FAST FUSION PROCEDURE - FF03
ISO 21307 PIPA POP 003

This Appendix is intended for the added use of Fast Fusion® weld cooling procedure in conjunction with the Butt Fusion Jointing of PE Pipes and Fittings Recommended Parameters within ISO 21307 and the Australian PIPA POP 003 that more fully explains the background, scope and purposes of the PIPA generic butt fusion procedure. This Fast Fusion procedure has been qualified for use in accordance with industry standards with particular piping product or combination of piping products. In addition to the terms and conditions herein above referenced, and without limiting such terms and conditions, any copying or reproduction of this procedure without written permission of Fast Fusion, LLC, is a violation of the proprietary and intellectual property rights of Fast Fusion, LLC.

Fast Fusion® does not replace industry approved fusion procedures. It is a proprietary technology of a weld bead temperature control used in conjunction with industry approved pipe joining fusion procedures and is added to industry known and accepted pipe joining fusion equipment.

This Fast Fusion procedure is for the butt fusion joining of PE pipe produced in accordance with the industry standards intended for butt fusion joining for gas, water distribution, waste water, industrial, irrigation, mining, etc., as well as PE fittings and other approved PE products for pressurized and non pressurized applications :

- PE 4710
- PE 100
- PE 80
- PE 3408
- PE 2406

Butt Fusion Procedure Parameters:
PIPA POP 003 specifies the use of ISO 21307 for the jointing of PE pipes with three proven butt fusion jointing procedures for pipes and fittings;

- Single pressure – low fusion jointing procedure
- Dual pressure – low fusion jointing pressure
- Single pressure – high fusion jointing pressure

P1, P2, P3 jointing pressure and T1,T2,T3,T4 & T6 are completed with the ISO 21307 and Australian PIPA POP 003 appendix calculation.

With the added use of Fast Fusion® - Only the calculation of T5 for Minimum Cooling Time in Machine Under Pressure is changed to the specific time period of seconds contained within this procedure and is Appendix 1.

Procedures Fast Fusion:

1. Each Fast Fusion machine will have a current copy of the PIPA - POP 003 Industry Guidelines for the Butt Fusion Jointing of PE Pipes and Fittings – recommended Parameters.

2. The Operators Manual for the industry approved fusion equipment installed or used with a Fast Fusion machine will be provided for its operation and be in the machine.

3. Certification of Completion of training is only issued by Fast Fusion.

4. The certified technician must have their current certification on the Fast Fusion machine.

5. Fast Fusion certified training program has the requirement of annual recertification and under the procedures of the Fast Fusion Certified Operator.

6. A fusion technician that does not complete a qualified production fusion weld within a period of thirty (30) days from the last, certification is revoked and they must be re-qualified. Certification is non-transferable from company to company.

7. At completion of the specified Fast Fusion weld cooling time period and before fusion pressure is released, each fusion weld bead surface temperature will be verified with a pyrometer or other electronic surface temperature device & recorded in the daily fusion log. If the weld bead temperature were to be above the procedure specified temperature, then fusion pressure will remain in place until 140° F or (60°C) or less and the problem identified with the Fast Fusion equipment and repaired before used again.

8. Visually inspect and compare the joint against the pipe and fusion equipment manufacturer's recommended appearance guidelines. Visually, the bead height above the pipe and the beads width should be rounded and uniformly sized all around the pipe circumference.

9. A daily fusion log will be maintained on each machine & each fusion will identified on the pipe of who completed it and the log signed off by the certified tech each day.

Fast Fusion® Weld Bead Temperature Control:

Following the Fast Fusion® Appendix 1 based upon the pipe OD and SDR the Fast Fusion® procedure would replace the calculation for the **minimum cooling time in machine under pressure** in the ISO 21307 PIPA POP 003 and the joint will remain immobile under fusion force until the joint has cooled adequately to develop strength. Allowing proper cooling times under fusion force prior to removal from the clamps of the machine is important in achieving joint integrity. The fusion force should be held between the pipe ends until the melt bead is cooled to the industry standard to release fusion pressure which is currently referenced to be 140 °F (60°C) or less for pressurized pipe.

