

Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


ArcelorMittal

Document number: 153-2/19 rev. 0
Compiled by J. Pospišil

IT - Technika
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EN ISO 3183-M:2012, Grade L415ME PSL2, 711.0x11.0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A
date: 9.1.2019

Rev. 0						
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE	
6	- weld beads	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.6 outside weld : max 3,0 mm inside weld : max 3,0 mm least 150 from each pipe -outside bead shall be removed by grinding. max height of teh weld after grinding 0,5 mm	DTP 15.3102-09 IS 15-G13/13	
	- radial offset	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.5,	DTP 15.3102-09 IS 15-G13/13	
	- misalignment of weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 pipe per shift	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.13.3. max 3,0 mm	DTP 15.3102-09 IS 15-G13/13	
7	REPAIR WELD	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe with defect (only weld)	acc. to manufacturer's procedure and EN 3183-M:2012, annex C.4 After weld repair, the total area of the repair shall be both ultrasonically and radiographically inspected in accordance to Annex E Maximum number of repairs in one section is three (3). A section is intended as 6 m of pipe length. Weld repairs within 200 mm of the pipe ends and repair of the crack are not permitted.	DTP 15.3103-09 IS 15-G13-13	
	HYDROSTATIC TEST	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Hydrostatic test pressure p= 11,2 MPa / 10 s.	DTP 15.3105-01 IS 15-G13/13	
	MECHANICAL TESTS and PRODUCT ANALYSIS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	-	acc. to manufacturer's procedure and EN 3183-M:2012, table 18 and M.7	IS 15-G13/13	
	Product analysis	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 per every heat	EN ISO 3183-M, table M.1, C, Mn, Si, P, S, V, Nb, Ti, Al celt., N, Cu, Ni, Cr, Mo, C.E. max. 0.43 %	IS 15- 01/14 IS 15-G13/13	

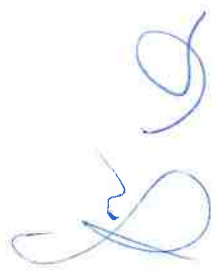
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 ArcelorMittal					
Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)					
Rev. 0		Document number: 153-2/19 rev. 0 EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x11,0 mm, 2015-08-00-KRDD-D.PP-TS.1-1 rev.A			
date: 9.1.2019		Compiled by J. Pospišil  TT - Technika			
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Tensile test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rt0.5 = 415 - 565 MPa, Rm = 520 - 760 MPa, Rt0.5/Rm = max. 0.85 A = min. 18 % transverse direction	IS 15-G13/13
	Impact test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C.	IS 15-G13/13
	Tensile test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rm = min. 520 Mpa	IS 15-G13/13
	Bend test of the weld	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18, table M.8 and M.9 mandrel diameter : 5T	IS 15-G13/13
	Impact test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	Impact test - heat affected zone	EN 3183-M:2012	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	macrographic test - weld seam	EN 3183-M:2012	1 per shift	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18	IS 15-G13/13
	DWTT test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 11, 12 Min 85% at temperature -20°C	IS 15-G13/13

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Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x11,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Hardness test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 Annex J 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 59 max 270HV for each zone (PM, WELD, HAZ)	IS 15-G13/13
10	NDT INSPECTION	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	IS 15-G13/13
11	Ultrasonic inspection	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183 annex M Longitudinal / transverse imperfections in the weld: ultrasonic test ISO 10893-1:2011, acceptance level U2H Laminar imperfections at the pipe ends: ultrasonic test acc. EN ISO 3183 E3.2.3 and ISO 10893-8, acceptance limit 6 mm max. circumferentially Laminar imperfections on strip or plate edges/area adjacent to weld seam acc. ISO 10893-9 acceptance level U2 Laminar imperfections in the pipe body: ultrasonic test ISO 10893-9:2011, acceptance level U2 NDT of the weld seam at pipe ends (untested ends)/repaired areas: ultrasonic test ISO 10893-11:2011 on longitudinal and transverse imperfections, acceptance level U2H and radiographic inspection ISO 10893-7:2011, image quality class B	IS 15-G13/13 Procedure NDT P-SN.1-01 Procedure P-US.1-01 Procedure P-US.1-02 Procedure P-RT.1-01
12	Residual magnetism	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 max 3 mT	IS 15-G13/13
13	PIPE ENDS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	DTP 15.3104-05 IS 15-G13/13

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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


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Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,8 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev. A

Document number: 153-4/19 rev. 0

date: 9.1.2019

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
1	TYPE	SAWH, produce acc. to EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
2	INPUT MATERIAL	release input material: Coil, welding wire, welding flux	every delivery	acc. to manufacturer's procedure	PP TT-5.06
3	MANUFACTURING, FORMING AND WELDING	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
4	CHEMICAL COMPOSITION	2015-08-00-KRDD-D.PP-TS.1-1	1 per every heat	EN 3183-M:2012, Table M.1, grade L415ME/X60ME	IS 15-01/10
5	VISUAL INSPECTION	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 10.2.7	DTP 15.3101-09 IS 15-G13/13
6	- surface imperfections	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.10	DTP 15.3102-09 IS 15-G13/13
7	DIMENSIONS INSPECTION	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11	DTP 15.3102-09 IS 15-G13/13
8	- outside diameter	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and 2015-08-00-KRDD-D.PP-TS.1-1 par. 9.11 OD 711 +/- 1.2 mm - pipe ends OD 711 +/- 1.77 mm - pipe body	DTP 15.3102-09 IS 15-G13/13
9	- out-of-roundness	2015-08-00-KRDD-D.PP-TS.1-1	3 pipes per shift	acc. to manufacturer's procedure and EN 3183-M:2012, tab. M.3 2015-08-00-KRDD-D.PP-TS.1-1 max 0,5 % D	DTP 15.3102-09 IS 15-G13/13
10	- wall thickness	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, tab. M.4 WT: 8,8 mm +/- 0,88 mm	DTP 15.3102-09 IS 15-G13/13
11	- length	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	13 m +/- 0,5 m max 5% shorter length 10 - 12,49 m	DTP 15.3104-05 DTP 15.3102-09 IS 15-G13/13
12	- straightness	EN 3183-M:2012 TS-TR-2015	every doubt of straightness deviation	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11.3.4 max. 2,0 mm / m	DTP 15.3102-09 IS 15-G13/13

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Rev. 0		EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,8 mm, 2015-08-00-KRDD-D.PP-TS.1-1 rev. A		date: 9.1.2019	
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
6	- weld beads	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.6 outside weld : max 3,0 mm inside weld : max 3,0 mm least 150 from each pipe -outside bead shall be removed by grinding. max height of teh weld after grinding 0,5 mm	DTP 15.3102-09 IS 15-G13/13
	- radial offset	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.5,	DTP 15.3102-09 IS 15-G13/13
	- misalignment of weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 pipe per shift	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.13.3, max 3,0 mm	DTP 15.3102-09 IS 15-G13/13
	REPAIR WELD	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe with defect (only weld)	acc. to manufacturer's procedure and EN 3183-M:2012, annex C.4 After weld repair, the total area of the repair shall be both ultrasonically and radiographically inspected in accordance to Annex E Maximum number of repairs in one section is three (3). A section is intended as 6 m of pipe length. Weld repairs within 200 mm of the pipe ends and repair of the crack are not permitted.	DTP 15.3102-09 IS 15-G13/13
8	HYDROSTATIC TEST	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Hydrostatic test pressure p= 8,4 MPa / 10 s.	DTP 15.3105-01 IS 15-G13/13
9	MECHANICAL TESTS and PRODUCT ANALYSIS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	-	acc. to manufacturer's procedure and EN 3183-M:2012, table 18 and M.7	IS 15-G13/13
	Product analysis	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 per every heat	EN ISO 3183-M, table M.1, C, Mn, Si, P, S, V, Nb, Ti, Al celtk., N, Cu, Ni, Cr, Mo, C.E. max. 0.43 %	IS 15- 01/14 IS 15-G13/13

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Manufacturing Procedure Specification (MPS) **Inspection Test Plan (ITP)**


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Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,8 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev. A

Document number: 153-4/19 rev. 0

date: 9.1.2019

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Tensile test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rt0.5 = 415 - 565 MPa, Rm = 520 - 760 MPa, Rt0.5/Rm = max. 0.85 A = min. 18 % transverse direction	IS 15-G13/13
	Impact test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C.	IS 15-G13/13
	Tensile test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rm = min. 520 Mpa	IS 15-G13/13
	Bend test of the weld	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18, table M.8 and M.9 mandrel diameter : 5T	IS 15-G13/13
	Impact test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	Impact test - heat affected zone	EN 3183-M:2012	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	macrographic test - weld seam	EN 3183-M:2012	1 per shift	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18	IS 15-G13/13
	DWTT test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 11, 12 Min 85% at temperature -20°C	IS 15-G13/13

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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)



Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,8 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev. A

Document number: 153-4/19 rev. 0

date: 9.1.2019

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Hardness test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 Annex J 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 59 max 270HV for each zone (PM, WELD, HAZ)	IS 15-G13/13
	NDT INSPECTION	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	IS 15-G13/13
	Ultrasonic inspection	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183 annex M Longitudinal / transverse imperfections in the weld: ultrasonic test ISO 10893-1:2011, acceptance level U2H Laminar imperfections at the pipe ends: ultrasonic test acc. EN ISO 3183 E3.2.3 and ISO 10893-8, acceptance limit 6 mm max. circumferentially Laminar imperfections on strip or plate edges/area adjacent to weld seam acc. ISO 10893-9 acceptance level U2 Laminar imperfections in the pipe body: ultrasonic test ISO 10893-9:2011, acceptance level U2 NDT of the weld seam at pipe ends (untested ends)/repaired areas: ultrasonic test ISO 10893-11:2011 on longitudinal and transverse imperfections, acceptance level U2H and radiographic inspection ISO 10893-7:2011, image quality class B	IS 15-G13/13 Procedure NDT P-SN.1-01 Procedure P-US.1-01 Procedure P-US.1-02 Procedure P-RT.1-01
	Residual magnetism	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 max 3 mT	IS 15-G13/13
	PIPE ENDS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	DTP 15.3104-05 IS 15-G13/13

