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Z662-15

Oil and gas pipeline systems



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Z662-15, Oil and gas pipeline systems

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Contents

Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials	19
Executive Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials	25
Subcommittee on Aluminum Pipeline Systems	27
Subcommittee on Coatings	28
Subcommittee on Construction	30
Subcommittee on Design	32
Subcommittee on Distribution	34
Editorial Subcommittee	36
Subcommittee on Materials	37
Subcommittee on Operations and Systems Integrity	39
Subcommittee on Production	41
Subcommittee on Management Systems	43
1 Scope	47
2 Reference publications and definitions	51
2.1 Reference publications	51
2.2 Definitions	69
3 Safety and loss management systems	81
3.1 General	81
3.2 Pipeline system integrity management program	82
3.3 Engineering assessments	82
3.3.1 General	82
3.3.2 Engineering assessment process	83
3.3.3 Documentation	83
3.4 Risk management	83
4 Design	83
4.1 General	83
4.2 Design conditions	85
4.2.1 General	85
4.2.2 Temperature	85
4.2.3 Sustained force and wind loading	86
4.2.4 Other loading and dynamic effects	86
4.3 Design criteria	86

- 4.3.1 General 86
- 4.3.2 Class location assessment areas 87
- 4.3.3 Class location designations 88
- 4.3.4 Class location end boundaries 88
- 4.3.5 Pressure design for steel pipe — General 92
- 4.3.6 Pressure design for steel pipe — Design factor (F) 93
- 4.3.7 Pressure design for steel pipe — Location factor (L) 93
- 4.3.8 Pressure design for steel pipe — Joint factor (J) 94
- 4.3.9 Pressure design for steel pipe — Temperature factor (T) 95
- 4.3.10 Pressure design for steel pipe — Allowances 95
- 4.3.11 Pressure design for steel pipe — Wall thickness 95
- 4.3.12 Pressure design for components — General 97
- 4.3.13 Pressure design for components — Closures 98
- 4.3.14 Pressure design for components — Elbows 98
- 4.3.15 Pressure design for components — Tees and crosses 98
- 4.3.16 Pressure design for components — Branch connections 98
- 4.3.17 Pressure design for components — Integrally reinforced extruded outlet headers 99
- 4.3.18 Pressure design for components — Welded branch connections 100
- 4.3.19 Pressure design for components — Reinforcement of single openings 104
- 4.3.20 Pressure design for components — Reinforcement of multiple openings 106
- 4.4 Valve location and spacing 106
- 4.5 Selection and limitation of piping joints 108
 - 4.5.1 Buttwelded joints 108
 - 4.5.2 Threaded joints 108
 - 4.5.3 Sleeve, coupled, mechanical interference fit, and other patented joints 108
 - 4.5.4 Additional requirements for mechanical interference fit joints 109
- 4.6 Flexibility and stress analysis — General stress design 109
 - 4.6.1 Applicability 109
 - 4.6.2 Stress design of restrained and unrestrained portions of pipeline systems 110
 - 4.6.3 Discontinuity stresses 110
 - 4.6.4 Supplemental stress design 110
 - 4.6.5 Hoop stress 110
 - 4.6.6 Steel properties 110
- 4.7 Flexibility and stress analysis — Stress design for restrained portions of pipeline systems 110
 - 4.7.1 Combined hoop and longitudinal stresses 111
 - 4.7.2 Combined stresses for restrained spans 111
 - 4.7.3 Anchors and restraints 111
- 4.8 Flexibility and stress analysis — Stress design for unrestrained portions of pipeline systems 112
- 4.9 Flexibility and stress analysis — Loads on pipe-supporting elements 116
 - 4.9.1 General 116
 - 4.9.2 Supports and braces 116
- 4.10 Flexibility and stress analysis — Design of pipe-supporting elements 116
- 4.11 Cover and clearance 116
- 4.12 Crossings 119
 - 4.12.1 General 119
 - 4.12.2 Crossings of utilities 119
 - 4.12.3 Crossings of roads and railways 119
 - 4.12.4 Crossings of water 122

- 4.13 Requirements for pipelines in proximity to electrical transmission lines and associated facilities 123
 - 4.13.1 General 123
 - 4.13.2 Effects on pipelines in proximity to high-voltage DC lines 123
 - 4.13.3 Safety requirements 123
- 4.14 Design of compressor stations over 750 kW and pump stations over 375 kW 124
 - 4.14.1 General 124
 - 4.14.2 Design of compressor stations over 750 kW 125
 - 4.14.3 Design of pump stations over 375 kW 128
- 4.15 Liquid storage in oil pipeline pump stations, tank farms, and terminals 131
 - 4.15.1 Aboveground tanks over 4000 L 131
 - 4.15.2 Aboveground tanks of 4000 L or less 132
 - 4.15.3 Underground tanks 132
 - 4.15.4 Pressure spheres, bullets, and ancillary vessels 132
 - 4.15.5 Pipe-type storage vessels 132
- 4.16 Gas storage in pipe-type and bottle-type holders 132
 - 4.16.1 General 132
 - 4.16.2 Aboveground installations 132
 - 4.16.3 Underground installations 133
- 4.17 Vaults 133
 - 4.17.1 Structural design 133
 - 4.17.2 Location 133
 - 4.17.3 Vault ventilation 133
 - 4.17.4 Drainage and waterproofing 134
- 4.18 Pressure control and overpressure protection of piping 134
 - 4.18.1 General 134
 - 4.18.2 General design requirements for systems for pressure control and overpressure protection 135
 - 4.18.3 Additional design requirements for pressure-relieving installations 135
 - 4.18.4 Additional overpressure-protection requirements for compressor and pump stations 136
- 4.19 Instrument, control, and sampling piping 136
- 4.20 Leak detection capability 137
- 4.21 Odorization 138
- 4.22 Requirements for pipelines installed by horizontal directional drilling 138

5 Materials 138

- 5.1 Qualification of materials 138
- 5.2 Steel materials and gaskets 139
 - 5.2.1 Design temperatures — Steel materials 139
 - 5.2.2 Notch toughness requirements — Steel pipe 140
 - 5.2.3 Notch toughness requirements — Steel components 144
 - 5.2.4 Steel pipe 144
 - 5.2.5 Steel components — General 149
 - 5.2.6 Steel components — Flanges 149
 - 5.2.7 Bolting 150
 - 5.2.8 Gaskets 150
 - 5.2.9 Steel components — Fittings 151
- 5.3 Other materials 152
 - 5.3.1 Aluminum piping 152

- 5.3.2 Polyethylene pipe and fittings 152
- 5.3.3 Cast iron components 152
- 5.3.4 Copper and copper-based alloys 153
- 5.3.5 Stainless steels 153
- 5.3.6 Reinforced composite pipe and fittings 153
- 5.3.7 Nonferrous flanges 153
- 5.3.8 Other alloys and composites 153
- 5.3.9 External coatings for pipe and piping 153
- 5.4 Oilfield water service 154
- 5.5 Cement-mortar linings 154
- 5.6 Reuse of materials 154
- 5.7 Records of materials 155
- 5.8 Engineering assessments 155

- 6 Transportation, handling, and installation 156**
 - 6.1 General 156
 - 6.2 Activities on pipeline rights-of-way 156
 - 6.2.1 Clearing, grading, and ground disturbances 156
 - 6.2.2 Pipe and components handling 157
 - 6.2.3 Bends and elbows in steel piping 157
 - 6.2.4 Alignment and welding 157
 - 6.2.5 Protective coatings 158
 - 6.2.6 Ditching and lowering-in 158
 - 6.2.7 Backfilling 158
 - 6.2.8 Internal cleaning 159
 - 6.2.9 Clean-up and restoration 159
 - 6.2.10 Installation of crossings 159
 - 6.2.11 Horizontal directional drilling (HDD) 159
 - 6.3 Pipe and component surface requirements applicable to steel piping 160
 - 6.3.1 Pipe and component manufacturing defects detected during installation inspection 160
 - 6.3.2 Field repair of gouges and grooves in pipe 160
 - 6.3.3 Dents in pipe 161
 - 6.3.4 Ripples, wrinkles, buckles, and out-of-roundness 161
 - 6.3.5 Removal of cracks in circumferential butt welds and in fillet welds 161
 - 6.3.6 Field repair of gouges, grooves, and dents in components 162
 - 6.3.7 Material acceptability 162
 - 6.4 Electrical test leads on pipeline systems 162
 - 6.5 Inspection 162
 - 6.6 Precautions to avoid uncontrolled fires 164

