

Supplementary Materials

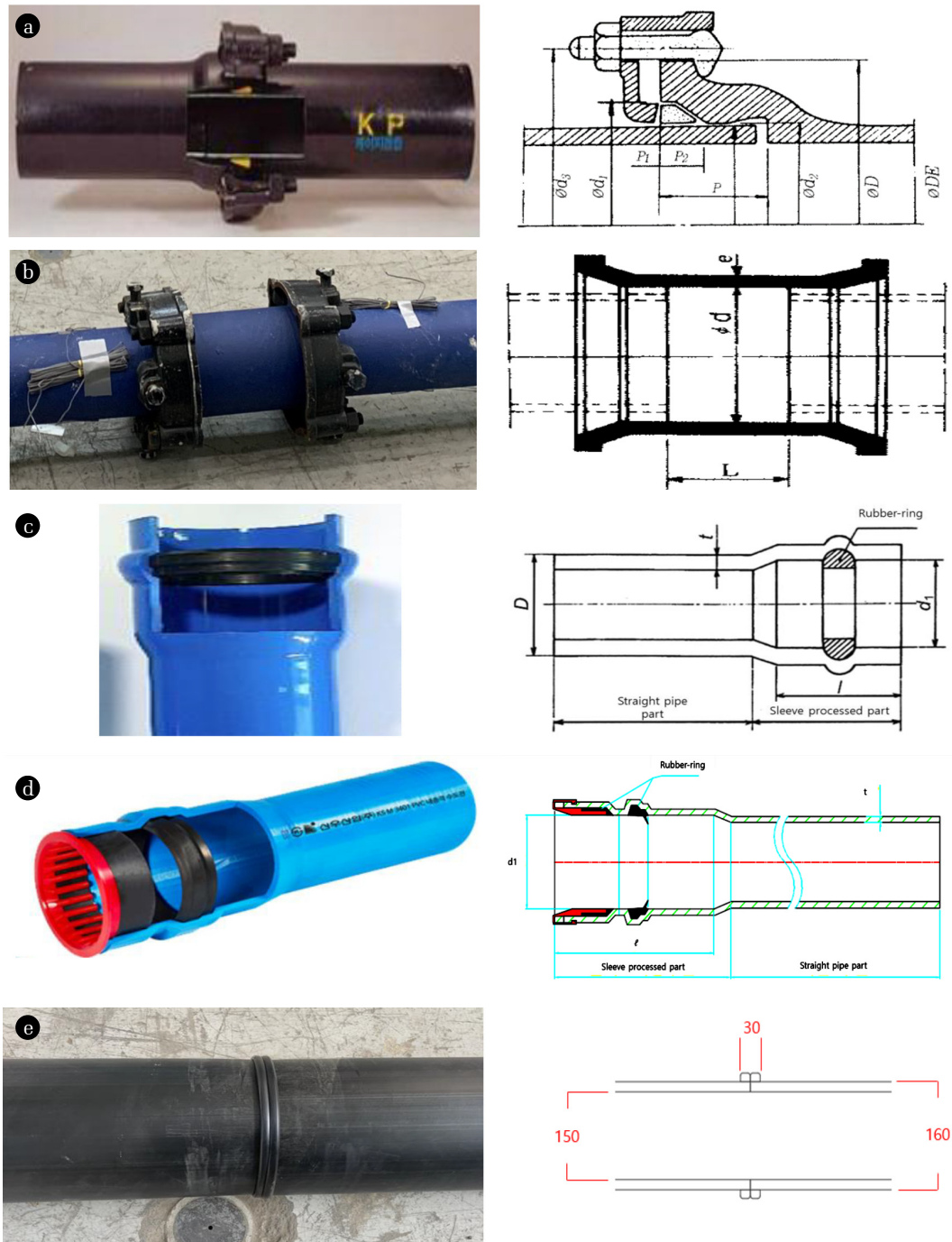


Fig. S1. Description of each test specimen. a: Test specimen No.1 (DCIP_KP mechanical joint); b: Test specimen No.2 (DCIP_Collar connection joint); c: Test specimen No.3 (HI-VP_Socket joint with one rubber-ring); d: Test specimen No.4 (HI-VP_Socket joint with two rubber-ring); e: Test specimen No.5 (HDPE_Fusion bonding).