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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)					
Rev. 0		Document number: 153-4/19 rev. 0  TT - Technika 7			
		EN ISO 3183-M:2012, Grade L415ME PSL2, 711.0x8.8 mm, 2015-08-00-KRDD-D.PP-TS.1-1 rev. A date: 9.1.2019 Compiled by J. Pospišil			
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
	- preparation of ends	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	beveled ends acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and TS-TR-2015 : bevel 30 ° -0/+5 ° root face 1,6 mm +/- 0,8 mm	DTP 15.3104-05 IS 15-G13/13
	squareness of cut	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 pipes per shift	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and 2015-08-00-KRDD-D.PP-TS.1-1 max 1,6 mm	DTP 15.3104-05 IS 15-G13/13
	- grinding of weld bead	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Inside : 100 +20/-0 mm Outside : min. 150 mm	IS 15-G13/13
	Marking stamping	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	AMTPO inspector mark EN ISO 3183 L415ME PSL2 E 711 x 8,8 SAWH Heat Number Pipe number	IS 15-G04-09


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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)

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Rev. 0

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
1	TYPE	SAWH, produce acc. to EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
2	INPUT MATERIAL	release input material: Coil, welding wire, welding flux EN 3183-M:2012	every delivery	acc. to manufacturer's procedure	PP TT-5.06
3	MANUFACTURING, FORMING AND WELDING	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
	CHEMICAL COMPOSITION	2015-08-00-KRDD-D.PP-TS.1-1	1 per every heat	EN 3183-M:2012, Table M.1, grade L415ME/X60ME	IS 15-01/10
	VISUAL INSPECTION	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 10.2.7	DTP 15.3101-09 IS 15-G13/13
4	- surface imperfections	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.10	DTP 15.3102-09 IS 15-G13/13
	DIMENSIONS INSPECTION	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11	DTP 15.3102-09 IS 15-G13/13
	- outside diameter	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and 2015-08-00-KRDD-D.PP-TS.1-1 par. 9.11 OD 711 +/- 1,2 mm - pipe ends OD 711 +/- 1,77 mm - pipe body	DTP 15.3102-09 IS 15-G13/13
5	- out-of-roundness	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	3 pipes per shift	acc. to manufacturer's procedure and EN 3183-M:2012, tab. M.3 2015-08-00-KRDD-D.PP-TS.1-1 max 0,5 % D	DTP 15.3102-09 IS 15-G13/13
	- wall thickness	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, tab. M.4 WT: 8,0 mm +/-0,80 mm	DTP 15.3102-09 IS 15-G13/13
	- length	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	15,5 m +/- 0,5 m max 5% shorter length 10 - 14,9 m	DTP 15.3104-05 DTP 15.3102-09 IS 15-G13/13
6	- straightness	EN 3183-M:2012 TS-TR-2015	every doubt of straightness deviation	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11.3.4 max. 2,0 mm / m	DTP 15.3102-09 IS 15-G13/13

mgr Michal Pietrek

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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
6	- weld beads	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.6 outside weld : max 3,0 mm inside weld : max 3,0 mm least 150 from each pipe -outside bead shall be removed by grinding. max height of teh weld after grinding 0,5 mm	DTP 15.3102-09 IS 15-G13/13
	- radial offset	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.5,	DTP 15.3102-09 IS 15-G13/13
	- misalignment of weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 pipe per shift	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.13.3, max 3,0 mm	DTP 15.3102-09 IS 15-G13/13
	REPAIR WELD	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe with defect (only weld)	acc. to manufacturer's procedure and EN 3183-M:2012, annex C.4 After weld repair, the total area of the repair shall be both ultrasonically and radiographically inspected in accordance to Annex E Maximum number of repairs in one section is three (3). A section is intended as 6 m of pipe length. Weld repairs within 200 mm of the pipe ends and repair of the crack are not permitted.	DTP 15.3103-09 IS 15-G13-13
	HYDROSTATIC TEST	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Hydrostatic test pressure p= 7,6 MPa / 10 s.	DTP 15.3105-01 IS 15-G13/13
	MECHANICAL TESTS and PRODUCT ANALYSIS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	-	acc. to manufacturer's procedure and EN 3183-M:2012, table 18 and M.7	IS 15-G13/13
	Product analysis	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 per every heat	EN ISO 3183-M, table M.1, C, Mn, Si, P, S, V, Nb, Ti, Al celk., N, Cu, Ni, Cr, Mo, C.I.E. max. 0,43 %	IS 15- 01/14 IS 15-G13/13


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mgr Marek Mazurek

000204




Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


ArcelorMittal

Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

Document number: 153- 5/19 rev. 0

date: 9.1.2019

Compiled by J. Pospišil


TT - Technika

Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Tensile test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rt0,5 = 415 - 565 MPa, Rm = 520 - 760 MPa, Rt0,5/Rm = max. 0,85 A = min. 18 % transverse direction	IS 15-G13/13
	Impact test - pipe body	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C,	IS 15-G13/13
	Tensile test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table M.2 Rm = min. 520 Mpa	IS 15-G13/13
	Bend test of the weld	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18, table M.8 and M.9 mandrel diameter : 5T	IS 15-G13/13
	Impact test - weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	Impact test - heat affected zone	EN 3183-M:2012	1 per 50 pipes with the same heat	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table G.2 KV 40 J min average, 30 J min temperature -29 °C	IS 15-G13/13
	macrographic test - weld seam	EN 3183-M:2012	1 per shift	acc. to manufacturer's procedure and EN ISO 3183-M:2012 table 18	IS 15-G13/13
	DWTT test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 11, 12 Min 85% at temperature -20°C	IS 15-G13/13

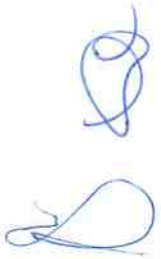
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COMMERCIAL DIRECTOR

mgr Michał Pietrek

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CEO

mgr Marek Mazurek

000205



Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


ArcelorMittal

Rev. 0

EN ISO 3183-M:2012, Grade L415ME PSL2, 711,0x8,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

Document number: 153- 5/19 rev. 0

date: 9.1.2019

Compiled by J. Pospišil

TT - Technika
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Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
9	Hardness test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 Annex J 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 59 max 270HV for each zone (PM, WELD,HAZ)	IS 15-G13/13
	NDT INSPECTION	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	IS 15-G13/13
	Ultrasonic inspection	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183 annex M Longitudinal / transverse imperfections in the weld:ultrasonic test ISO10893-1:2011, acceptance level U2H Laminar imperfections at the pipe ends: ultrasonic test acc. EN ISO 3183 E3.2.3 and ISO 10893-8, acceptance limit 6 mm max. circumferentially Laminar imperfections on strip or plate edges/area adjacent to weld seam acc. ISO 10893-9 acceptance level U2 Laminar imperfections in the pipe body: ultrasonic test ISO 10893-9:2011, acceptance level U2 NDT of the weld seam at pipe ends (untested ends)/repaired areas: ultrasonic test ISO 10893-11:2011 on longitudinal and transverse imperfections, acceptance level U2H and radiographic inspection ISO 10893-7:2011, image quality class B	IS 15-G13/13 Procedure NDT P-SN.1-01 Procedure P-US.1-01 Procedure P-US.1-02 Procedure P-RT.1-01
	Residual magnetism	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 max 3 mT	IS 15-G13/13
	PIPE ENDS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	DTP 15.3104-05 IS 15-G13/13

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COMMERCIAL DIRECTOR
mgr Michal Pietrek

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mgr Marek Mazurek

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 Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)					
Rev. 0		EN ISO 3183-M:2012, Grade L415ME PSL2, 711.0x8.0 mm, 2015-08-00-KRDD-D.PP-TS.1-1 rev.A	Document number: 153- 5/19 rev. 0		
		date: 9.1.2019	Compiled by J. Pospišil 		
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
	- preparation of ends	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	beveled ends acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and TS-TR-2015 : bevel 30 ° -0/+5 ° root face 1,6 mm +/- 0,8 mm	DTP 15.3104-05 IS 15-G13/13
	squareness of cut	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 pipes per shift	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and 2015-08-00-KRDD-D.PP-TS.1-1 max 1,6 mm	DTP 15.3104-05 IS 15-G13/13
	- grinding of weld bead	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Inside : 100 +20/-0 mm Outside : min. 150 mm	IS 15-G13/13
	Marking stamping	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	AMTPO inspector mark EN ISO 3183 L415ME PSL2 E 711 x 8,0 SAWH Heat Number Pipe number	IS 15-G04-09


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 COMMERCIAL DIRECTOR
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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