- 7 Joining 164**
 - 7.1 General 164
 - 7.2 Arc and gas welding — General 165
 - 7.3 Arc and gas welding — Joint configurations 167
 - 7.3.1 Butt welds 167
 - 7.3.2 Fillet welds 168
 - 7.4 Arc and gas welding — Welding equipment 175
 - 7.5 Arc and gas welding — Materials 176
 - 7.5.1 Pipe and components 176

- 7.5.2 Filler metals and fluxes 176
- 7.5.3 Shielding gases 177
- 7.6 Arc and gas welding — Qualification of welding procedure specifications 177
 - 7.6.1 General 177
 - 7.6.2 Company approval 177
 - 7.6.3 Records 177
 - 7.6.4 Welding procedure specifications 177
 - 7.6.5 Essential changes for qualification of welding procedure specifications 180
- 7.7 Arc and gas welding — Testing for qualification of welding procedure specifications and qualification of welders 186
 - 7.7.1 Welding of test joints 186
 - 7.7.2 Testing of butt welds — General 186
 - 7.7.3 Testing of butt welds — Tension test 192
 - 7.7.4 Testing of butt welds — Nick-break test 193
 - 7.7.5 Testing of butt welds — Root-bend and face-bend tests 194
 - 7.7.6 Testing of butt welds — Side-bend test 194
 - 7.7.7 Testing of fillet welds and branch connection welds — Root-break test 195
 - 7.7.8 Testing of fillet welds and branch connection welds — Macrosection test 198
 - 7.7.9 Additional testing of partial-penetration butt welds 198
- 7.8 Arc and gas welding — Qualification of welders 199
 - 7.8.1 General 199
 - 7.8.2 Qualification range 200
 - 7.8.3 Special qualification — Butt welds 201
 - 7.8.4 Visual inspection 201
 - 7.8.5 Qualification of welders by visual and nondestructive inspection 202
 - 7.8.6 Retests 202
 - 7.8.7 Records of qualified welders 202
- 7.9 Arc and gas welding — Production welding 202
 - 7.9.1 General 202
 - 7.9.2 Alignment and root gap 203
 - 7.9.3 Grounding 203
 - 7.9.4 Use of line-up clamps — Butt welds 203
 - 7.9.5 Relative movement 203
 - 7.9.6 Bevelled ends 203
 - 7.9.7 Weather conditions 204
 - 7.9.8 Clearance 204
 - 7.9.9 Cleaning between beads 204
 - 7.9.10 Position welding 204
 - 7.9.11 Roll welding 205
 - 7.9.12 Identification of welds 205
 - 7.9.13 Seal welding 205
 - 7.9.14 Fillet welds 205
 - 7.9.15 Preheating, interpass temperature control, controlled cooling, and stress relieving 205
 - 7.9.16 Stress relieving 206
- 7.10 Arc and gas welding — Inspection and testing of production welds 207
 - 7.10.1 General 207
 - 7.10.2 Visual inspection 208
 - 7.10.3 Mandatory nondestructive inspection 208
 - 7.10.4 Nondestructive inspection 209

- 7.10.5 Destructive testing 210
- 7.10.6 Disposition of defective welds 210
- 7.11 Arc and gas welding — Standards of acceptability for nondestructive inspection 211
 - 7.11.1 General 211
 - 7.11.2 Weld crown 211
 - 7.11.3 Incomplete penetration of the root bead 212
 - 7.11.4 Incomplete fusion 213
 - 7.11.5 Internal concavity 213
 - 7.11.6 Undercut 214
 - 7.11.7 Incomplete fusion due to cold lap 215
 - 7.11.8 Lack of cross-penetration 216
 - 7.11.9 Elongated slag inclusions 216
 - 7.11.10 Hollow bead 217
 - 7.11.11 Burn-through areas 217
 - 7.11.12 Isolated slag inclusions 218
 - 7.11.13 Spherical porosity 218
 - 7.11.14 Wormhole porosity 220
 - 7.11.15 Cracks and arc burns 220
 - 7.11.16 Unequal leg length — Fillet welds 220
 - 7.11.17 Accumulation of imperfections 220
 - 7.11.18 Weld conditions limiting radiographic interpretation 220
- 7.12 Arc and gas welding — Repair of welds containing repairable defects 221
 - 7.12.1 Partial-penetration butt welds 221
 - 7.12.2 Authorization for repairs 221
 - 7.12.3 Repair procedures 221
 - 7.12.4 Removal of arc burns in weld areas 221
 - 7.12.5 Removal of cracks in circumferential butt welds and in fillet welds 222
 - 7.12.6 Inspection of repairs 222
- 7.13 Arc and gas welding — Materials and equipment for radiographic inspection 222
 - 7.13.1 General 222
 - 7.13.2 Radiographic procedure 223
 - 7.13.3 Radiation sources 223
 - 7.13.4 Imaging media 223
 - 7.13.5 Screens 223
 - 7.13.6 Image quality indicators 223
 - 7.13.7 Comparator shims 224
- 7.14 Arc and gas welding — Production of radiographs 225
 - 7.14.1 Radiation source location 225
 - 7.14.2 Geometric relationship 225
 - 7.14.3 Size of radiation field 226
 - 7.14.4 Location of image quality indicators 226
 - 7.14.5 Radiographic image identification markers 227
 - 7.14.6 Processing of radiographic images 227
 - 7.14.7 Radiation protection 228
 - 7.14.8 Radiographers 228
 - 7.14.9 Retention of radiographic records 228
- 7.15 Arc and gas welding — Ultrasonic inspection of circumferential butt welds in piping 228
 - 7.15.1 Methods 228
 - 7.15.2 Terminology 229

- 7.15.3 General 229
- 7.15.4 Equipment and supplies — General 229
- 7.15.5 Equipment and supplies — Additional requirements for mechanized inspection systems 229
- 7.15.6 Qualification of ultrasonic inspectors 230
- 7.15.7 Calibration 230
- 7.15.8 Inspection procedure for production welds 231
- 7.15.9 Inspection procedure for production welds — Additional requirements for mechanized inspection 231
- 7.15.10 Standards of acceptability for ultrasonic inspection 232
- 7.15.11 Ultrasonic inspection reports and records 233
- 7.16 Mechanical interference fit joints 234
 - 7.16.1 General 234
 - 7.16.2 Qualification of joining procedure specifications 234
 - 7.16.3 Qualification of operators 235
 - 7.16.4 Inspection procedures 235
- 7.17 Welding on in-service piping 236
 - 7.17.1 General 236
 - 7.17.2 Fillet welds and branch connection welds on liquid-filled piping or flowing-gas piping and direct deposition welds on flowing-gas piping 236
 - 7.17.3 Essential changes for qualification of welding procedure specifications intended for welding on in-service piping 237
 - 7.17.4 Fillet welds and branch connection welds — Face bend test 241
 - 7.17.5 Fillet welds and branch connection welds — Macroexamination and hardness tests 242
 - 7.17.6 Qualification of welding procedure specifications and welders for direct deposition welds 244
 - 7.17.7 Nondestructive inspection of welds made on in-service piping 247

