

# ISO 24817:2017-08 (E)

## Petroleum, petrochemical and natural gas industries - Composite repairs for pipework - Qualification and design, installation, testing and inspection

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	2
4	Symbols and abbreviated terms .....	6
4.1	Symbols .....	6
4.2	Abbreviated terms .....	9
5	Applications .....	9
6	Summary of key issues .....	11
7	Qualification and design .....	13
7.1	Repair feasibility assessment .....	13
7.2	Repair class .....	14
7.3	Repair design lifetime .....	14
7.4	Required data .....	15
7.4.1	Background .....	15
7.4.2	Original equipment design data .....	15
7.4.3	Maintenance and operational histories .....	15
7.4.4	Service condition data .....	15
7.4.5	Repair system qualification data .....	16
7.5	Design methodology .....	17
7.5.1	Overview .....	17
7.5.2	Environmental compatibility .....	19
7.5.3	Design temperature effects .....	19
7.5.4	Design based on substrate load sharing (defect type A) .....	21
7.5.5	Design based on repair laminate allowable strains (defect type A) .....	23
7.5.6	Design based on repair-allowable stresses determined by performance testing (defect type A) .....	24
7.5.7	Design of repairs for through-wall defects (defect type B) .....	25
7.5.8	Axial extent of repair .....	28
7.5.9	Optional design considerations .....	30
7.5.10	Dent and/or gouge type defects .....	34
7.5.11	Fretting type defects .....	34
7.5.12	Delamination or blister type defects .....	34
7.5.13	Repair of other components .....	35
7.5.14	Design output .....	38
7.6	Re-qualification of the repair system .....	38
7.6.1	Overview .....	38
7.6.2	For type A defect repairs .....	38
7.6.3	For type B defect repairs .....	38
8	Installation .....	39
8.1	Storage conditions .....	39

8.2	Documentation prior to repair application .....	39
8.2.1	Method statement .....	39
8.2.2	Work pack .....	39
8.3	Installer qualifications .....	40
8.4	Installation procedure .....	40
8.5	Repair completion documentation .....	41
8.6	Live repairs .....	43
8.7	Repair of clamps, piping components, tanks, or vessels .....	43
8.8	Environmental considerations .....	43
9	Testing and inspection .....	43
9.1	General .....	43
9.2	Allowable defects for the repair system .....	44
9.3	Repair of defects within the repair system .....	47
9.4	Inspection methods .....	48
9.5	Repair system maintenance and remedial options .....	48
9.5.1	Overview .....	48
9.5.2	Condition of the repair - visual inspection .....	48
9.5.3	Condition of the pipe substrate .....	49
9.5.4	Remedial options .....	49
9.5.5	Extension (revalidation) of repair design lifetime .....	49
9.5.6	Future modifications .....	50
10	System testing .....	50
11	Decommissioning .....	51
	Annex A (normative) Design data sheet .....	52
	Annex B (normative) Qualification data .....	55
	Annex C (normative) Short-term pipe spool survival test .....	59
	Annex D (normative) Measurement of LCL for through-wall defect calculation .....	61
	Annex E (normative) Measurement of performance test data .....	64
	Annex F (normative) Measurement of impact performance .....	67
	Annex G (normative) Measurement of the degradation factor .....	68
	Annex H (informative) Axial extent of repair look-up table .....	70
	Annex I (normative) Installer qualification .....	72
	Annex J (informative) Installation requirements and guidance .....	75
	Annex K (informative) Design considerations .....	77
	Annex L (informative) Management of the integrity of composite repair systems to pipework and vessels .....	82
	Bibliography .....	86