ArcelorMittal

Document number: 153-6/19 rev. 0
Compiled by J. Pospíšil

EN ISO 3183-M:2012, Grade L415ME PSL2, 508,0x8,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

date: 9.1.2019

Rev. 0

Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
1	TYPE	SAWH, produce acc. to EN 3183-M:2012	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
2	INPUT MATERIAL	2015-08-00-KRDD-D.PP-TS.1-1 release input material: Coil, welding wire, welding flux	every delivery	acc. to manufacturer's procedure	PP TT-5.06
3	MANUFACTURING, FORMING AND WELDING	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure	DTP 15.3101-09 IS 15-G13/13
4	CHEMICAL COMPOSITION	EN 3183-M:2012	1 per every heat	EN 3183-M:2012, Table M.1, grade L415ME/X60ME	IS 15-01/10
5	VISUAL INSPECTION	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 10.2.7	DTP 15.3101-09 IS 15-G13/13
6	- surface imperfections	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.10	DTP 15.3102-09 IS 15-G13/13
	DIMENSIONS INSPECTION	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11	DTP 15.3102-09 IS 15-G13/13
	- outside diameter	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and 2015-08-00-KRDD-D.PP-TS.1-1 par. 9.11	DTP 15.3102-09 IS 15-G13/13
	- out-of-roundness	2015-08-00-KRDD-D.PP-TS.1-1	3 pipes per shift	OD 508 +/- 1,2 mm - pipe ends OD 508 +/- 1,27 mm - pipe body	DTP 15.3102-09 IS 15-G13/13
	- wall thickness	EN 3183-M:2012	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, tab. M.3	DTP 15.3102-09 IS 15-G13/13
	- length	2015-08-00-KRDD-D.PP-TS.1-1	every pipe	2015-08-00-KRDD-D.PP-TS.1-1 max 0,5 % D	DTP 15.3102-09 IS 15-G13/13
	- straightness	EN 3183-M:2012 TS-TR-2015	every doubt of straightness deviation	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.11.3.4 max. 2,0 mm / m	DTP 15.3104-05 DTP 15.3102-09 IS 15-G13/13 DTP 15.3102-09 IS 15-G13/13

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mgr Michał Pietrek

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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)					
Rev. 0	EN ISO 3183-M:2012, Grade L415ME PSL2, 508,0x8,0 mm, 2015-08-00-KRDD-D.PP-TS.1-1 rev.A		Document number: 153-6/19 rev. 0		
	date: 9.1.2019		Compiled by J. Pospišil		
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE
6	- weld beads	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.6 outside weld : max 3,0 mm inside weld : max 3,0 mm least 150 from each pipe -outside bead shall be removed by grinding. max height of teh weld after grinding 0,5 mm	DTP 15.3102-09 IS 15-G13/13
	- radial offset	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and EN 3183-M:2012, table M.5,	DTP 15.3102-09 IS 15-G13/13
	- misalignment of weld seam	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 pipe per shift	acc. to manufacturer's procedure and EN 3183-M:2012, par. 9.13.3. max 3,0 mm	DTP 15.3102-09 IS 15-G13/13
7	REPAIR WELD	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe with defect (only weld)	acc. to manufacturer's procedure and EN 3183-M:2012, annex C.4 After weld repair, the total area of the repair shall be both ultrasonically and radiographically inspected in accordance to Annex E Maximum number of repairs in one section is three (3). A section is intended as 6 m of pipe length. Weld repaira within 200 mm of the pipe ends and repair of the crack are not permitted.	DTP 15.3103-09 IS 15-G13-13
8	HYDROSTATIC TEST	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Hydrostatic test pressure p= 10,6 MPa / 10 s.	DTP 15.3105-01 IS 15-G13/13
	MECHANICAL TESTS and PRODUCT ANALYSIS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	-	acc. to manufacturer's procedure and EN 3183-M:2012, table 18 and M.7	IS 15-G13/13
	Product analysis	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 per every heat	EN ISO 3183-M, table M.1, C, Mn, Si, P, S, V, Nb, Ti, Al celk., N, Cu, Ni, Cr, Mo, C.E. max. 0,43 %	IS 15- 01/14 IS 15-G13/13

mgr Michal Pietrek

mgr Marek Mazurek

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Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


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Document number: 153-6/19 rev. 0

Compiled by J. Pospišil

EN ISO 3183-M:2012, Grade L415ME PSL2, 508,0x8,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

date: 9.1.2019

Rev. 0						
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE	
9	Hardness test	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	1 set per 50 pipes	EN ISO 3183-M:2012 Annex J 2015-08-00-KRDD-D.PP-TS.1-1 par. 2.7.2.3 - item 59 max 270HV for each zone (PM, WELD, HAZ)	IS 15-G13/13	
10	NDT INSPECTION	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	IS 15-G13/13	
	Ultrasonic inspection	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183 annex M Longitudinal / transverse imperfections in the weld: ultrasonic test ISO 10893-1:2011, acceptance level U2H Laminar imperfections at the pipe ends: ultrasonic test acc. EN ISO 3183 E3.2.3 and ISO 10893-8, acceptance limit 6 mm max. circumferentially Laminar imperfections on strip or plate edges/area adjacent to weld seam acc. ISO 10893-9 acceptance level U2 Laminar imperfections in the pipe body: ultrasonic test ISO 10893-9:2011, acceptance level U2 NDT of the weld seam at pipe ends (untested ends)/repaired areas: ultrasonic test ISO 10893-11:2011 on longitudinal and transverse imperfections, acceptance level U2H and radiographic inspection ISO 10893-7:2011, image quality class B	IS 15-G13/13 Procedure NDT P-SN.1-01 Procedure P-US.1-01 Procedure P-US.1-02 Procedure P-RT.1-01	
	Residual magnetism	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 max 3 mT	IS 15-G13/13	
	PIPE ENDS	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012	DTP 15:3104-05 IS 15-G13/13	

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COMMERCIAL DIRECTOR

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000211

Manufacturing Procedure Specification (MPS) Inspection Test Plan (ITP)


ArcelorMittal

Document number: 153-6/19 rev. 0

TT Technika

Compiled by J. Pospišil

EN ISO 3183-M:2012, Grade L415ME PSL2, 508,0x8,0 mm,
2015-08-00-KRDD-D.PP-TS.1-1 rev.A

date: 9.1.2019

Rev. 0						
Nr	DESCRIPTION	REFERENCE STANDARD	FREQUENCY OF INSPECTION	ACCEPTANCE LIMIT	MANUFACTURE'S PROCEDURE CODE	
	- preparation of ends	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	beveled ends acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and TS-TR-2015 : bevel 30 ° -0/+5 ° root face 1,6 mm +/- 0,8 mm	DTP 15.3104-05 IS 15-G13/13	
	squareness of cut	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	2 pipes per shift	acc. to manufacturer's procedure and ČSN EN ISO 3183-M:2012 and 2015-08-00-KRDD-D.PP-TS.1-1 max 1,6 mm	DTP 15.3104-05 IS 15-G13/13	
	- grinding of weld bead	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	Inside : 100 +20/-0 mm Outside : min. 150 mm	IS 15-G13/13	
	Marking stamping	EN 3183-M:2012 2015-08-00-KRDD-D.PP-TS.1-1	every pipe	AMTPO inspector mark EN ISO 3183 L415ME PSL2 E 508 x 8,0 SAWH Heat Number Pipe number	IS 15-G04-09	

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COMMERCIAL DIRECTOR
mgr Michal Pietrek

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000212

A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19							
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX							
B08, B12/13	Quantity delivered: B13 Actual mass pcs mtrs kgs XX XXX,XXX XXXX								A06 Customer / Consignee: XXXXXXXX								
B09-11	Dimensions: 508,0 x 8,00 mm																
B02	Steel designation: L415ME/X60ME PSL2																
B01, B03, B04	Product, conditions and terms of delivery: SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp AMTP OSTRAVA ISO 3183 508,0 x 8,00 mm L415ME/X60ME-PSL2 SAWH 5 KJ 20 KJ PIPE No.:																
C71-92	Heat (H) and product (P) chemical analyses (%)								C70	Steel made by basic oxygen process, fully killed, strand cast.							
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ	
	N283549 H	0,06	1,36	0,210	0,016	0,005	0,02	0,01	0,02	0,032	0,0050	0,002	0,005	0,017	0,046	0,14	
	P	0,06	1,39	0,217	0,013	0,005	0,02	0,01	0,02	0,033	0,0040	<0,001	0,002	0,015	0,047	0,14	
	P	0,06	1,38	0,216	0,013	0,005	0,02	0,01	0,02	0,032	0,0040	<0,001	0,002	0,015	0,047	0,14	
Z99																	
B07	Test results:		MPa		MPa		%		J		DWT		HV10				
			C11 Yield Point		C12 Tensile Strength		C13 Elongation		C40-43 Impact test		- 20°C		C30-32 Hardness				
			R _{10,5}		R _m		A ₅		10x7,5 / -29°C		min. 85%		max. 300				
			415 - 565		520 - 760		min. 18		max. 0.85								
					min. 520				min. 30 min. 30 min. 30								
	N283549	5210037	parent. met.	454	564	25,1	0,80	223	222, 224, 222	100, 100	250						
			weld seam		641			53	26, 94, 38		261						
			HAZ					177	180, 182, 170		253						
			parent. met.					INF. SHEAR AREA (%)									
								100	100, 100, 100								
Z99																	
D01	Visual and dimensional inspection with satisfactory results								X	D51	Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				10,6 MPa / 10s		
C52	Bend test weld seam - satisfactory								X	D52	Elektroinductive resistance test by						
D53	Residual magnetic field (max. 3mT) - satisfactory								X								
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory								X	D07	Ultrasonic examination of 100% weld seam, pipe ends - satisfactory				X		
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007. Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371 Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4 - weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W																	
MANUFACTURER OF COILS: AM KRAKOW 000213																	
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																

Z02 Date of issue 9.1.2019/Vo

Tel.: +420 595683644

ArcelorMittal

ArcelorMittal Tubular Products Ostrava a.s.
Vratimovská 689, 707 02 Ostrava 7
Řízení jakosti

A01 ArcelorMittal Tubular Products Ostrava a.s.
A05 QA Department
Vratimovská 689
707 02 Ostrava-Kunčice
Czech Republic