8 Pressure testing 248

- 8.1 General 248
- 8.2 Safety during pressure tests 250
- 8.3 Compressor and pump station piping 250
- 8.4 Instrument and control piping 251
- 8.5 Test-head assemblies 251
- 8.6 Testing procedures and techniques 252
- 8.7 Piping to be operated at pressure greater than 700 kPa 253
 - 8.7.1 Strength and leak tests 253
 - 8.7.2 Pressure-test mediums 254
 - 8.7.3 Minimum strength and leak test pressures 255
 - 8.7.4 Maximum strength and leak test pressures 255
 - 8.7.5 Duration of tests 256
 - 8.7.6 Maximum operating pressures 257
 - 8.7.7 Pressure-test measurements and records 257
- 8.8 Piping intended to be operated at pressures of 700 kPa or less 259
 - 8.8.1 Strength and leak tests 259
 - 8.8.2 Pressure-test mediums 260
 - 8.8.3 Minimum leak test pressures 260
 - 8.8.4 Maximum leak test pressures 260
 - 8.8.5 Duration of tests 260
 - 8.8.6 Maximum operating pressures 261

8.8.7	Pressure-test measurements and records	261
8.9	Leaks and ruptures during pressure tests	261
8.10	Disposal of pressure-test mediums	262
8.11	Cleaning and drying	262
8.12	Tie-ins of tested sections	262
9	Corrosion control	263
9.1	General	263
9.2	Selection of external protective coatings for buried or submerged piping	264
9.3	Application and inspection of external protective coatings for buried or submerged piping	269
9.4	Storage, handling, transportation, and installation of coated pipe and components	270
9.5	Cathodic protection — Design and installation	270
9.6	Electrical isolation	271
9.7	Electrical interference	271
9.7.1	Direct current	271
9.7.2	Alternating current and lightning	271
9.8	Corrosion control test stations	272
9.9	Operation and maintenance of impressed current and sacrificial cathodic protection systems	273
9.10	Internal corrosion control	274
9.10.1	Susceptibility to internal corrosion	274
9.10.2	Mitigation	274
9.10.3	Monitoring	274
9.11	Corrosion control records	275
10	Operating, maintenance, and upgrading	275
10.1	Engineering assessments of existing pipelines	275
10.2	Safety	276
10.2.1	Training programs	276
10.2.2	Employee information	276
10.2.3	Supervisor responsibility	276
10.2.4	Hazards	276
10.2.5	Security	276
10.2.6	Work sites	276
10.2.7	Firefighting and special equipment	276
10.2.8	In-service pipelines	277
10.2.9	Additional precautions for pipeline systems transporting high-vapour-pressure hydrocarbons	277
10.2.10	Fluids containing H ₂ S	278
10.2.11	Carbon dioxide pipelines and gas pipelines containing predominantly CO ₂	278
10.2.12	Steam distribution pipelines	278
10.3	Integrity of pipeline systems	278
10.3.1	Pipeline system integrity management program	278
10.3.2	Integrity of existing pipeline systems	279
10.3.3	Leak detection for liquid hydrocarbon pipeline systems	280
10.3.4	Leak detection for gas pipeline systems and carbon dioxide pipeline systems	280
10.3.5	Leak detection for oilfield water and multiphase pipeline systems	281
10.3.6	Pipeline system incident investigations	281

- 10.3.7 Change in service fluid 281
- 10.3.8 Upgrading to a higher maximum operating pressure 281
- 10.3.9 Pressure testing existing piping 282
- 10.4 Records 283
 - 10.4.1 General 283
 - 10.4.2 Pipeline systems 283
 - 10.4.3 Pipeline emergency records 284
 - 10.4.4 Pipeline system incidents 284
 - 10.4.5 Pressure-test records 285
- 10.5 Operating and maintenance procedures 285
 - 10.5.1 General 285
 - 10.5.2 Pipeline emergencies 286
 - 10.5.3 Pipeline identification 286
 - 10.5.4 Signs at stations and other facilities 288
 - 10.5.5 Ground disturbance 288
 - 10.5.6 Odorization 289
 - 10.5.7 Precautions to avoid unintentional ignition of gas-air mixtures or hydrocarbon liquids 289
 - 10.5.8 Environmental effects 289
- 10.6 Right-of-way inspection and maintenance 290
 - 10.6.1 Pipeline patrolling 290
 - 10.6.2 Vegetation control 290
 - 10.6.3 Exposed facilities 291
 - 10.6.4 Crossings 291
- 10.7 Change of class location 291
- 10.8 Crossings of existing pipelines 292
- 10.9 Operation and maintenance of facilities and equipment 293
 - 10.9.1 Compressor and pump stations 293
 - 10.9.2 Aboveground tanks and pressure vessels 293
 - 10.9.3 Underground storage 295
 - 10.9.4 Pipe-type and bottle-type gas holders and pipe-type storage vessels 295
 - 10.9.5 Pressure-control, pressure-limiting, and pressure-relieving systems 296
 - 10.9.6 Valves 297
 - 10.9.7 Vaults 297
 - 10.9.8 Quick opening closures 297
- 10.10 Evaluation of imperfections 297
 - 10.10.1 General 297
 - 10.10.2 Corrosion imperfections in pipe 298
 - 10.10.3 Gouges, grooves, and arc burns in pipe 300
 - 10.10.4 Dents in pipe 301
 - 10.10.5 Pipe body surface cracks 304
 - 10.10.6 Weld imperfections in field circumferential welds 304
 - 10.10.7 Weld imperfections in mill seam welds and mill circumferential welds 304
 - 10.10.8 Ripples, wrinkles, and buckles in steel pipe 305
- 10.11 Permanent repair methods 308
 - 10.11.1 General 308
 - 10.11.2 Grinding repairs 309
 - 10.11.3 Piping replacements 311
 - 10.11.4 Repair sleeves for pipe 311
 - 10.11.5 Defect removal by hot tapping 314

10.11.6	Direct deposition welding	314
10.12	Temporary repair methods	315
10.12.1	General	315
10.12.2	Composite reinforcement repair sleeves	319
10.13	Maintenance welding	319
10.13.1	General	319
10.13.2	In-service piping	319
10.14	Pipeline hot taps	320
10.14.1	General	320
10.14.2	Pipe preparation	320
10.14.3	Parameters	320
10.15	Deactivation and reactivation of piping	321
10.15.1	Deactivation of piping	321
10.15.2	Reactivation of piping	321
10.16	Abandonment of pipelines and pipe-type storage vessels	321
10.16.1	General	321
10.16.2	Buried pipelines	322
10.16.3	Removal of related surface equipment	322
10.16.4	Aboveground pipelines	322
10.16.5	Records	322
10.17	Abandonment of pipeline related facilities	322
10.17.1	General	322
10.17.2	Underground vaults and closed top pits	323
10.17.3	Aboveground tanks and pressure vessels	323
10.17.4	Underground storage tanks	323

11 Offshore steel pipelines 323

11.1	Applicability	323
11.2	Design — General	324
11.3	Design information	324
11.3.1	Pipeline route	324
11.3.2	Route survey and data acquisition	327
11.3.3	Pipeline operating conditions	328
11.4	Design and load conditions	328
11.5	Functional loads	329
11.6	Environmental loads	330
11.6.1	General	330
11.6.2	Wind forces	330
11.6.3	Hydrodynamic loads — General	330
11.6.4	Wave-induced and current-induced hydrodynamic loads	331
11.6.5	Loads due to ice conditions and regional ice features	331
11.6.6	Seismic activity	332
11.6.7	Loads arising from marine growth	333
11.6.8	Indirect environmental loads	333
11.6.9	Accidental loads	333
11.7	Design analysis	333
11.8	Design for mechanical strength	334
11.8.1	Design criteria for installation	334
11.8.2	Design criteria for pressure testing	335

