

# DIN EN 14870-4:2023-10 (E)

Petroleum and natural gas industries - Induction bends, fittings and flanges for pipeline transportation systems - Part 4: Factory cold bends (ISO 15590-4:2019, modified); English version EN 14870-4:2023

---

<b>Contents</b>	<b>Page</b>
European foreword .....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	8
4 Symbols and abbreviated terms .....	11
4.1 Symbols .....	11
4.2 Abbreviated terms .....	11
5 General requirements .....	12
5.1 Units of measurement .....	12
5.2 Rounding .....	12
5.3 Conformance to this document .....	12
6 Designation of cold bends .....	12
7 Design .....	13
8 Information provided by the purchaser .....	13
8.1 General information .....	13
8.2 Additional information .....	13
8.3 Information on the mother pipe .....	14
9 Manufacturing .....	15
9.1 Mother pipe .....	15
9.2 Qualification test bend .....	15
9.3 Production cold bending .....	16
9.4 Post-bending heat treatment .....	16
9.5 Forming and sizing after bending .....	17
9.6 Strip/plate end welds .....	17
9.7 Jointers and girth welds .....	17
9.8 End preparation .....	17
10 Testing and inspection .....	17
10.1 General requirements .....	17
10.2 Extent of testing and inspection .....	19
10.2.1 Qualification test bend .....	19
10.2.2 Production bends .....	21
10.2.3 Production test bends .....	21
10.3 Chemical composition .....	21
10.4 Physical testing .....	21
10.4.1 General .....	21
10.4.2 Tensile testing .....	22
10.4.3 Charpy V-notch impact testing .....	22
10.4.4 Through-thickness hardness testing .....	23
10.4.5 Surface hardness testing .....	24
10.4.6 Metallographic examination .....	24
10.4.7 Guided bend testing .....	24

10.4.8	Flattening tests .....	25
10.5	Non-destructive testing.....	25
10.5.1	Visual inspection.....	25
10.5.2	Weld seam testing .....	26
10.5.3	Inspection of bend ends .....	26
10.5.4	Magnetic particle testing or liquid-penetrant testing on the bend body .....	26
10.5.5	Ultrasonic testing on the bend body .....	26
10.5.6	Level of residual magnetism.....	26
10.5.7	Repairs.....	26
10.5.8	NDT personnel.....	27
10.6	Dimensions .....	27
10.7	Gauging.....	30
10.8	Hydrostatic testing.....	30
11	Inspection document.....	30
12	Marking .....	30
Annex A	(normative) Manufacturing procedure specification .....	32
A.1	General .....	32
A.2	Manufacturing procedure specification .....	32
Annex B	(normative) PSL 2S cold bends ordered for sour service .....	34
B.1	Introduction .....	34
B.2	Additional information provided by the purchaser.....	34
B.3	Manufacturing.....	34
B.3.1	Manufacturing procedure.....	34
B.3.2	Pipe manufacturing .....	34
B.4	Testing and inspection.....	34
B.4.1	Tensile properties .....	34
B.4.2	HIC/SWC test .....	35
B.4.3	SSC test.....	35
B.4.4	Requirements.....	36
B.4.5	Hardness test.....	36
B.5	Hard spots .....	36
B.6	Inspection.....	37
B.7	Non-destructive inspection.....	37
B.7.1	Laminar imperfections at the pipe ends .....	37
B.7.2	Ultrasonic testing on the bend body .....	37
B.7.3	Ultrasonic inspection of SAW seam welds.....	37
B.7.4	Non-destructive inspection of HFW weld seams.....	37
Bibliography	.....	38