IZOSTAL S.A. CHAIRMAN OF THE BOARD
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COMMITTEE DIRECTOR
mgr Michal Pietrek

mgr Marek Mazurek

Bc. Petr Pastucha

Work's Inspector
Z02 Validation

35

E.z. 2576/16/15/P



A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19												
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX												
B08, B12/13	Quantity delivered:								B13	Actual mass												
	pcs		mtrs		kgs																	
	XX		XXX,XXX		XXXX																	
B09-11	Dimensions:								XXXXXXX													
	711,0 x 8,00 mm																					
B02	Steel designation: L415ME/X60ME PSL2																					
B01, B03, B04	Product, conditions and terms of delivery: SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																					
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp																					
AMTP OSTRAVA ISO 3183 711,0 x 8,00 mm L415ME/X60ME-PSL2 SAWH 5 KJ 20 KJ PIPE No.:																						
C71-92	Heat (H) and product (P) chemical analyses (%)								C70	Steel made by basic oxygen process, fully killed, strand cast.												
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ						
	N283549 H	0,06	1,36	0,210	0,016	0,005	0,02	0,01	0,02	0,032	0,0050	0,002	0,005	0,017	0,046	0,14						
	P	0,06	1,39	0,217	0,013	0,005	0,02	0,01	0,02	0,033	0,0040	<0,001	0,002	0,015	0,047	0,14						
	P	0,06	1,38	0,216	0,013	0,005	0,02	0,01	0,02	0,032	0,0040	<0,001	0,002	0,015	0,047	0,14						
Z99																						
B07	Test results:		MPa		MPa		%		R _e /R _m		J		DWTT		HV10							
			C11 Yield Point		C12 Tensile Strength		C13 Elongation				C40-43 Impact test				C30-32 Hardness							
	Heat No. c00 Specimen No.		R _{10.5}		R _m		A ₅		max.		10x7,5 / -29°C		- 20°C		max. 300							
	Requirements: parent. met.		415 - 565		520 - 760		min. 18		0.85		Ø min. 32		min. 24									
	weld seam				min. 520						Ø min. 30		min. 23									
	HAZ										Ø min. 30		min. 23									
	N283549	5210037 parent. met.	454		564		25,1		0,80		223		222, 224, 222		100, 100							
		weld seam			641						53		26, 94, 38		250							
		HAZ									177		180, 182, 170		261							
		parent. met.									INF.SHEAR AREA (%)				253							
											100		100, 100, 100									
Z99																						
D01	Visual and dimensional inspection with satisfactory results								X	D51	Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				7,6 MPa / 10s							
C52	Bend test weld seam - satisfactory								X	D52	Elektroinductive resistance test by											
D53	Residual magnetic field (max. 3mT) - satisfactory								X									- satisfactory				
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory								X	D07	Ultrasonic examination of 100% weld seam, pipe ends - satisfactory								X			
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007. Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371 Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4 - weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W																						
MANUFACTURER OF COILS: AM KRAKOW																						
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																					
Z02	Date of issue 9.1.2019/Vo																					

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Vratimovská 689, 707 02 Ostrava 7
Řízení jakosti

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A01 ArcelorMittal Tubular Products Ostrava a.s.

A05 QA Department

Vratimovská 689

707 02 Ostrava-Kunčice

Czech Republic

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mgr Michal Pietrek

mgr Marek Mazurek

Bc. Petr Pastucha

Work's Inspector
Z02 Validation

E.z. 2576/16/15/P



A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19							
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX							
B08, B12/13	Quantity delivered:				B13 Actual mass				A06 Customer / Consignee: XXXXXXXXXX								
	pcs	mtrs			kgs												
	XX	XXX,XXX			XXXX												
B09-11	Dimensions: 711,0 x 8,80 mm																
B02	Steel designation: L415ME/X60ME PSL2																
B01, B03, B04	Product, conditions and terms of delivery: SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp																
AMTP OSTRAVA ISO 3183 711,0 x 8,80 mm L415ME/X60ME-PSL2 SAWH 5 KJ 20 KJ PIPE No.:																	
C71-92	Heat (H) and product (P) chemical analyses (%)								C70	Steel made by basic oxygen process, fully killed, strand cast.							
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ	
	N283549 H	0,06	1,36	0,210	0,016	0,005	0,02	0,01	0,02	0,032	0,0050	0,002	0,005	0,017	0,046	0,14	
	P	0,06	1,39	0,217	0,013	0,005	0,02	0,01	0,02	0,033	0,0040	<0,001	0,002	0,015	0,047	0,14	
	P	0,06	1,38	0,216	0,013	0,005	0,02	0,01	0,02	0,032	0,0040	<0,001	0,002	0,015	0,047	0,14	
Z99																	
B07	Test results:		MPa		MPa		%		R _e /R _m		J		DWTT		HV10		
			C11 Yield Point		C12 Tensile Strength		C13 Elongation		max.		C40-43 Impact test		- 20°C		C30-32 Hardness		
	Heat No. c00 Specimen No.		R _{10.5}		R _m		A ₅				10x7,5 / -29°C		min. 85%		max. 300		
	Requirements: parent. met.		415 - 565		520 - 760		min. 18		0.85		Ø min. 32		min. 24				
	weld seam				min. 520						Ø min. 30		min. 23				
	HAZ										Ø min. 30		min. 23				
	N283549	5210037 parent. met.	454		564		25,1		0,80		223		222, 224, 222		100, 100		
		weld seam			641						53		26, 94, 38		250		
		HAZ									177		180, 182, 170		261		
		parent. met.									INF. SHEAR AREA (%)		100, 100, 100		253		
Z99																	
D01	Visual and dimensional inspection with satisfactory results				X		D51	Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				8,4 MPa / 10s					
C52	Bend test weld seam - satisfactory				X		D52	Elektroinductive resistance test by									
D53	Residual magnetic field (max. 3mT) - satisfactory				X										- satisfactory		
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory				X		D07	Ultrasonic examination of 100% weld seam, pipe ends - satisfactory				X					
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007. Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371 Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4 - weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W MANUFACTURER OF COILS: AM KRAKOW																	
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																
Z02	Date of issue 9.1.2019/Vo																

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Vratimovská 689, 707 02 Ostrava 7
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A05 QA Department

Vratimovská 689

707 02 Ostrava-Kunčice

Czech Republic

IZOSTAL S.A.
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COMMERCIAL DIRECTOR
CEO

mgr Michal Pietrek

mgr Marek Mazurek

Bc. Petr Pastucha

Work's Inspector
z02 Validation

E.Z. 2576/16/15/P



A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19												
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX												
B08, B12/13	Quantity delivered:								B13	Actual mass												
	pcs		mtrs		kgs																	
	XX		XXX,XXX		XXXX																	
B09-11	Dimensions:								XXXXXXX													
	711,0 x 11,00 mm																					
B02	Steel designation:																					
	L415ME/X60ME PSL2																					
B01, B03, B04	Product, conditions and terms of delivery:																					
	SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																					
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp																					
	AMTP OSTRAVA				ISO 3183 711,0 x 11,00 mm L415ME/X60ME-PSL2 SAWH				5 KJ		20 KJ		PIPE No.:									
C71-92	Heat (H) and product (P) chemical analyses (%)								C70	Steel made by basic oxygen process, fully killed, strand cast.												
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ						
	N283549 H	0,06	1,36	0,210	0,016	0,005	0,02	0,01	0,02	0,032	0,0050	0,002	0,005	0,017	0,046	0,14						
	P	0,06	1,39	0,217	0,013	0,005	0,02	0,01	0,02	0,033	0,0040	<0,001	0,002	0,015	0,047	0,14						
	P	0,06	1,38	0,216	0,013	0,005	0,02	0,01	0,02	0,032	0,0040	<0,001	0,002	0,015	0,047	0,14						
Z99																						
B07	Test results:		MPa		MPa		%		J		DWTT		HV10									
			C11 Yield Point		C12 Tensile Strength		C13 Elongation		C40-43 Impact test		- 20°C		C30-32 Hardness									
	Heat No. C00 Specimen No.		R _{10.5}		R _m		A ₅		max.		min. 32		max. 300									
	Requirements: parent. met.		415 - 565		520 - 760		min. 18		0.85		min. 30											
	weld seam				min. 520						min. 30											
	HAZ																					
	N283549	5210037 parent. met.	454		564		25,1		0,80		297		296, 299, 296		100, 100							
		weld seam			641						70		35, 125, 51		261							
		HAZ									237		240, 243, 227		253							
		parent. met.									INF.SHEAR AREA (%)											
											100		100, 100, 100									
Z99																						
D01	Visual and dimensional inspection with satisfactory results								X	D51	Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				11,2 MPa / 10s							
C52	Bend test weld seam - satisfactory								X	D52	Elektroinductive resistance test by											
D53	Residual magnetic field (max. 3mT) - satisfactory								X									- satisfactory				
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory								X	D07	Ultrasonic examination of 100% weld seam, pipe ends - satisfactory								X			
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007.																						
Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371																						
Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4																						
- weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W																						
MANUFACTURER OF COILS: AM KRAKOW																						
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																					
Z02	Date of issue 9.1.2019/Vo																					

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ArcelorMittal Tubular Products Ostrava a.s.
Vratimovská 689, 707 02 Ostrava 7
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A01 ArcelorMittal Tubular Products Ostrava a.s.