11.8.3	Design criteria for operation	335
11.8.4	Determination of stresses	336
11.8.5	Pipe wall thickness specification	337
11.8.6	Strain-based design	337
11.8.7	Strain-based design criteria	339
11.9	Design for thermal expansion	339
11.10	Design for on-bottom stability	339
11.11	Design for fatigue life	340
11.12	Design for free spans, anchoring, and supports	340
11.13	Design for shore approaches	340
11.14	Design for components	341
11.15	Design for crossings	341
11.16	Pipeline components and fabrication details	341
11.16.1	General	341
11.16.2	Supports, braces, anchors, and buckle arresters	342
11.16.3	Mechanical connectors	342
11.16.4	Welded branch connections and reinforcements	342
11.16.5	Reducers	342
11.16.6	Weight-coating	342
11.16.7	Thermal insulation	344
11.17	Pipeline pressure control	344
11.18	Leak detection	344
11.19	Emergency shutdown valve	344
11.20	Materials	344
11.20.1	General	344
11.20.2	Pipe	345
11.20.3	Fittings, flanges, and valves	345
11.21	Installation	346
11.21.1	General	346
11.21.2	Transportation, handling, and storage of materials	346
11.21.3	Ancillary equipment and specialty items	346
11.21.4	Installation procedures	346
11.21.5	Installation inspection	347
11.21.6	Repair of pipe and components prior to installation	348
11.21.7	Repair of pipelines after installation	348
11.21.8	As-built surveys	348
11.21.9	Commissioning	348
11.22	Welding	349
11.22.1	General	349
11.22.2	Qualification of welding procedures	349
11.22.3	Testing of welded joints — Pipe butt welds	349
11.22.4	Production welding	350
11.22.5	Underwater welding	350
11.23	Mechanical connectors	350
11.24	Pressure testing	351
11.24.1	General	351
11.24.2	Testing of mechanical connector assemblies	351
11.24.3	Test pressure	351
11.24.4	Pressure-test medium	352

- 11.24.5 Safety during pressure tests 352
- 11.24.6 Pressure-test records 352
- 11.25 Corrosion control 352
 - 11.25.1 General 352
 - 11.25.2 External corrosion control — Protective coatings 352
 - 11.25.3 External corrosion control — Cathodic protection systems 353
 - 11.25.4 Internal corrosion control 353
 - 11.25.5 Maintenance of cathodic protection systems 354
 - 11.25.6 Records 354
- 11.26 Operating and maintenance 354
 - 11.26.1 General 354
 - 11.26.2 Manual of operating procedures 354
 - 11.26.3 Contingency manual 355
 - 11.26.4 Communication systems 355
 - 11.26.5 Inspection and patrolling of pipelines 355
 - 11.26.6 Leak detection 356
 - 11.26.7 Valves 356
 - 11.26.8 Control and safety devices 356
 - 11.26.9 Safety 357
 - 11.26.10 Repair of pipelines 357
 - 11.26.11 Records 357
 - 11.26.12 Pipeline deactivation and reactivation 357
- 12 Gas distribution systems 358**
 - 12.1 General 358
 - 12.2 Applicability 358
 - 12.3 Gas containing hydrogen sulphide 358
 - 12.4 Design 358
 - 12.4.1 Steel piping 358
 - 12.4.2 Polyethylene piping — Design pressure 361
 - 12.4.3 Polyethylene piping — Design limitations 363
 - 12.4.4 Polyethylene piping — Design pressure of components 364
 - 12.4.5 Copper pipe and tubing 364
 - 12.4.6 Plastic piping materials — Other than polyethylene 364
 - 12.4.7 Cover 365
 - 12.4.8 Pipelines within road and railway rights-of-way 365
 - 12.4.9 Limitations on operating pressure — General 366
 - 12.4.10 Limitations on operating pressure — Piping within customers' buildings 367
 - 12.4.11 Pressure control and overpressure protection 367
 - 12.4.12 Distribution system valves — General 369
 - 12.4.13 Distribution system valves — Valve location and spacing 369
 - 12.4.14 Distribution system valves — Service shutoffs 370
 - 12.4.15 Customers' meters and service regulators 371
 - 12.4.16 Distribution systems within buildings 372
 - 12.4.17 Liquefied petroleum gas (LPG) pipeline systems 373
 - 12.5 Materials 373
 - 12.5.1 General 373
 - 12.5.2 Steel pipe, tubing, and components 373
 - 12.5.3 Polyethylene pipe, tubing, and components 373

- 12.5.4 Cast iron valves 374
- 12.5.5 Polyamide (PA) piping systems 374
- 12.6 Installation 375
 - 12.6.1 General 375
 - 12.6.2 Steel piping 375
 - 12.6.3 Ditch depth 375
 - 12.6.4 Polyethylene piping — General 375
 - 12.6.5 Polyethylene piping — Inspection and handling 376
 - 12.6.6 Polyethylene piping — Direct burial 376
 - 12.6.7 Polyethylene piping — Insertion in casing 377
 - 12.6.8 Polyethylene piping — Bends and branches 377
 - 12.6.9 Copper piping 378
 - 12.6.10 Installation of service lines — Drainage 378
 - 12.6.11 Installation of service lines into or under buildings 378
 - 12.6.12 Installation of service lines — Additional installation requirements for polyethylene service lines 378
 - 12.6.13 Trenchless installations 379
- 12.7 Joining 380
 - 12.7.1 General 380
 - 12.7.2 Steel pipe joints and connections — Essential changes for qualification of welding procedure specifications 380
 - 12.7.3 Steel pipe joints and connections — Qualification of welders 380
 - 12.7.4 Steel pipe joints and connections — Inspection of production welds 383
 - 12.7.5 Steel pipe joints and connections — Inspection of tie-in welds 384
 - 12.7.6 Steel pipe joints and connections — Steel pipe joints within buildings 384
 - 12.7.7 Polyethylene pipe joints and connections — General 384
 - 12.7.8 Polyethylene pipe joints and connections — Joining by heat fusion 384
 - 12.7.9 Polyethylene pipe joints and connections — Joining by electrofusion 385
 - 12.7.10 Polyethylene pipe joints and connections — Joining by mechanical methods 385
 - 12.7.11 Joints in copper pipe and tubing 386
 - 12.7.12 Service line connections 386
- 12.8 Pressure testing 387
 - 12.8.1 Piping in distribution systems intended to be operated at pressures in excess of 700 kPa 387
 - 12.8.2 Steel piping in distribution systems intended to be operated at pressures 700 kPa or less 388
 - 12.8.3 Piping within customers' buildings 388
 - 12.8.4 Polyethylene piping 388
 - 12.8.5 Test-head assemblies 389
- 12.9 Corrosion control 389
 - 12.9.1 Steel piping 389
 - 12.9.2 Copper piping 390
 - 12.9.3 Corrosion inspection 390
- 12.10 Operating, maintenance, and upgrading 390
 - 12.10.1 General 390
 - 12.10.2 Marking of piping 390
 - 12.10.3 Distribution system maintenance 390
 - 12.10.4 Pressure recording for distribution systems 392
 - 12.10.5 Valve maintenance 392
 - 12.10.6 Pressure-control, pressure-limiting, and pressure-relieving devices 392
 - 12.10.7 Repair procedures for steel distribution pipeline systems 392

- 12.10.8 Maintenance welding 393
- 12.10.9 Squeezing of polyethylene and polyamide pipe for pressure-control purposes 393
- 12.10.10 Maintenance and repair requirements for polyethylene, polyamide, and polyvinyl chloride pipe and tubing 394
- 12.10.11 Static electricity dissipation 395
- 12.10.12 Pressure upgrading of distribution piping 395
- 12.10.13 Pipeline emergencies 395
- 12.10.14 Ground disturbances 395
- 12.10.15 Class location 396

