be prepared to SA2.5 according to ISO 8501-1:2007. Well adhered paint and fusion bonded epoxy (FBE) coatings up to about 1 mm can stay in place.

3 Route Cable - Route the cable from the location of the final connection box installation to the gPIMS® location. Make sure the cable is well secured and tied down.

4 Pre-install Check of gPIMS® - Attach the gPIMS® unit to the cable and connection box assembly then connect a Wavemaker® instrument to the connection box using a standard Lemo® transducer cable. Perform a capacitance check on the Wavemaker®. The capacitance values for all segments should be within 20% of the expected values in order to continue with the installation.

5 Additional Pre-bonding Tasks - Carry out a dry-fit check of the gPIMS® to make sure it fits the size of the pipe. If the pipe size is greater than 16 inch, a reference line drawn around the circumference is required.

6 Bond gPIMS® - Clean the inside of the sensor with isopropyl wipes. Apply coupling compound Araldite 2014 to each element positions with a bead between 2 to 3 mm in diameter. Place the sensor around the pipe at the prepared location and tighten the clamping mechanism to the recommended torque setting (see Table 1). The orientation of the gPIMS® should be with the clamping mechanism at the 12 o'clock position. However, when combining two gPIMS® for large diameter pipes, the clamping mechanisms should be at the 3 and 9 o'clock positions.

7 Coupling Check on Pipe - View the coupling screen on the Wavemaker® while rubbing the pipe with a metallic object. Should the coupling balance not be satisfactory at the recommended torque setting, then the torque may be increased gradually up to the maximum values, which shall not be exceeded. Adjust the sensor until all segments roughly couple equally well, then collect a test file.

8 Place Flexible Cover and Seal gPIMS® - Apply sealant all around the circumference between the edge of the gPIMS® and the pipe. Remove the release paper from the sealing tape of the flexible cover and press the edges of the cover firmly onto the gPIMS®. Clamp the edge seals of the gPIMS® with the edge bands. Encapsulate the void beneath the flexible cover with Resin Pack 14C until it starts rising into the breather tube, then clip the breather tube.

9 Connect Cable - Apply *Tigerseal* around the edge of the square connector surface. Use a diagonal pair of locating pins to plug in the connector. Screw the connector in place using two M6 bolts but without tightening completely. Remove the locating pins and replace with M6 bolts. All bolts must now be tightened down, alternating between them. Smooth off the *Tigerseal* that squeezes out at this stage. When combining rings, the cable should be attached in position 'C' (cable points towards long end of gPIMS®), as in Figure 1.

10 Visual Checks - Carry out a final visual check around the gPIMS®, looking out for insufficient sealing or leaks from the flexible cover.

11 Installation Guided Wave Test - A GW test using the gPIMS® unit must be carried out at this time. Fill in and/or update all fields in the *gPIMS® installation tab* in the WavePro™ software.

12 Wait for Resin to Cure - The cure time of the coupling resin depends on pipe temperature (see Table 2). At 23°C the curing time is five hours.

13 Post-installation Guided Wave Test – Once the resin has cured, perform a GW test using the Wavemaker® and analyse the data as for the pre-installation test. Set the reference file in the gPIMS® installation tab as the current one. In a final step, cut off the breather tubes from the gPIMS® cover.

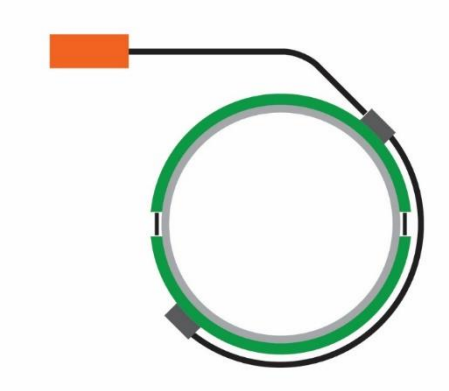

Figure 1: Standard orientation for a combined gPIMS® system.

Table 1. Recommended Torque Settings

Pipe Size	Recommended Torque		Maximum Torque	
(in)	(Nm)	(lb ft)	(Nm)	(lb ft)
3	0.8	0.6	3.0	2.2
4	1.0	0.7		
6	1.4	1.0		
8	1.4	1.0		
10	1.6	1.2		
12	1.8	1.3		
14	2.0	1.5		
16	2.2	1.6		
18	2.4	1.8		
20	2.6	1.9		
22	2.8	2.1		
24	3.0	2.2		
26	3.2	2.4	6.0	4.4
28	3.4	2.5		
30	3.6	2.7		
32	3.8	2.8		
34	4.0	3.0		
36	4.3	3.2		
38	4.5	3.3		
40	4.7	3.5		
42	4.9	3.6		
44	5.1	3.8		
46	5.4	4.0		
48	5.6	4.1		
60	6.0	5.0		

Table 2. Approximate cure times for the coupling compound Araldite 2014.

Temperature (˚C)	10	15	23	40	60
Approximate cure time	20h 0m	11h 0m	5h 0m	1h 20m	0h 20m