A05 QA Department

Vratimovská 689

707 02 Ostrava-Kunčice

Czech Republic

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mgr Marek Mazurek

Bc. Petr Pastucha

Work's Inspector
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E.z. 2576/16/15/P

A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19							
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX							
B08, B12/13	Quantity delivered:				B13 Actual mass				A06 Customer / Consignee: XXXXXXXXXX								
	pcs	mtrs			kgs												
	XX	XXX,XXX			XXXX												
B09-11	Dimensions: 711,0 x 12,50 mm																
B02	Steel designation: L415ME/X60ME PSL2																
B01, B03, B04	Product, conditions and terms of delivery: SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp AMTP OSTRAVA ISO 3183 711,0 x 12,50 mm L415ME/X60ME-PSL2 SAWH								5 KJ		20 KJ		PIPE No.:				
C71-92	Heat (H) and product (P) chemical analyses (%)								C70 Steel made by basic oxygen process, fully killed, strand cast.								
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	AlT	N	MO	V	TI	NB	CEQ	
	N283549 H	0,06	1,36	0,210	0,016	0,005	0,02	0,01	0,02	0,032	0,0050	0,002	0,005	0,017	0,046	0,14	
	P	0,06	1,39	0,217	0,013	0,005	0,02	0,01	0,02	0,033	0,0040	<0,001	0,002	0,015	0,047	0,14	
	P	0,06	1,38	0,216	0,013	0,005	0,02	0,01	0,02	0,032	0,0040	<0,001	0,002	0,015	0,047	0,14	
Z99																	
B07	Test results:		MPa		MPa		%		R _e /R _m		J		DWTT		HV10		
	Heat No. c00 Specimen No.		c11 Yield Point		c12 Tensile Strength		c13 Elongation		max.		C40-43 Impact test		- 20°C		C30-32 Hardness		
	Requirements: parent. met.		R _{10.5}		R _m		A ₅		0.85		10x10 / -29°C		min. 85%		max. 300		
	weld seam		415 - 565		520 - 760		min. 18				Ø min. 43 min. 32						
	HAZ				min. 520						Ø min. 40 min. 30						
	N283549	5210037 parent. met.	454		564		25,1		0,80		297 296, 299, 296		100, 100		250		
		weld seam			641						70 35, 125, 51				261		
		HAZ									237 240, 243, 227				253		
		parent. met.									INF.SHEAR AREA (%)						
											100 100, 100, 100						
Z99																	
D01	Visual and dimensional inspection with satisfactory results				X		D51 Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				12,8 MPa / 10s						
C52	Bend test weld seam - satisfactory				X		D52 Elektroinductive resistance test by										
D53	Residual magnetic field (max. 3mT) - satisfactory				X						- satisfactory						
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory				X		D07 Ultrasonic examination of 100% weld seam, pipe ends - satisfactory				X						
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007.																	
Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371																	
Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4																	
- weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W																	
MANUFACTURER OF COILS: AM KRAKOW																	
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																

Z02 Date of issue 9.1.2019/Vo

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A01 ArcelorMittal Tubular Products Ostrava a.s.

A05 QA Department

Vratimovská 689

707 02 Ostrava-Kunčice

Czech Republic

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mgr Murek Mazurek

ArcelorMittal Tubular Products Ostrava a.s.
Vratimovská 689, 707 02 Ostrava 7
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Bc. Petr Pastucha

Work's Inspector
z02 Validation

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A02 Inspection certificate "3.1" (EN 10 204)

A03 Document No.: 20019/19

DOCUMENT SPECIMENT

Page: 1/1

A07	Customer's Order (P.O.) No./Item No.: XXXXXX								A08	Manufacturer's Works Order No.: XXXXX/X/19							
A11	Supplier's Order No.: XXXXXX								A10	Advice - Note No.: XXXXXX							
B08, B12/13	Quantity delivered:				B13 Actual mass				A06 Customer / Consignee: XXXXXXXXXX								
	pcs	mtrs			kgs												
	XX	XXX,XXX			XXXX												
B09-11	Dimensions: 711,0 x 11,00 mm																
B02	Steel designation: L485ME/X70ME PSL2																
B01, B03, B04	Product, conditions and terms of delivery: SPIRALLY WELDED PIPES - SAWH, acc.to EN ISO 3183/2012 - Annex M.																
A04, B06	Marking: Manufacturer's mark, mill inspector's stamp																
AMTP OSTRAVA ISO 3183 711,0 x 11,00 mm L485ME/X70ME-PSL2 SAWH 5 KJ 20 KJ PIPE No.:																	
C71-92	Heat (H) and product (P) chemical analyses (%)										C70 Steel made by basic oxygen process, fully killed, strand cast.						
B07	Heat No.:	C	MN	SI	P	S	CU	NI	CR	ALt	N	MO	V	TI	NB	CEQ	
	N630783 H	0,07	1,62	0,31	0,009	0,002	0,01	0,21	0,02	0,034	0,005	0,08	0,05	0,02	0,06	0,38	
	P	0,07	1,65	0,31	0,009	0,003	0,02	0,22	0,02	0,037	0,004	0,08	0,04	0,02	0,06	0,39	
	P	0,07	1,65	0,31	0,009	0,003	0,02	0,22	0,02	0,036	0,004	0,08	0,04	0,02	0,06	0,39	
Z99																	
B07	Test results:		MPa		MPa		%		J		DWTT		HV10				
C04	Heat No.	Specimen No.	C11 Yield Point		C12 Tensile Strength		C13 Elongation		C40-43 Impact test		- 20°C		C30-32 Hardness				
	Requirements:	parent. met.	R _{10,5}		R _m		A ₅		10x10 / -29°C		min. 85%		max. 300				
		weld seam	485 - 605		570 - 760		min. 18		max. 0,90								
		HAZ			min. 570				Ø min. 55 Ø min. 40 Ø min. 40								
	N630783	6101138 parent. met.	499		649		20,6		0,77		298		250				
		weld seam			717						129		261				
		HAZ									296		253				
		parent. met.									INF.SHEAR AREA (%)						
											100						
											100, 100, 100						
Z99																	
D01	Visual and dimensional inspection with satisfactory results				X		D51 Hydraulic test - min. test pressure acc.to EN ISO 3183 (10.2.6.6.) - satisfactory				13,1 MPa / 10s						
C52	Bend test weld seam - satisfactory				X		D52 Elektroinductive resistance test by										
D53	Residual magnetic field (max. 3mT) - satisfactory				X						- satisfactory						
D06	Radiographic exam. of 100% pipe ends, weld repairs - satisfactory				X		D07 Ultrasonic examination of 100% weld seam, pipe ends - satisfactory				X						
The manufacturer has an established and certified management system according to ISO 9001:2015, ISO 14001:2015, ISO 50001:2011, OHSAS 18001:2007. Tally Sheet No.: 20019A/19. Classification scratch pattern No.: 5210371 Orientation of sample- parent.met.:add.C11-C13)...1T,a/4 add.C40-43)...3T,a/4 - weld seam :add.C12)...1W add.C40-43)...3W add.C52)...2W 000218																	
MANUFACTURER OF COILS: AM KRAKOW																	
Z01	All pipes conform to the above mentioned standards and ordering requirements and agreements.																
Z02	Date of issue 9.1.2019/Vo																

CHAIRMAN OF THE BOARD

mgr Marek Mazurek

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707 02 Ostrava-Kunčice

Czech Republic

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

Bc. Petr Pastucha

Work's Inspector
z02 Validation



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.1

xxx-19/xx

A02-A03

Page No 1/2

Purchaser

A06

EXAMPLE-1

Producer:
U. S. Steel Košice, s.r.o.
DZ Radiatory a rúry

A05

Date:

Z02

xxx

B01 Product: SPIRALLY WELDED STEEL PIPES SAWH
RURY STALOWE SPIRALNIE SPAWANE - SAWH
B01 According: EN ISO 3183:2012(E)
B03 Specification: 2015-08-00-KRDD-D.PP-TS.1-1, Date:2016-02-15

B02

Steel designation: L415ME

C70

Steelmaking process: B O F

A07, A09

Purchaser's order No.:

A10

Packing Sheet:

-

Marking

Outside: USS Kosice•EN ISO3183/2012•D•t•SAWH•L 415 ME•G•PSL2•E • Pipe No. • Pipe lenght •TK 1-23•

B06

Item No	B06 No. of Pieces	B12 Th. Mass (kg)	B14 Total length (m)	B09- B11 Dimensions, Pipe No.	B07 Heat No.	C00 Test No.	
						C71	C00-C50
1	1	X	X	508x8,00mm, 13+-0,5m			

Visual inspection:

D01

Dimensional inspection: EN ISO 3183:2012(E)

Satisfactory

Hydrostatic pressure tes: EN ISO 3183:2012(E), p.10.2.6.7,

Satisfactory

Welding procedures are prepared and approved acc. to EN 15614-1

Item No.- 10,40 MPa 10s

Welding workshop: acc. standard EN ISO 3834-2, Order No. 0842/50/2016

Operators and Welders are certified acc EN ISO14732 and EN ISO 9606-1

Mechanical Testing Laboratory: accreditation No. S-012, according to requirements of ISO/IEC 17025:2005 Standard
NDT laboratory: accreditation No. S-383, according to requirements of ISO/IEC 17025:2005 Standard

Hardness testing: max. 270HV10

Satisfactory

Macrographic testing

Satisfactory

Non-destructive testing:

D02

Weld test acc. to EN ISO 3183:2012(E), Annex M, UT: class U2H, RT: class B with electronic recording elektronicznej

Satisfactory

UT of the raw material in pipe body and in area adjacent to the weld acc. to EN ISO 3183:2012(E), Annex M, class U2, acc. to EN ISO 10893-9:2011, EN ISO 10893-8:2011, p.1.b)

Satisfactory

UT of the raw material at pipe ends acc. to EN ISO 3183:2012(E), Annex M, acc. to EN ISO 10893-8:2011, p.1c)