13 Reinforced composite, thermoplastic-lined, and polyethylene pipelines 396

- 13.1 Reinforced composite pipelines 396
 - 13.1.1 General 396
 - 13.1.2 Design 397
 - 13.1.3 Materials 401
 - 13.1.4 Installation 402
 - 13.1.5 Joining 403
 - 13.1.6 Joining personnel — training and qualification 404
 - 13.1.7 Joining inspection 405
 - 13.1.8 Pressure testing 406
 - 13.1.9 Operation 406
 - 13.1.10 Pipeline repairs 407
 - 13.1.11 Deactivation or abandonment 407
- 13.2 Thermoplastic-lined pipelines 408
 - 13.2.1 General 408
 - 13.2.2 Design 408
 - 13.2.3 Materials 410
 - 13.2.4 Installation 411
 - 13.2.5 Joining liners 411
 - 13.2.6 Flange connections 412
 - 13.2.7 Pressure testing 412
 - 13.2.8 Operation and maintenance 413
- 13.3 Polyethylene pipelines 414
 - 13.3.1 General 414
 - 13.3.2 Design 414
 - 13.3.3 Materials 418
 - 13.3.4 Installation 420
 - 13.3.5 Joining procedure and qualification 421
 - 13.3.6 Joining personnel — Competency requirements 423
 - 13.3.7 Joining inspection 424
 - 13.3.8 Pressure testing 427
 - 13.3.9 Operation and maintenance 429

14 Steam distribution pipelines and high temperature pipelines 430

- 14.1 General 430
 - 14.1.1 Scope 430
 - 14.1.2 Applicability 430
 - 14.1.3 Multiple service pipelines 430
 - 14.1.4 Alternate provisions 430

- 14.1.5 Definitions 430
 - 14.2 Design 431
 - 14.2.1 General 431
 - 14.2.2 Straight pipe under internal pressure 431
 - 14.2.3 Pipe bends 432
 - 14.2.4 Limits of calculated stresses due to sustained loads and displacement strains 433
 - 14.2.5 Expansion, flexibility, and support 433
 - 14.2.6 Corrosion and erosion allowances 433
 - 14.2.7 Wall thickness tolerance 433
 - 14.3 Materials 434
 - 14.3.1 General 434
 - 14.3.2 Material testing 435
 - 14.3.3 Fittings (excluding bends and transition pieces) 435
 - 14.3.4 Flanges 437
 - 14.3.5 Non-standard flanges and clamp connectors 437
 - 14.3.6 Valves 438
 - 14.3.7 Transition pieces 438
 - 14.3.8 Pipe bends — General 439
 - 14.3.9 Pipe bends — Qualification and production 439
 - 14.3.10 Piping supports 440
 - 14.4 Joining 440
 - 14.5 Pressure testing 441
 - 14.6 Corrosion control 442
 - 14.7 Steam distribution pipelines — Commissioning and operating 442
- 15 Aluminum piping 443**
- 15.1 General 443
 - 15.2 Applicability 443
 - 15.3 Design 444
 - 15.3.1 Pressure design for aluminum pipe 444
 - 15.3.2 Pressure design for components 446
 - 15.3.3 Piping joints 446
 - 15.3.4 Aluminum properties 446
 - 15.3.5 Uncased railway crossings 447
 - 15.3.6 Effects on pipelines in proximity to low-voltage alternating current lines and associated facilities 448
 - 15.4 Materials 448
 - 15.4.1 Design temperatures 448
 - 15.4.2 Notch toughness 448
 - 15.4.3 Aluminum pipe and components 448
 - 15.5 Installation of aluminum piping 449
 - 15.5.1 Bends and elbows 449
 - 15.5.2 Attachment of test leads 449
 - 15.5.3 Storage and handling of aluminum pipe and fittings during installation 449
 - 15.5.4 Ambient temperature 449
 - 15.5.5 Burial of coiled aluminum pipe by ploughing 449
 - 15.5.6 Plain dents 450
 - 15.6 Joining 451
 - 15.6.1 General 451

- 15.6.2 Arc welding 451
- 15.6.3 High energy joining — General 451
- 15.6.4 High energy joining — Qualification of joining procedure specifications 451
- 15.6.5 High energy joining — Qualification of personnel 451
- 15.6.6 High energy joining — Inspection and testing of high energy joints for qualification of joining procedure specifications and personnel 452
- 15.6.7 High energy joining — Production welding 452
- 15.6.8 High energy joining — Inspection and testing of high energy joints 453
- 15.6.9 Mechanical interference fit joints 453
- 15.7 Pressure testing 453
- 15.8 Corrosion control 454
- 15.8.1 Test lead attachment 454
- 15.8.2 Installation of cathodic protection systems 454
- 15.8.3 Corrosive medium 454
- 15.9 Operating, maintenance, and upgrading 455
- 15.9.1 Evaluation of imperfections and repair of piping containing defects 455
- 15.9.2 Maintenance welding 456
- 15.9.3 Pipeline hot taps 456
- 15.10 Sour service 456
- 15.10.1 General 456
- 15.10.2 Material properties 456
- 15.10.3 Exposure to iron sulphides 457
- 15.10.4 Location factor 457
- 15.10.5 Sectionalizing valves 457
- 15.10.6 Nondestructive inspection 457
- 15.10.7 Integrity management program 457
- 15.10.8 Construction 457
- 15.10.9 Operating and maintenance 457
- 15.10.10 Records 457

16 Sour service pipelines 458

- 16.1 General 458
- 16.2 Sour service — Specific definition 458
- 16.3 Design 459
- 16.3.1 Design parameters 459
- 16.3.2 Design information 460
- 16.3.3 Stress design 460
- 16.3.4 Anchors and restraints 460
- 16.3.5 Threaded joints 460
- 16.3.6 Pipe-type and bottle-type holders and pipe-type storage vessels 460
- 16.4 Materials 460
- 16.4.1 Environmental cracking 460
- 16.4.2 Material provisions 460
- 16.4.3 Marking 461
- 16.4.4 Nonferrous materials 461
- 16.5 Construction 461
- 16.5.1 Deviations 461
- 16.5.2 Records 461
- 16.5.3 Inspection plan 462

- 16.6 Joining 462
 - 16.6.1 Carbon equivalent 462
 - 16.6.2 Change in carbon equivalent 462
 - 16.6.3 Butt welds of unequal thickness 462
 - 16.6.4 Weld hardness requirements 462
 - 16.6.5 Deposited weld metal composition limitations 463
 - 16.6.6 Alignment 463
 - 16.6.7 Preheat 463
 - 16.6.8 Backwelding 463
- 16.7 Corrosion and corrosion control 463
 - 16.7.1 Supplemental mitigation requirements 463
 - 16.7.2 Mitigation and monitoring program 464
 - 16.7.3 Design and sizing of pigs 464
- 16.8 Operating and maintenance 464
 - 16.8.1 Procedures 464
 - 16.8.2 Records 464
 - 16.8.3 Repair methods 464
 - 16.8.4 Hydrogen charging 464
 - 16.8.5 Direct deposition welding 464
 - 16.8.6 Change management process 465
 - 16.8.7 Changes in service conditions 465
 - 16.8.8 Integrity management program 465
- 16.9 Gas and multiphase pipeline systems 465
 - 16.9.1 Additional requirements 465
 - 16.9.2 Design 465
 - 16.9.3 Joining 466
 - 16.9.4 Operating and maintenance 466
- 16.10 Additional requirements for gas pipeline systems only 466
 - 16.10.1 General 466
 - 16.10.2 Mechanical interference fit joints 467
 - 16.10.3 Start-up corrosion mitigation 467
- 17 Composite-reinforced steel pipelines 467**
 - 17.1 General 467
 - 17.2 Applicability 468
 - 17.3 Specific definitions 468
 - 17.4 Design 468
 - 17.4.1 Stress distribution 468
 - 17.4.2 Maximum operating pressure 468
 - 17.4.3 Design pressure 469
 - 17.4.4 External pressures and loadings 469
 - 17.4.5 Stress limits 470
 - 17.4.6 Design temperature 470
 - 17.4.7 Engineering assessment 470
 - 17.5 Materials and manufacture 470
 - 17.5.1 Steel pipe 470
 - 17.5.2 Fibre-reinforced composite 470
 - 17.5.3 Composite-reinforced steel pipe manufacture 471
 - 17.6 Installation 473