Table S1. Purpose and significance of pipes used for four-point bending test

No.	Type		Test specimen explanation
	property	Pipes type	
1	Metal	DCIP (2 nd type)	The most used joint method in Korean piping construction
2	Metal	DCIP (2 nd type)	Widely used for long-distance piping construction in Korean local areas.
3	Non-metal	HI-VP	Manufactured by only in socket joint, and the test comparing the joint deflection limit
4	Non-metal	HI-VP	results of each two methods will be the first case.
5	Non-metal	HDPE	Due to the characteristics of the material, it is expected that the joint deflection limit will be superior as it is used for fusion bonding

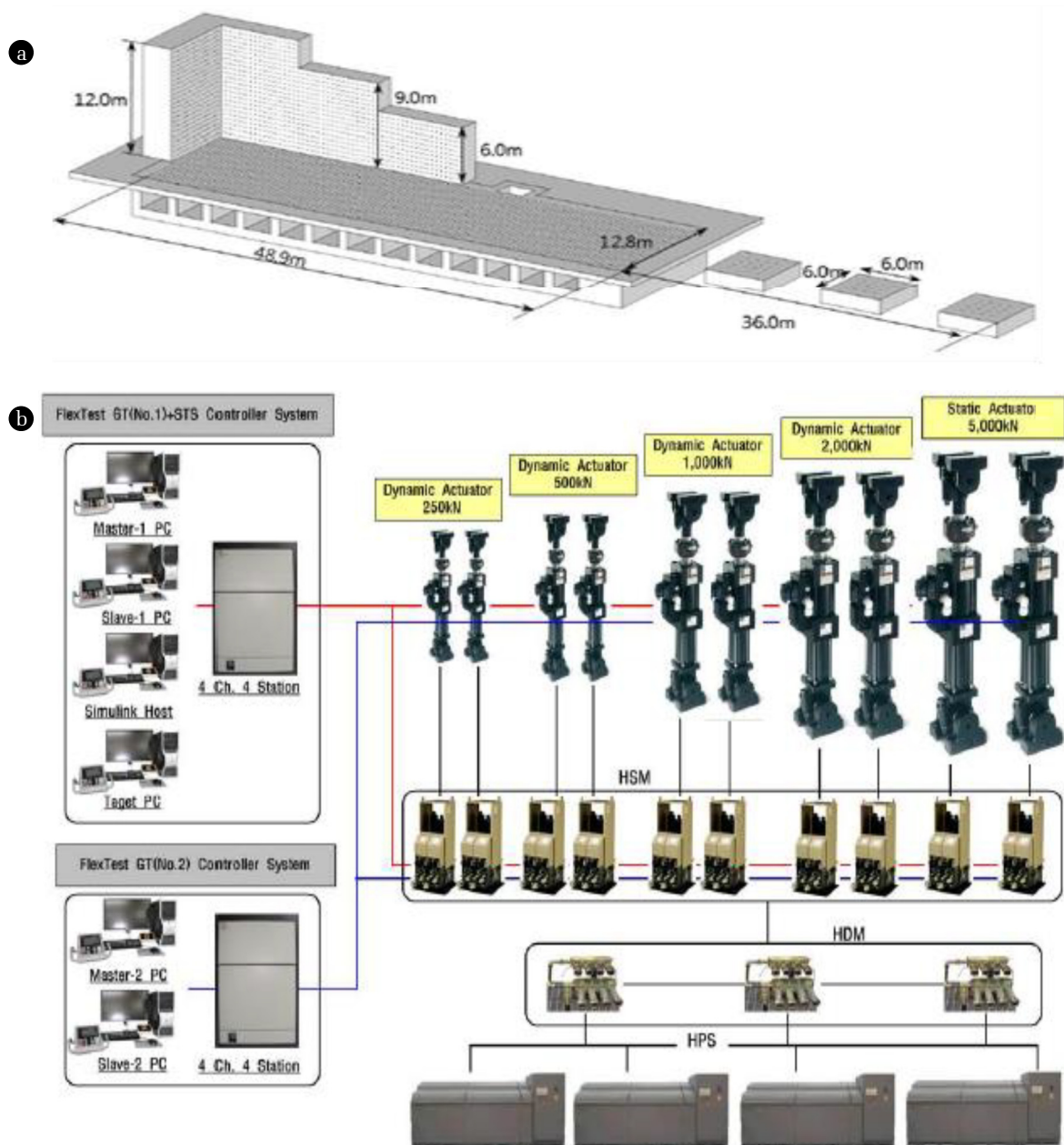


Fig. S2. Specification of experimental facility and MTS Flex test GT controller. a: Schematic of experimental facility; b: Outline of MTS Flex test GT controller.