Satisfactory

Weld test at pipe ends by RT acc. to EN ISO 3183:2012(E) table M.10

Satisfactory

Magnetism residual on pipe ends: EN ISO 3183:2012(E)

Satisfactory

NDT Operators are certified acc. to EN 473 or EN ISO 9712: leader operator level III, RT, UT



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.2

xxx-19/xx

A02-A03

Test Result

Page No.2/2

Chemical composition: %

C71

Heat No.	Product Analysis	C max. 0,10 %	Mn max. 1,60 %	Si max. 0,45 %	P max. 0,025 %	S max. 0,015 %	Al 0,015- 0,06 %	N max. 0,012 %	Cu max. 0,25 %	Ni max. 0,30 %	Cr max. 0,30 %	Ti max. 0,07 %	V max. 0,09 %	Nb max. 0,06 %	Mo max. 0,10 %	Nb+V +Ti ≤0,15 %	P+S ≤0,035 %	CE _{Pcm} max.0,21%

Mechanical tests:

C00 - C50

C00 Test No.	C40, C41 Dimensions (mm)		C01, C02 Specimen	C03 Test temperature.	Tensile test				C50 Bend test	* Impact test (J)		C51 DWTT	* Impact test weld/ HAZ (J)	
	a0 (h-2)	b0 (w)			C11 Yeld strength	C12 Tensile strength	C13 Elongation	C14 Ratio R _l /R _m		C42 Single values	C43 Average value		C42 Single values	C43 Average value
Requirements:				°C	R _{t0,5} MPa	R _m MPa	A ₅ %	R _{t0,5} /R _m		KV ₂ (10,0x8,0 mm)			KV ₂ (10,0x8,0 mm)	
EN ISO 3183:2012(E)					415-565	min.	min.	max.	5T	min Σ/ 3 40		% Σ/ 2 max. 85	min Σ/ 3 40	
Result														
			2											
			3											
		10,00	2	-29°C										
		10,00	2	-29°C										
		10,00	3	-29°C										
		10,00	4	-29°C										

2-Basic material-transverse, 3-Weldjoint-transverse, 4-HAZ- transverse

2-Basic material-transverse, 3-Weldjoint-transverse, 4-HAZ- transverse

* If test element is less than 10,00 mm, is made by impact test values KV₂ calculation. Values are recalculated in accordance with standard

Z05

Manufacturer is certified according to:

ISO 9001:2008:

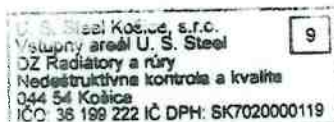
No: Q 0977-2

API Spec Q1/API Spec 5L:

No: 5L-0317

Z01

Producer certify that the delivered products comply with the requirements of the order.



Z02

Location: Košice

Date:

Jozef Taraba
Inspection representative

000220

Code Numbers in accordance with EN 10168:2004
e-mail: jtaraba@sk.uss.com, tel: +421-55-673-2411

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

F-PS/RS/0105-04/13-01-12



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.1 xxx-19/xx

A02-A03

Page No 1/2

Purchaser

A06

EXAMPLE-2

Producer:
U.S. Steel Košice, s.r.o.
DZ Radiátory a rúry

A05

Date:

Z02

xxx

Product: SPIRALLY WELDED STEEL PIPES SAWH
RURY STALOWE SPIRALNIE SPAWANE - SAWH
According: EN ISO 3183:2012(E)
Specification: 2015-08-00-KRDD-D.PP-TS.1-1, Date:2016-02-15

B02

Steel designation: L415ME

C70

Steelmaking process: B O F

A07, A09

Purchaser's order No.:

A10

Packing Sheet:

Marking

Outside:

USS Kosice•EN ISO3183/2012•D•t•SAWH•L 415 ME•G•PSL2•E • Pipe No. • Pipe lenght •TK 1-23•

B06

Item No	B08 No. of Pieces	B12 Th. Mass (kg)	B14 Total length (m)	B09- B11 Dimensions, Pipe No.	B07 Heat No.	C00 Test No .	
						C71	C00-C50
1	1	X	X	711x8,80mm, 13,00+-0,5m			

D01

Visual inspection:

Satisfactory

Dimensional inspection: EN ISO 3183:2012(E)

Satisfactory

Hydrostatic pressure tes: EN ISO 3183:2012(E) , p.10.2.6.7

Item No – 8,30 MPa 10s

Welding procedures are prepared and approved acc. to EN 15614-1

Welding workshop: acc. standard EN ISO 3834-2, Order No. 0842/50/2016

Operators and Welders are certified acc EN ISO14732 and EN ISO 9606-1

Mechanical Testing Laboratory: accreditation No. S-012, according to requirements of ISO/IEC 17025:2005 Standard
NDT laboratory: accreditation No. S-383, according to requirements of ISO/IEC 17025:2005 Standard

Hardness testing: max. 270HV10

Satisfactory

Macrographic testing

Satisfactory

Non-destructive testing:

D02

Weld test acc. to EN ISO 3183:2012(E), Annex M, UT: class U2H, RT: class B with electronic recording elektronicznej

Satisfactory

UT of the raw material in pipe body and in area adjacent to the weld acc. to EN ISO 3183:2012(E), Annex M, class U2, acc. to EN ISO 10893-9:2011, EN ISO 10893-8:2011, p.1.b)

Satisfactory

UT of the raw material at pipe ends acc. to EN ISO 3183:2012(E), Annex M, acc. to EN ISO 10893-8:2011, p.1.c)

Satisfactory

Weld test at pipe ends by RT acc. to EN ISO 3183:2012(E) table M.10

Satisfactory

Magnetism residual on pipe ends: EN ISO 3183:2012(E)

Satisfactory

NDT Operators are certified acc. to EN 473 or EN ISO 9712: leader operator level III, RT, UT

000221

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COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.2

xxx-19/xx

A02-A03

Page No.2/2

Test Result

Chemical composition: %

C71

Heat No.	Product Analysis	C max. 0,10 %	Mn max. 1,60 %	Si max. 0,45 %	P max. 0,025 %	S max. 0,015 %	Al 0,015- 0,06 %	N max. 0,012 %	Cu max. 0,25 %	Ni max. 0,30 %	Cr max. 0,30 %	Ti max. 0,07 %	V max. 0,09 %	Nb max. 0,06 %	Mo max. 0,10 %	Nb+V +Ti ≤0,15 %	P+S ≤0,035 %	CE _{Fe} max 0,21%

Mechanical tests:

C00 - C50

Mechanical tests*														
C00 Test No.	C40: C41 Dimensions (mm)		C01: C02 Specimen	C03 Test temperature.	Tensile test				C50 Bend test	Impact test (J)		C51 DWTT	Impact test weld/ HAZ (J)	
	a0 (h-2)	b0 (w)			C11 Yield strength	C12 Tensile strength	C13 Elongation	C14 Ratio R _l /R _m		C42 Single values	C43 Average value		C42 Single values	C43 Average value
Requirements:				°C	R _{t0,5} MPa	R _m MPa min.	A ₅ % min.	R _{t0,5} /R _m max.		KV ₂ (10,0x8,0 mm) min Σ/ 3	% Σ/ 2 max. 85	KV ₂ (10,0x8,0 mm) min Σ/ 3		
EN ISO 3183:2012(E)					415-565	520-760	18	0,90	5T		40		40	
Result														
			2											
			3											
			2	-29°C										
		10,00	2	-29°C										
		10,00	3	-29°C										
		10,00	4	-29°C										

2-Basic material-transverse, 3-Weldjoint-transverse, 4-HAZ- transverse

* If test element is less than 10,00 mm, is made by impact test values KV₂ calculation. Values are recalculated in accordance with standard

Manufacturer is certified according to:

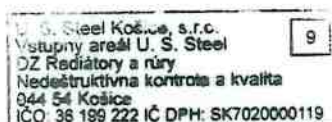
ISO 9001:2008:

No: Q 0977-2

API Spec Q1/API Spec 5L:

No: 5L-0317

Producer certify that the delivered products comply with the requirements of the order.



Location: Košice

Date:

Jozef Taraba
Inspection representative

000222

Code Numbers in accordance with EN 10168:2004
e-mail: taraba@sk.uss.com, tel: +421-55-673-2413

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

F-PS/RS/0105-04/13-01-12



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.1

xxx-19/xx

Page No 1/2

Purchaser

EXAMPLE-3

Producer:
U. S. Steel Košice, s.r.o.
DZ Radiatory a rúry

Date:
xxx

Product: SPIRALLY WELDED STEEL PIPES SAWH
RURY STALOWE SPIRALNIE SPAWANE - SAWH
According: EN ISO 3183:2012(E)
Specification: 2015-08-00-KRDD-D.PP-TS.1-1, Date:2016-02-15

Steel designation: L415ME

Steelmaking process: B O F

A07, A06

Purchaser's order No.:

A10

Packing Sheet:

Marking

Outside: USS Kosice•EN ISO3183/2012•D•L•SAWH•L 415 ME•G•PSL2•E • Pipe No. • Pipe lenght •TK 1-23•

B06

Item No	B08 No. of Pieces	B12 Th. Mass (kg)	B14 Total length (m)	B09-B11 Dimensions, Pipe No.	B07 Heat No.	Test No.	
						C71	C00-C50
1	1	X	X	711x8,00mm, 15,50+-0,5m			

Visual inspection:

Satisfactory

Dimensional inspection: EN ISO 3183:2012(E)