17.6.1	Field bending	473
17.6.2	Damage	473
17.6.3	Crossings	473
17.7	Joining	474
17.7.1	General	474
17.7.2	Joint reinforcement	474
17.7.3	Transitions to steel pipe	474
17.7.4	Qualification of joining procedure specifications	474
17.8	Pressure testing	474
17.9	Corrosion control	475
17.10	Operation and maintenance	475

Annex A (informative)	— Safety and loss management system	478
Annex B (informative)	— Guidelines for risk assessment of pipeline systems	488
Annex C (informative)	— Limit states design	497
Annex D (informative)	— Guidelines for in-line inspection of pipelines	523
Annex E (informative)	— Recommended practice for liquid hydrocarbon pipeline leak detection	525
Annexes F and G	have been deleted	539
Annex H (normative)	— Pipeline failure records	540
Annex I (informative)	— Oilfield steam distribution pipelines — Alternate provisions	560
Annex J (informative)	— Recommended practice for determining the acceptability of imperfections in fusion welds using engineering critical assessment	565
Annex K (informative)	— Standards of acceptability for circumferential pipe butt welds based upon fracture mechanics principles	567
Annex L (informative)	— Alternative or supplementary test methods for coating property and characteristics evaluation	585
Annex M (informative)	— Guidance for system control, monitoring, and protection of hydrocarbon pipeline systems	587
Annex N (informative)	— Guidelines for pipeline system integrity management programs	593
Annex O (informative)	— Reliability-based design and assessment (RBDA) of onshore non-sour service natural gas transmission pipelines	605
Annex P (informative)	— Development and qualification and welding procedure specifications	665
Commentary		670

Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials

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G. Forgeron	Imperial Oil Resources, Calgary, Alberta <i>Category: Producer Interest</i>	
J.A. Fournell	QAi Quality Assurance Inc, Edmonton, Alberta <i>Category: General Interest</i>	
L.H. Gales	Transportation Safety Board of Canada, Gatineau, Québec	<i>Associate</i>

M.H. Glass	Trans-Northern Pipelines Inc., Richmond Hill, Ontario <i>Category: User Transmission</i>	
K.G. Goerz	Shell Canada Energy, Calgary, Alberta <i>Category: Producer Interest</i>	
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J. Harvey	EnCana Services Company Ltd., Calgary, Alberta <i>Category: Producer Interest</i>	
S.D. Ironside	Enbridge Pipelines Inc, Edmonton, Alberta <i>Category: User Transmission</i>	
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T. Lawrence	TMK IPSCO, Houston, Texas, USA <i>Category: Supplier/Fabricator/Contractor</i>	
T. Linder	Canadian Energy Pipeline Association (CEPA), Calgary, Alberta	<i>Associate</i>

R. W. MacDonald	Shell Canada Energy, Calgary, Alberta <i>Category: Producer Interest</i>	
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R. Paccagnan	ATCO Pipelines, Edmonton, Alberta <i>Category: User Transmission</i>	
G.F. Palermo	Palermo Plastics Pipe (P3) Consulting, Friendsville, Tennessee, USA <i>Category: Supplier/Fabricator/Contractor</i>	
R.B. Partington	Federation of Alberta Gas Co-ops Ltd., Sherwood Park, Alberta <i>Category: User Distribution</i>	

D.S. Perkins	ConocoPhillips Canada, Calgary, Alberta	<i>Associate</i>
T.J. Pesta	Pesta Consulting Ltd., Calgary, Alberta	<i>Associate</i>
D. Petursson	Manitoba Hydro, Winnipeg, Manitoba <i>Category: User Distribution</i>	
M. Poehlmann	ABSA, Edmonton, Alberta <i>Category: Government and/or Regulatory Authority</i>	
A.B. Rothwell	Brian Rothwell Consulting Inc, Calgary, Alberta	<i>Associate</i>
J. Sandison	CMC Consultants Inc, Winnipeg, Manitoba <i>Category: General Interest</i>	
P. Singh	Bredero Shaw LLC, Houston, Texas, USA <i>Category: Supplier/Fabricator/Contractor</i>	
C. Skocdopole	Aluminum Pipe Systems, Eckville, Alberta <i>Category: Supplier/Fabricator/Contractor</i>	
J. Sutherland	PII Pipeline Solutions (GE Oil & Gas), Calgary, Alberta	<i>Associate</i>
T.N. Tarfa	Velan Incorporated, Montréal, Québec <i>Category: Supplier/Fabricator/Contractor</i>	
N. Thalassinos	Enbridge Gas Distribution, Toronto, Ontario <i>Category: User Distribution</i>	
H. Wallace	Alberta Energy Regulator, Calgary, Alberta <i>Category: Government and/or Regulatory Authority</i>	

L. Wojtanowski	Sun-Canadian Pipe Line Company Ltd., Waterdown, Ontario <i>Category: User Transmission</i>	
J. Zhou	TransCanada PipeLines Ltd., Calgary, Alberta <i>Category: User Transmission</i>	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>
P. Fernandez Marchi	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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H. Wallace	Alberta Energy Regulator, Calgary, Alberta	
J. Zhou	TransCanada PipeLines Ltd., Calgary, Alberta	
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P. Fernandez Marchi	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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R. Caesar	BC Ministry of Energy, Victoria, British Columbia	
C. Caba	AkzoNobel Coatings, Inc., Nashville, Tennessee, USA	
K. Crichton	Bayou Perma Pipe Canada, Camrose, Alberta	
B.T. Elliott	Shaw Pipe Protection Ltd., Edmonton, Alberta	
A. Geiger	Canusa-CPS, Sherwood Park, Alberta	
A. Glowach	Glowach Pipe Coating Consultant, Beaumont, Alberta	
J.B. Hakkinen	Axalta Powder Coatings, Hummelstown, Pennsylvania, USA	
L. Lai	ROSEN Canada Ltd., Calgary, Alberta	
P. Lucas	Axson Coatings, Aubevoye, France	

D.J.B. Morrison	DM Pipeline Coating Consulting Inc., Calgary, Alberta	
J. Morse	Enbridge Pipelines Inc., Edmonton, Alberta	
N. Nguyen	3M Company, Austin, Texas, USA	
D.P. Ochitwa	National Energy Board, Calgary, Alberta	
S. Papavinasam	CorrMagnet Consulting Inc., Ottawa, Ontario	
N. Park	Shell Canada Ltd., Calgary, Alberta	
K. Recsky	FortisBC Energy Inc., Kelowna, British Columbia	
J. Rogozinski	Valspar Corporation, North Kansas City, Missouri, USA	
J. Shore	Union Gas Ltd., Chatham, Ontario	
G. Van Boven	Spectra Energy Transmission, Vancouver, British Columbia	
D. Wong	ShawCor Ltd., Toronto, Ontario	
R. Worthingham	Worthingham Professional Services Inc., Calgary, Alberta	
S. Zahabi	Enbridge Gas Distribution, Toronto, Ontario	
P. Fernandez Marchi	CSA Group, Toronto, Ontario	<i>Project Manager</i>

Subcommittee on Construction

H. Wallace	Alberta Energy Regulator, Calgary, Alberta	<i>Chair</i>
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W. Celis	Saskatchewan Ministry of the Economy, Regina, Saskatchewan	
R. Caesar	BC Ministry of Energy, Victoria, British Columbia	
R. Cooke	National Energy Board, Calgary, Alberta	
D. Danielson	SaskEnergy/TransGas, Regina, Saskatchewan	
R. Fafara	TransCanada PipeLines Ltd., Calgary, Alberta	
D.R. Fedoration	DONNF Enterprises Inc., Calgary, Alberta	
T. Fiddler	Enbridge Pipelines Inc., Edmonton, Alberta	
G.A. Harms	Three Streams Engineering Division, AMEC Foster Wheeler Canada Ltd., Calgary, Alberta	
R. Hogg	Enbridge Inc., Edmonton, Alberta	
R.M. Huntley	RMH Welding Consulting Inc., Calgary, Alberta	
M. Hylton	Stantec Consulting Ltd., Calgary, Alberta	