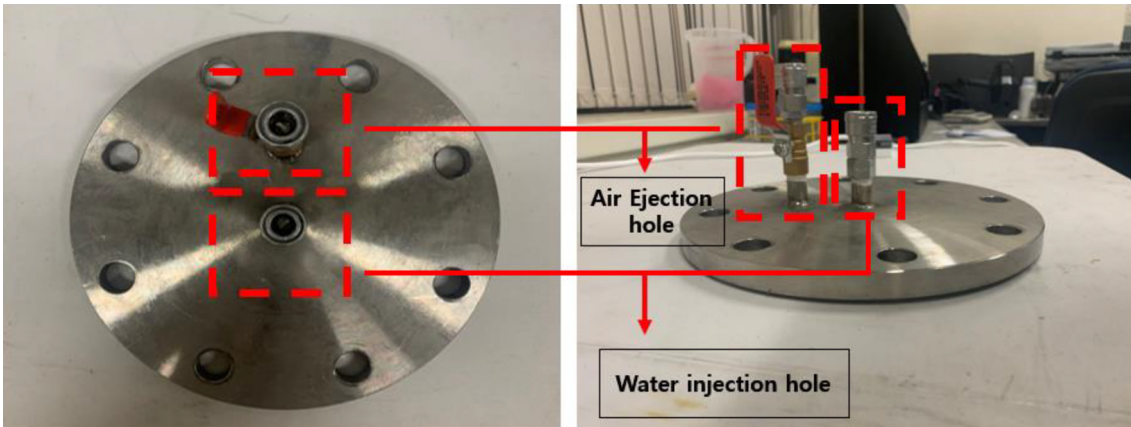


Fig. S3. Specially manufactured flange stopper

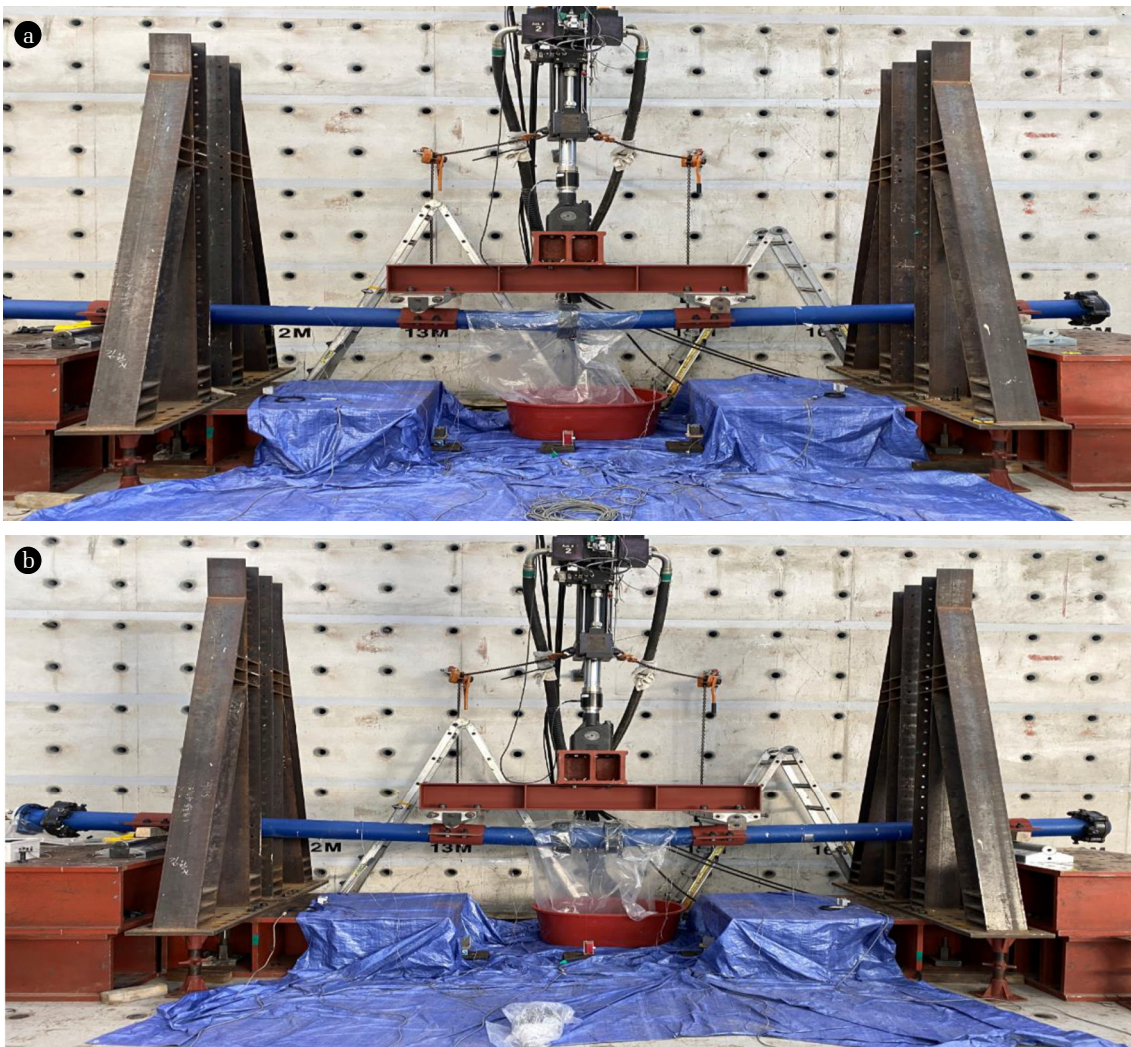


Fig. S4. Status of test specimen before four-point bending test. (a: Test specimen No.1 (DCIP_KP mechanical joint); b: Test specimen No.2 (DCIP_Collar connection joint); c: Test specimen No.3 (HI-VP_Socket joint with one rubber-ring); d: Test specimen No.4 (HI-VP_Socket joint with two rubber-ring); e: Test specimen No.5 (HDPE_Fusion bonding)