The Fast Fusion® technology is a fully automatic process applied through Fast Fusion specific proprietary designed equipment that is controlled through either a PLC or micro-processor that has Fast Fusion® proprietary software installed. If the equipment being used does not have the Fast Fusion® identifying trademark shown below, its use is a violation of the patent and proprietary method and is an invalid method and not approved for use:

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD Mm	SDR	T5 Seconds
63	17	43
	13.6	47
	11	50
	9	56
	7.4	62
75	41	31
	33	37
	26	41
	26	41
	21	48
	17	52
	13.6	55
	11	59
	9	66
	7.4	74
90	41	38
	33	44
	26	53
	21	58
	17	62
	13.6	66
	11	71
	9	80
	7.4	89
110	41	48
	33	54
	26	65
	21	70
	17	76
	13.6	81
	11	87
	9	97
	7.4	108

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
125	41	56
	33	62
	26	74
	21	80
	17	86
	13.6	92
	11	98
	9	111
	7.4	123
140	41	63
	33	69
	26	83
	21	90
	17	96
	13.6	103
	11	110
	9	124
	7.4	138
160	41	73
	33	79
	26	95
	21	102
	17	110
	13.6	118
	11	126
	9	142
	7.4	158

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
180	41	83
	33	89
	26	106
	21	115
	17	124
	13.6	133
	11	142
	9	160
	7.4	177
200	41	92
	33	98
	26	118
	21	128
	17	138
	13.6	148
	11	157
	9	177
	7.4	197
225	41	105
	33	111
	26	133
	21	144
	17	155
	13.6	166
	11	177
	9	199
	7.4	222

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
250	41	117
	33	123
	26	148
	21	160
	17	172
	13.6	185
	11	197
	9	221
	7.4	246
280	41	132
	33	138
	26	165
	21	179
	17	193
	13.6	207
	11	220
	9	248
	7.4	276
315	41	149
	33	155
	26	186
	21	202
	17	217
	13.6	233
	11	248
	9	279
	7.4	310

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
355	41	169
	33	175
	26	210
	21	227
	17	245
	13.6	262
	11	280
	9	315
	7.4	350
400	41	191
	33	197
	26	236
	21	256
	17	276
	13.6	295
	11	315
	9	354
	7.4	394
450	41	216
	33	222
	26	266
	21	288
	17	310
	13.6	332
	11	354
	9	399
	7.4	443

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
500	41	240
	33	246
	26	295
	21	320
	17	345
	13.6	369
	11	394
	9	443
	7.4	492
560	41	270
	33	276
	26	331
	21	358
	17	386
	13.6	413
	11	441
	9	496
	7.4	551
630	41	304
	33	310
	26	372
	21	403
	17	434
	13.6	465
	11	496
	9	558
	7.4	620

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
710	41	343
	33	349
	26	419
	21	454
	17	489
	13.6	524
	11	559
800	41	388
	33	394
	26	473
	21	512
	17	551
	13.6	591
	11	630
900	41	437
	33	443
	26	531
	21	576
	17	620
	13.6	664
	11	709

FAST FUSION FF03 APPENDIX1
Minimum Cooling Time in Machine Under Pressure

Pipe Dimension		Fast Fusion
OD mm	SDR	T5 Seconds
1000	41	486
	33	492
	26	591
	21	640
	17	689
	13.6	738
	11	787
1200	41	585
	33	591
	26	709
	21	768
	17	827
	13.6	886
	11	945
1400	41	620
	33	689
	26	827
	21	896
	17	965
	13.6	1034
	11	1102
1600	41	708
	33	787
	26	945
	21	1024
	17	1102
	13.6	1181
	11	1260