G.R. Johnson	FortisBC Energy Inc., Surrey, British Columbia	
M.A. Kereliuk	Qualimet Inc., Edmonton, Alberta	
R. Ostrom	Pipeline Welding Solutions Inc., Edmonton, Alberta	
R. Peters	SGS Ludwig Associates Ltd., Edmonton, Alberta	
S. Piché	Gaz Métro, Montréal, Québec	
S. Stephenson	Tundra Energy Marketing Ltd., Calgary, Alberta	
K. Thorn	CWB Group, Milton, Ontario	
R. Werenich	Enbridge Gas Distribution, Toronto, Ontario	
B. Wilson	Acuren Group Inc., Calgary, Alberta	
T. Yu	Ledcor Pipeline Ltd., Edmonton, Alberta	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

Subcommittee on Design

J. Zhou	TransCanada PipeLines Ltd., Calgary, Alberta	<i>Chair</i>
T.J. Zimmerman	Enbridge Pipelines Inc, Edmonton, Alberta	<i>Vice-Chair</i>
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A. Bhatia	Alliance Pipeline Ltd., Calgary, Alberta	
T.D. Brauen	Imperial Oil, Calgary, Alberta	
R. Caesar	BC Ministry of Energy, Victoria, British Columbia	
T. Caveny	WorleyParsons Canada Services Ltd., Edmonton, Alberta	
P. Colwell	Union Gas Ltd., Chatham, Ontario	
D. Horsley	Horsley Consulting Ltd., Calgary, Alberta	
G.A. Kanzaki	FortisBC Energy Inc (FEI), Surrey, British Columbia	
S. Kenny	Carleton University, Ottawa, Ontario	
P. Kormann	Kormann & Associates Inc, Calgary, Alberta	
S.C. Lee	Alberta Energy Regulator, Calgary, Alberta	
S. Mendell	Enbridge Gas Distribution, Toronto, Ontario	

B.W. Nesbitt	National Energy Board, Calgary, Alberta	
M.A. Nessim	C-FER Technologies, Edmonton, Alberta	
M.L. Rew	Canadian Natural Resources Ltd. (CNRL), Calgary, Alberta	
G. Shulhan	Stantec Consulting Ltd., Calgary, Alberta	
J. Steeves	WorleyParsons Canada Services Ltd., Calgary, Alberta	
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T. Tomkiw	Husky Oil Operations Ltd., Calgary, Alberta	
J.S. van de Panne	KEYERA Energy, Calgary, Alberta	
R.H. Wartlik	Spectra Energy Transmission, Vancouver, British Columbia	
P. Fernandez Marchi	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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G. Palermo	Palermo Plastics Pipe (P3) Consulting, Friendsville, Tennessee, USA	<i>Chair</i>
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J. Gonzalo	Enbridge Gas Distribution, Toronto, Ontario	
R. Knapp	Plastics Pipe Institute, Excelsior, Minnesota, USA	
K.E. Mills	Energy Consultants International Inc., Winnipeg, Manitoba	
K. Oliphant	Jana, Aurora, Ontario	

R.B. Partington	Federation of Alberta Gas Co-ops Ltd., Sherwood Park, Alberta	
D. Prydun	Manitoba Hydro, Winnipeg, Manitoba	
C. Rollings	Heritage Gas Ltd., Dartmouth, Nova Scotia	
C. Windhorst	ATCO Gas, Edmonton, Alberta	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

Editorial Subcommittee

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R. Marsden	Cenovus Energy Inc., Calgary, Alberta	
R. Mayer	Spectra Energy Transmission, Halifax, Nova Scotia	
K. Mills	Energy Consultants International Inc., Winnipeg, Manitoba	
C. Rollings	Heritage Gas Ltd., Dartmouth, Nova Scotia	
K. Thorn	CWB Group, Milton, Ontario	
I.A. Ward	Shell Global Solutions Canada, Calgary, Alberta	
T.J. Zimmerman	Enbridge Pipelines Inc, Edmonton, Alberta	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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M. Whitehouse	Enbridge Gas Distribution, Mooretown, Ontario	<i>Vice-Chair</i>
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D.M. Duan	TransCanada PipeLines Ltd., Calgary, Alberta	
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C. Guan	TransCanada PipeLines Ltd., Calgary, Alberta	
D. Horsley	Horsley Consulting Ltd., Calgary, Alberta	
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G. Melnychuk	Stream-Flo Industries Ltd., Edmonton, Alberta	

D.B. Milmine	DM Professional Services Ltd., Calgary, Alberta	
K. Ocean	Enbridge Gas Distribution, Toronto, Ontario	
D.P. Ochitwa	National Energy Board, Calgary, Alberta	
H. Ramay	WorleyParsons, Calgary, Alberta	
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R. Schmidt	Canadoil, Russellville, Arkansas, USA	
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S. Tracy	EVRAZ Inc. NA, Calgary, Alberta	
W.R. Tyson	Natural Resources Canada, Ottawa, Ontario	
G. Van Boven	Spectra Energy Transmission, Vancouver, British Columbia	
I. Ward	Shell Global Solutions Canada, Calgary, Alberta	
M. Whitehouse	Enbridge Gas Distribution, Mooretown, Ontario	
B. Wray	Galperti Canada, Edmonton, Alberta	
S. Xu	CanmetMATERIALS Natural Resources Canada, Hamilton, Ontario	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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T. Cook	The Cook Group Ltd., Calgary, Alberta	
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S. Gosse	Encana Services Company Ltd., Calgary, Alberta	
G.A. Harms	Three Streams Engineering Division, AMEC Foster Wheeler Canada Ltd., Calgary, Alberta	
A. Hobbins	ConocoPhillips Canada Ltd., Grande Prairie, Alberta	
L. Hunt	Spectra Energy Transmission, Vancouver, British Columbia	
S. Jehlicka	Enbridge Gas Distribution, Toronto, Ontario	

R.A. Marsden	Cenovus Energy Inc., Calgary, Alberta	
R.G. Mora	Imperial Oil Ltd. — Pipeline and Distribution, Calgary, Ontario	
A. Murasan	National Energy Board, Calgary, Alberta	
J.D. Norris	JD Pipeline Consulting, Calgary, Alberta	
A. Rahman	T.D. Williamson Canada ULC, Georgetown, Ontario	
M.T. Reed	Alliance Pipeline Ltd., Calgary, Alberta	
B. Sadoway	TransCanada PipeLines Ltd., Calgary, Alberta	
D. Skibinsky	Alliance Pipeline Ltd., Calgary, Alberta	
R. Sporns	Enbridge Pipelines Inc., Edmonton, Alberta	
C. Tremblay	Gaz Métro, Montréal, Québec	
B. Waheed	BC Oil and Gas Commission, Kelowna, British Columbia	
S. Walker	Union Gas Ltd., Chatham, Ontario	
H. Wallace	Alberta Energy Regulator, Calgary, Alberta	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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R. W. MacDonald	Shell Canada Energy, Calgary, Alberta	
B. McFadyen	Enbridge Pipelines Inc., Calgary, Alberta	

P.K. Mishra	Three Streams Engineering Division, AMEC Foster Wheeler Canada Ltd., Calgary, Alberta	
S. Prestie	Imperial Oil Canada, Calgary, Alberta	
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D. Srnica	ABSA, Edmonton, Alberta	
R. Szopa	Enerplus Corp., Calgary, Alberta	
I.A. Ward	Shell Global Solutions Canada, Calgary, Alberta	
B. Watts	Encana Corporation, Calgary, Alberta	
J. Whittaker	Cenovus Energy Inc., Calgary, Alberta	
B. Wilson	Acuren Group Inc., Calgary, Alberta	
S. Capper	CSA Group, Toronto, Ontario	<i>Project Manager</i>

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J. Harvey	Encana Services Corporation Ltd., Calgary, Alberta	
L. Hunt	Spectra Energy Transmission, Vancouver, British Columbia	
M. Maxwell	Enbridge Pipelines Inc., Edmonton, Alberta	
F. Pataki	FortisBC Energy Inc. (FEI), Surrey, British Columbia	
M. Reed	Alliance Pipeline Ltd., Calgary, Alberta	
H. Wallace	Alberta Energy Regulator, Calgary, Alberta	
J. Zhou	TransCanada PipeLines Ltd., Calgary, Alberta	

S. Capper

CSA Group,
Toronto, Ontario

Project Manager

Preface

This is the seventh edition of CSA Z662, *Oil and gas pipeline systems*. It supersedes the previous editions published in 2011, 2007, 2003, 1999, 1996, and 1994.