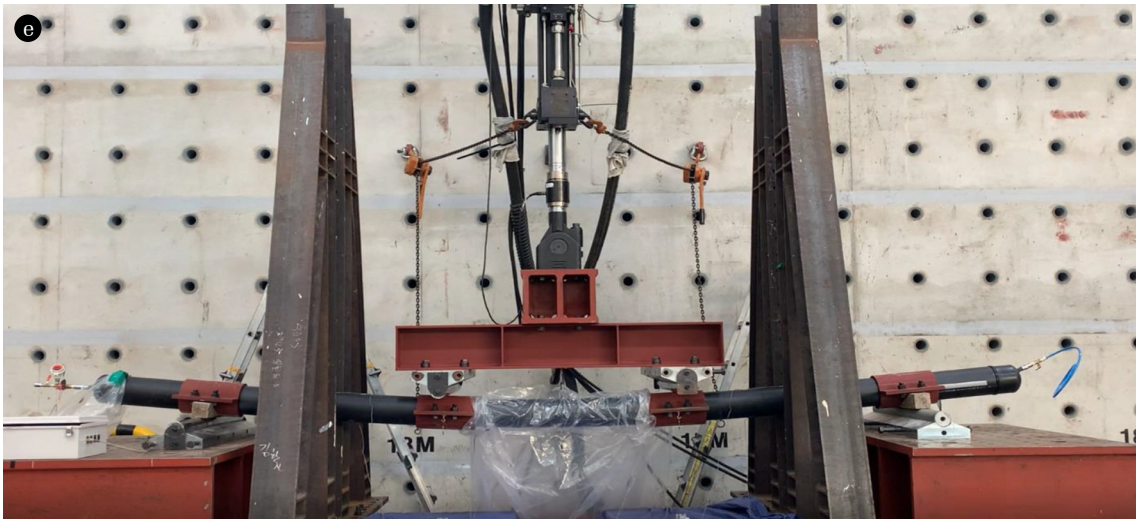
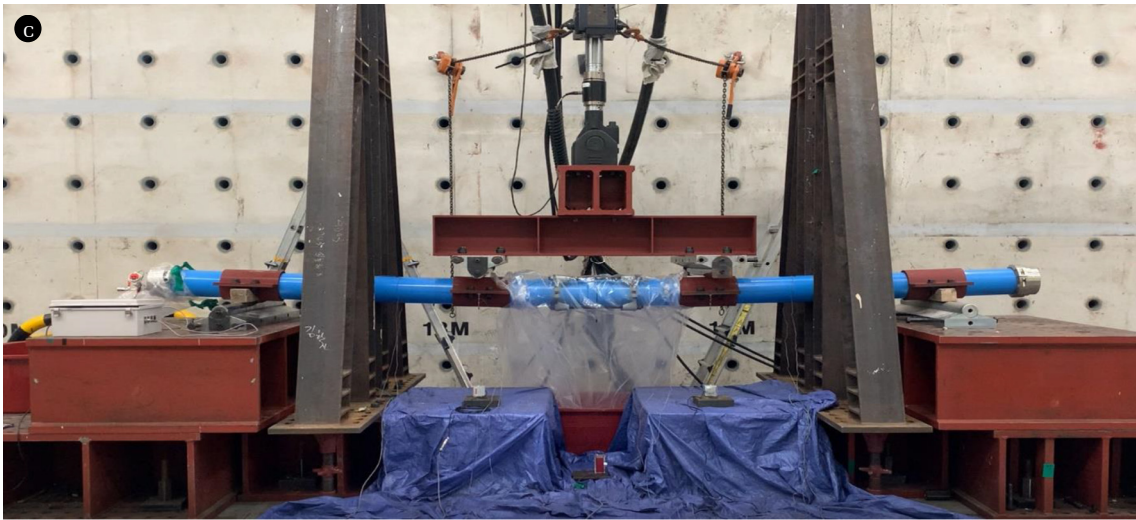


Fig. S4. Continue

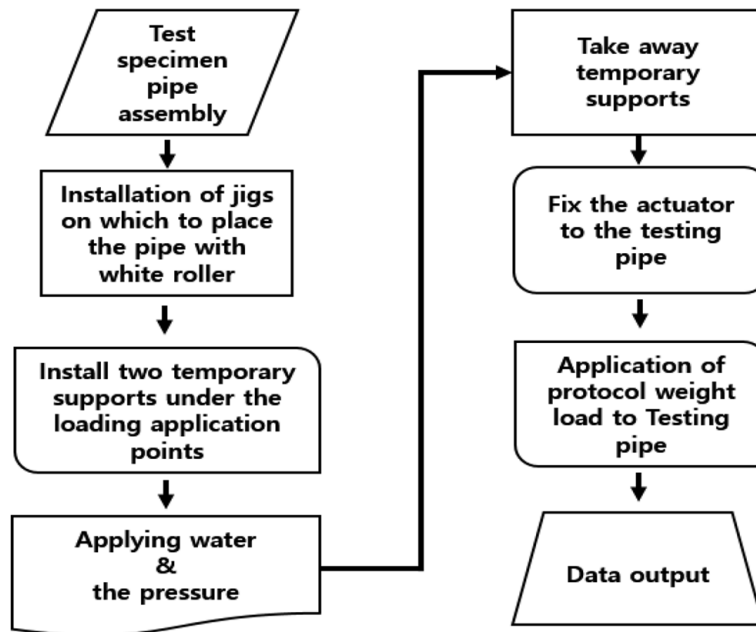


Fig. S5. Procedure of four-point bending method.