Satisfactory

Hydrostatic pressure tes: EN ISO 3183:2012(E), p.10.2.6.7,

Item No - 7,60 MPa 10s

Welding procedures are prepared and approved acc. to EN 15614-1

Welding workshop: acc. standard EN ISO 3834-2, Order No. 0842/50/2016

Operators and Welders are certified acc EN ISO14732 and EN ISO 9606-1

Mechanical Testing Laboratory: accreditation No. S-012, according to requirements of ISO/IEC 17025:2005 Standard
NDT laboratory: accreditation No. S-383, according to requirements of ISO/IEC 17025:2005 Standard

Hardness testing: max. 270HV10

Satisfactory

Macrographic testing

Satisfactory

Non-destructive testing:

Weld test acc. to EN ISO 3183:2012(E), Annex M, UT: class U2H, RT: class B with electronic recording elektronicznej

Satisfactory

UT of the raw material in pipe body and in area adjacent to the weld acc. to EN ISO 3183:2012(E), Annex M, class U2, acc. to EN ISO 10893-9:2011, EN ISO 10893-8:2011, p.1.b)

Satisfactory

UT of the raw material at pipe ends acc. to EN ISO 3183:2012(E), Annex M, acc. to EN ISO 10893-8:2011, p.1.c)

Satisfactory

Weld test at pipe ends by RT acc. to EN ISO 3183:2012(E) table M.10

Satisfactory

Magnetism residual on pipe ends: EN ISO 3183:2012(E)

Satisfactory

NDT Operators are certified acc. to EN 473 or EN ISO 9712; leader operator level III, RT, UT

000223



U. S. Steel Košice, s.r.o. A01
Vstupný areál U. S. Steel
044 54 Košice
Slovak Republic

Inspection certificate No.:
EN 10 204:2004/3.2 xxx-19/xx

A02-A03

Page No.2/2

Test Result

Chemical composition: %

Heat No.	Product Analysis	C max. 0,10 %	Mn max. 1,60 %	Si max. 0,45 %	P max. 0,025 %	S max. 0,015 %	Al 0,015- 0,06 %	N max. 0,012 %	Cu max. 0,25 %	Ni max. 0,30 %	Cr max. 0,30 %	Ti max. 0,07 %	V max. 0,09 %	Nb max. 0,06 %	Mo max. 0,10 %	Nb+V +Ti ≤0,15 %	P+S ≤0,035 %	CE _{Pcm} max 0,21%

Mechanical tests:

C00 Test No.	C40, C41 Dimensions (mm)		C01, C02 Specimen	C03 Test temperature.	Tensile test				C50 Bend test	* Impact test (J)		C51 DWTT	* Impact test weld/ HAZ (J)		C44			
	a0 (h-2)	b0 (w)			C11 Yield strength	C12 Tensile strength	C13 Elongation	C14 Ratio R _t /R _m		C42 Single values	C43 Average value		C42 Single values	C43 Average value				
	Requirements:										°C		R _{t0,5} MPa	R _m MPa		A ₅ %	R _{t0,5} /R _m	
EN ISO 3183:2012(E)					415-565	520-760	18	0,90	5T		min Σ/ 3 40	Σ/ 2 max. 85	min Σ/ 3 40					
Result																		
			2															
			3															
			2	-29°C														
		10,00	2	-29°C														
		10,00	3	-29°C														
		10,00	4	-29°C														
2-Basic material transverse, 3-Weld joint transverse, 4-HAZ- transverse																		

2-Basic material-transverse, 3-Weldjoint-transverse, 4-HAZ-transverse

* If test element is less than 10,00 mm, is made by impact test values KV₂ calculation. Values are recalculated in accordance with standard

Z05

Manufacturer is certified according to:

ISO 9001:2008: No: Q 0977-2 API Spec Q1/API Spec 5L: No: 5L-0317

Z01

Producer certify that the delivered products comply with the requirements of the order.

U. S. Steel Košice, s.r.o.
Vstupný areál U. S. Steel
DZ Radiatory a rúry
Nedestruktívna kontrola a kvalita
044 54 Košice
IČO: 38 199 222 IČ DPH: SK702000011

Z02

Location: Košice

Date:

Jozef Taraba
Inspection representative

000224

Code Numbers in accordance with EN 10168:2004
e-mail: jtaraba@sk.uss.com, tel: +421-55-673-2411

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
mgr Marek Mazurek

F-PS/RS/0105-04/13-01-12



MANUFACTURING PROCEDURE SPECIFICATION (MPS) U.S.STEEL KOŠICE s.r.o.

PIPE TYPE DIAMETER 508 x 8,0 mm, STEEL NAME, TECHNICAL DELIVERY CONDITIONS
Document number: 2015-8-00-KRDD-D.PP-TS.1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
1.	TYPE	SAWH			
2.	STARTING MATERIAL	L 415 ME			
3.	MANUFACTURING AND FORMING	ISO 3183-12+A1/18 ISO 3183-12+A1/18			
4.	CHEMICAL COMPOSITION	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	1 x heat	Cold rolled pipe	PS/RS/0054 PBP/RS/0169
5.	PRODUCT ANALYSIS	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	1 x heat	Acc.to point M.4.1.1 CE (Pcm) shall not exceed 0,21%.	PS/RS/0031
	VISUAL INSPECTION			Acc.to point M.4.1.1. Table M1 C ≤ 0,10%, Mo ≤ 0,10%, S, P < 0,035%, CE (Pcm) ≤ 0,21%.	PS/RS/0031
	surface imperfections				
	geometrical deviations				
	hard spots				
	DIMENSION INSPECTION				
	diameter		Each pipe	Acc.to point 9.10.7 Acc.to point 9.10.5 Acc.to point 9.10.6	PS/RS/0031 PS/RS/0084 PS/RS/0083
	out off roundness			Acc.to point 9.11, M5 Diameter pipe ends tolerance ±1,20 mm The internal out of roundness within 100 mm of the pipe end shall not exceed 0,5% x D of diameter	
	check wall thickness with UT equipment	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	Each pipe	Check with UT equipment shall be carried out on each pipe at 3 circumferential locations equally spaced along the pipe length; a minimum of 4 measurements (equally spaced) shall be taken around the circumference. 13,0m ±0,5m	PS/RS/0031 PS/RS/0084 PS/RS/0083
	length				
	weld bead height			acc. 6.3, table M.6, outside, inside max 3,0 mm	
	straightness				
	REPAIR WELD	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	1 x shift Each pipe qualified for repair	Acc.to point M.6.1, table M5 Appendix C Appendix D	PP/RS/0067 PP/RS/0071

000225

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR

mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO

mgr Marek Mazurek

PIPE TYPE DIAMETER 508 x 8,0 mm, STEEL NAME, TECHNICAL DELIVERY CONDITIONS

Document number: 2015-8-00-KRDD-D.PP-TS.1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
9.	HYDROSTATIC TEST	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	100 % pipes	Acc.to point M.7.4.3 Acc.to point 10.2.6.7 Hydrostatic test pressure= 104 bar	PBP/RS/0153
10.	MECHANICAL TESTS				
	Macrographic examination	ISO 3183-12+A1/18	1 x shift		
	Tensile test	ISO 3183-12+A1/18	1x per batch	Acc.to point 10.2.5	PBP/RS/0169
	- pipe body (T.W.)	2015-08-00-KRDD-D.PP-TS.1-1		Table M2	PS/RS/0031
	- weld (T.W.)				
	bend test	ISO 3183-12+A1/18	1x per batch	Acc.to point 10.2.4.6	PS/RS/0031
	DWT	2015-08-00-KRDD-D.PP-TS.1-1	1x per batch	Acc.to point 2.7.2.3-11,12	PS/RS/0031
	charpy test	2015-08-00-KRDD-D.PP-TS.1-1	1x per batch	Acc.to point 2.7.2.3-8, 9	PS/RS/0031
	NDT INSPECTION				
	UT of weld seam	ISO 3183,M:2012; EN ISO 10893-11		Table 2, class U2H	PS/RS/0045
	RT of weld seam ends (untested ends by UT)	ISO 3183,M:2012; EN ISO 10893-7		Acc.to point 10	PS/RS/0044
	UT of pipe body	ISO 3183,M:2012; EN ISO 10893-9	100 % pipes	Table 3, class U2	PS/RS/0045
	UT of area adjacent to weld	2015-08-00-KRDD-D.PP-TS.1-1		Acc.to point 2.7.2.3. - 51)	
	UT of pipe ends	ISO 3183,M:2012; EN ISO 10893-8		Table 2, class U2	PS/RS/0045
		2015-08-00-KRDD-D.PP-TS.1-1		Acc.to point 2.7.2.3. - 52)	
		ISO 3183,M:2012; EN ISO 10893-8		Acc.to point 8.1	PS/RS/0045
	Residual magnetism		random once per 4 h		
12	PIPE ENDS	ISO 3183:2012		Acc.to point E7	PS/RS/0044
	bevel and root face	ISO 3183-12+A1/18	100 % pipes		
		2015-08-00-KRDD-D.PP-TS.1-1		Acc.to point 9.12.5.2	PS/RS/0051
	grinding of weld bead	ISO 3183-12+A1/18	100 % pipes	Acc.to point 2.7.2.2- 9	
		2015-08-00-KRDD-D.PP-TS.1-1			
	WEIGHTING	ISO 3183-12+A1/18	100 % pipes	Acc.to point 2.7.2.3 -16	PS/RS/0072
		2015-08-00-KRDD-D.PP-TS.1-1		Acc.to point 9.14	PS/RS/0056
13.					PBP/RS/0176

Vypracoval:

Ing. Vaňko Michal
Ing. Taraba Jozef

Posudzoval:

Ing. Fudor Peter
Head Manager

Schválil:

Ing. Timko Vladimír
director RaR

Datum: 07.01.2019

IZOSTAL S.A. S.A.
VICE PRESIDENT
CHAIRMAN OF THE BOARD
COMMERCIAL DIRECTOR
mgr Michal Pietrek
mgr Marek Mazurek



MANUFACTURING PROCEDURE SPECIFICATION (MPS)

U.S. STEEL KOŠICE S.R.O.