The following are the most significant changes, relative to the previous edition:

- a) updating and revising the requirements for safety and loss management systems, integrity management programs, and engineering assessments process. This resulted in significant changes to Clause 3 to clarify the requirements and highlight that requirements for safety and loss management system and for the pipeline system integrity management program must address the full lifecycle of a pipeline, including design, material selection, construction, operation, and maintenance;
- b) clarification of the requirements for mitigation programs for internal corrosion and monitoring of the effectiveness of the programs when pipelines are susceptible to internal corrosion (Clause 9);
- c) new requirements for training and certification of field applied coating applicators through a Clause 9 reference to CSA Z245.30;
- d) clarification of requirements for steam distribution pipelines and high temperature pipelines (Clause 14);
- e) broader inclusion of, and additional requirements for, CO₂ pipelines;
- f) further requirements for abandonment of pipelines (Clause 10);
- g) new requirements for addressing ripples and wrinkles, buckles, and out of roundness on pipe (Clause 10);
- h) clarification of the requirements for reinforced composite, thermoplastic-lined, and polyethylene pipelines;
- i) clarification of the sour service requirements for gas-free pipeline systems for crude oil, crude oil blends, and low vapour pressure condensate (Clause 16);
- j) updating of the requirements for leak detection on liquid hydrocarbon pipelines previously published in Update 3 (August 2013) to CSA Z662-11. The recommended practice considers computational methods and direct leak detection methods (Annex E);
- k) expansion of Annex M to address system control, monitoring, and protection for all hydrocarbon pipelines; and
- l) new Annex P to provide guidance on the development and qualification of welding procedure specifications.

The requirements of this Standard are considered to be adequate under conditions normally encountered in the oil and natural gas industry. Specific requirements for abnormal or unusual conditions are not prescribed, nor are all details related to engineering and construction prescribed. It is intended that all work performed within the scope of this Standard meet the standards of safety and integrity expressed or implied herein, and that the requirements of this Standard be applied with due regard to the protection of the environment, which includes land, water, plant life, and animal life. Detailed requirements concerning the protection of the environment are not prescribed.

It is expected that changes will be made from time to time, based on new experience and technology. Where necessary, amendments and supplements will be prepared by the Technical Committee and published in accordance with CSA Group practices.

This Standard was prepared by the Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials, under the jurisdiction of the Strategic Steering Committee on Petroleum and Natural Gas Industry Systems, and has been formally approved by the Technical Committee.

This edition of CSA Z662 is dedicated to the memories of Richard Caesar and Mike Hallihan.

Notes:

- 1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
- 2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
- 3) *This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*
- 4) *To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:*
 - a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
 - b) *provide an explanation of circumstances surrounding the actual field condition; and*
 - c) *where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.

- 5) *This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@csagroup.org and include “Proposal for change” in the subject line:*
 - a) *Standard designation (number);*
 - b) *relevant clause, table, and/or figure number;*
 - c) *wording of the proposed change; and*
 - d) *rationale for the change.*

Z662-15

Oil and gas pipeline systems

1 Scope

Δ **1.1**
G [There is a commentary available for this Clause.](#)

This Standard covers the design, construction, operation, maintenance, deactivation, and abandonment of oil and gas industry pipeline systems that convey

- a) liquid hydrocarbons, including crude oil, multiphase fluids, condensate, liquid petroleum products, natural gas liquids, and liquefied petroleum gas;
- b) oilfield water;
- c) oilfield steam;
- d) liquid or dense phase carbon dioxide; or
- e) gas.

Notes:

- 1) *Vapour phase carbon dioxide pipeline systems fall under Item e).*
- 2) *Designers are cautioned that the requirements in this Standard might not be appropriate for gases other than natural gas, manufactured gas, vapour phase carbon dioxide, and synthetic natural gas.*

Δ **1.2**
G [There is a commentary available for this Clause.](#)

The scope of this Standard, as shown in Figures 1.1 and 1.2, includes

- a) for oil industry fluids, piping and equipment in offshore pipelines, onshore pipelines, tank farms, pump stations, pressure-regulating stations, and measuring stations;
- b) oil pump stations, pipeline tank farms, and pipeline terminals;
- c) pipe-type storage vessels;
- d) carbon dioxide pipelines;
- e) for gas industry fluids, piping and equipment in offshore pipelines, onshore pipelines, compressor stations, measuring stations, and pressure-regulating stations;
- f) gas compressor stations; and
- g) gas storage lines and pipe-type and bottle-type gas storage vessels.

Δ **1.3**
G [There is a commentary available for this Clause.](#)

This Standard does not apply to

- a) piping with metal temperatures below $-70\text{ }^{\circ}\text{C}$;
- b) gas piping beyond the outlet of the customer's meter set assembly (covered by CSA B149.1);
- c) piping in natural gas liquids extraction plants, gas processing plants (except main gas stream piping in dehydration and all other processing plants installed as part of gas pipeline systems), gas manufacturing plants, industrial plants, and mines;
- d) oil refineries, terminals other than pipeline terminals, and marketing bulk plants;
- e) abandoned piping;
- f) in-plant piping for drinking, make-up, or boiler feed water;

- g) casing, tubing, or pipe in oil or gas wells, wellheads, separators, production tanks, and other production facilities;
- h) vent piping for waste gases of any kind operating at or near atmospheric pressure;
- i) heat exchangers;
- j) liquefied natural gas systems (covered by CSA Z276);
- k) liquid fuel distribution systems;
- l) loading/unloading facilities for tankers or barges;
- m) refuelling facilities; and
- n) hydrocarbon storage in underground formations and associated equipment (covered by CSA Z341 Series).

1.4

C [There is a commentary available for this Clause.](#)

This Standard is intended to establish essential requirements and minimum standards for the design, construction, operation, and maintenance of oil and gas industry pipeline systems. This Standard is not a design handbook, and competent engineering judgment should be employed with its use.

Note: *For steel pipe of grade higher than Grade 555, requirements in addition to those specified in this Standard might be needed. Matters that should be considered include joining, thermal aging effects during coating application, strain capacity (including cold bending), pressure testing, assessment of imperfections, and repair.*

1.5

C [There is a commentary available for this Clause.](#)

The requirements of this Standard are applicable to the operation, maintenance, and upgrading of existing installations. It is not intended that such requirements be applied retroactively to existing installations insofar as design, materials, construction, and established operating pressures are concerned, except as required by Clause 10.7.1 for changes in class location and Clause 10.8.1 for crossings of existing pipelines.

1.6

C [There is a commentary available for this Clause.](#)

Unless otherwise stated, to determine conformance with the specified requirements, it is intended that observed or calculated values be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of ASTM E29.

1.7

C [There is a commentary available for this Clause.](#)

Where any requirements of this Standard are at variance with the requirements of other publications referenced in this Standard, it is intended that the requirements of this Standard govern.

1.8

C [There is a commentary available for this Clause.](#)

It is not the intent of this Standard to prevent the development of new equipment or practices, or to prescribe how such innovations are to be handled.