PIPE TYPE DIAMETER 711 x 8,0 mm, STEEL NAME, TECHNICAL DELIVERY CONDITIONS

Document number: 2015-8-00-KRDD-D-PP-TS.1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
1.	TYPE	SAWH			
2.	STARTING MATERIAL	L 415 ME ISO 3183-12+A1/18			
3.	MANUFACTURING AND FORMING	ISO 3183-12+A1/18		Cold rolled pipe	PS/RS/0034 PBP/RS/0169 PS/RS/0031
4.	CHEMICAL COMPOSITION	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS.1-1	1 x heat	Acc. to point M 4.1.1 CE (Pcm) shall not exceed 0,21%.	
	PRODUCT ANALYSIS	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS.1-1	1 x heat	Acc. to point M 4.1.1. Table M1 C ≤ 0,10%, Mo ≤ 0,10%, S, P < 0,035%, CE (Pcm) ≤ 0,21%.	PS/RS/0031
	VISUAL INSPECTION	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS.1-1	Each pipe	Acc. to point 9.10.7 Acc. to point 9.10.5 Acc. to point 9.10.6 Acc. to point 9.11.1, M5	PS/RS/0031 PS/RS/0084 PS/RS/0083
	DIMENSION INSPECTION			Diameter pipe ends tolerance ±1,20 mm The internal out of roundness within 100 mm of the pipe end shall not exceed 0,5% x D of diameter	
	out off roundness	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS.1-1	Each pipe	Check with UT equipment shall be carried out on each pipe at 3 circumferential locations equally spaced along the pipe length: a minimum of 4 measurements (equally spaced) shall be taken around the circumference. 15,5m ±0,5m acc. 6.3, table M 6, outside, inside max 3,0 mm Acc. to point M 6.1, table M5	PS/RS/0031 PS/RS/0084 PS/RS/0083
	check wall thickness with UT equipment				
	length				
	weld bead height				
	straightness				
	REPAIR WELD	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS.1-1	1 x shift Each pipe qualified for repair	Appendix C Appendix D	PP/RS/0067 PP/RS/0071

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO

mgr Marek Mazurek

mgr Michal Pietrek

000227

PIPE TYPE DIAMETER 711 x 8,0 mm, STEEL NACE, TECHNICAL DELIVERY CONDITIONS

Document number: 2015-8-00-KRDD-D-PP-TS-1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
9.	HYDROSTATIC TEST	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS-1-1	100 % pipes	Acc. to point M.7.4.3 Acc. to point 10.2.6.7 Hydrostatic test pressure=76 bar	PBP/RS/0153
10.	MECHANICAL TESTS				
	Macrographic examination	ISO 3183-12+A1/18	1 x shift	Acc. to point 10.2.5	PBP/RS/0169
	Tensile test	ISO 3183-12+A1/18	1x per batch	Table M2	PS/RS/0031
	- pipe body (T, W,)	2015-08-00-KRDD-D-PP-TS-1-1			
	- weld (T, W,)				
	bend test	ISO 3183-12+A1/18	1x per batch	Acc. to point 10.2.4.6	PS/RS/0031
	DWT	2015-08-00-KRDD-D-PP-TS-1-1	1x per batch	Acc. to point 2.7.2.3-11, 12	PS/RS/0031
	charpy test	2015-08-00-KRDD-D-PP-TS-1-1	1x per batch	Acc. to point 2.7.2.3-8, 9	PS/RS/0031
11.	NDT INSPECTION				
	UT of weld seam	ISO 3183,M:2012; EN ISO 10893-11		Table 2, class U2H	PS/RS/0045
	RT of weld seam ends (untested ends by UT)	ISO 3183,M:2012; EN ISO 10893-7		Acc. to point 10	PS/RS/0044
	UT of pipe body	ISO 3183,M:2012; EN ISO 10893-9 2015-08-00-KRDD-D-PP-TS-1-1	100 % pipes	Table 3, class U2 Acc. to point 2.7.2.3 - 51)	PS/RS/0045
	UT of area adjacent to weld	ISO 3183,M:2012; EN ISO 10893-8 2015-08-00-KRDD-D-PP-TS-1-1		Table 2, class U2 Acc. to point 2.7.2.3 - 52)	PS/RS/0045
	UT of pipe ends	ISO 3183,M:2012; EN ISO 10893-8		Acc. to point 8.1	PS/RS/0045
12	Residual magnetism	ISO 3183:2012	random once per 4 h	Acc. to point E7	PS/RS/0044
	PIPE ENDS				
	bevel and root face	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS-1-1	100 % pipes	Acc. to point 9.12.5.2 Acc. to point 2.7.2.2-9	PS/RS/0051
	grinding of weld bead	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS-1-1	100 % pipes		PS/RS/0072
13.	WEIGHTING	ISO 3183-12+A1/18 2015-08-00-KRDD-D-PP-TS-1-1	100 % pipes	Acc. to point 2.7.2.3 - 16 Acc. to point 9.14	PS/RS/0056 PBP/RS/0176

Vypracoval:

Ing. Valiko Michal
Ing. Taraba Jozef

Datum: 07.01.2019

Posudzoval:

Ing. Fudor Peter
Head Manager

Schválil:

Ing. Timko Vladimír
director RAK

U. S. Steel Košice, s.r.o.
Vstupný areál U. S. Steel
DZ Radiatory a rúry
prevádzka Rurovne
044 54 Košice
IČO: 36 199 222 IČ DPH: SK7020000119

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COMMERCIAL DIRECTOR
mgr. Michał Piórek

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mgr. Marek Mazurek



MANUFACTURING PROCEDURE SPECIFICATION (MPS)
U.S.STEEL KOŠICE s.r.o.

PIPE TYPE DIAMETER 711 x 8,8 mm, STEEL NAME, TECHNICAL DELIVERY CONDITIONS

Document number: 2015-8-00-KRDD-D.PP-TS.1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
1.	TYPE	SAWH			
2.	STARTING MATERIAL	L415 ME ISO 3183-12+A1/18			
3.	MANUFACTURING AND FORMING	ISO 3183-12+A1/18		Cold rolled pipe	PS/RS/0054 PBP/RS/0169
4.	CHEMICAL COMPOSITION	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS 1-1	1 x heat	Acc.to point M.4.1.1 CE (P _{cm}) shall not exceed 0,21%	PS/RS/0031
5.	PRODUCT ANALYSIS	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS 1-1	1 x heat	Acc.to point M.4.1.1, Table M1 C ≤ 0,10%, Mo ≤ 0,10%, S, P < 0,035%, CE (P _{cm}) ≤ 0,21%,	PS/RS/0031
6.	VISUAL INSPECTION	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS 1-1	Each pipe	Acc.to point 9.10.7 Acc.to point 9.10.5 Acc.to point 9.10.6	PS/RS/0031 PS/RS/0084 PS/RS/0083
	DIMENSION INSPECTION			Acc.to point 9.11, M5 Diameter pipe ends tolerance ± 1,20 mm	
	out off roundness	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS 1-1	Each pipe	The internal out of roundness within 100 mm of the pipe end shall not exceed 0,5% x D of diameter	PS/RS/0031 PS/RS/0084 PS/RS/0083
	check wall thickness with UT equipment			Check with UT equipment shall be carried out on each pipe at 3 circumferential locations equally spaced along the pipe length; a minimum of 4 measurements (equally spaced) shall be taken around the circumference.	
	length			13,0m ± 0,5m	
	weld bead height			acc. 6.3, table M.6, outside, inside max 3,0 mm	
	straightness			Acc.to point M.6.1, table M5	
8.	REPAIR WELD	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS 1-1	1 x shift Each pipe qualified for repair	Appendix C Appendix D	PP/RS/0067 PP/RS/0071

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PIPE TYPE DIAMETER 711 x 8,8 mm, STEEL NAME, TECHNICAL DELIVERY CONDITIONS

Document number: 2015-8-00-KRDD-D.PP-TS.1-1

rev.: 2016-02-15

NR	DESCRIPTION	REFERENCE STANDARD	FREQUENCY	ACCEPTANCE LIMIT	MANUFACTURE'S
9.	HYDROSTATIC TEST	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	100 % pipes	Acc.to point M.7.4.3 Acc.to point 10.2.6.7 Hydrostatic test pressure=83 bar	PBP/RS/0153
10.	MECHANICAL TESTS				
	Macrographic examination	ISO 3183-12+A1/18	1 x shift	Acc.to point 10.2.5	PBP/RS/0169
	Tensile test	ISO 3183-12+A1/18	1x per batch	Table M2	PS/RS/0031
	- pipe body (T,W.) - weld (T,W.)	2015-08-00-KRDD-D.PP-TS.1-1			
	bend test	ISO 3183-12+A1/18	1x per batch	Acc.to point 10.2.4.6	PS/RS/0031
	DWT	2015-08-00-KRDD-D.PP-TS.1-1	1x per batch	Acc.to point 2.7.2.3-11,12	PS/RS/0031
	charpy test	2015-08-00-KRDD-D.PP-TS.1-1	1x per batch	Acc.to point 2.7.2.3-8, 9	PS/RS/0031
	NDT INSPECTION				
	UT of weld seam	ISO 3183.M:2012; EN ISO 10893-11		Table 2, class U2H	PS/RS/0045
	RT of weld seam ends (untested ends by UT)	ISO 3183.M:2012; EN ISO 10893-7		Acc.to point 10	PS/RS/0044
	UT of pipe body	ISO 3183.M:2012; EN ISO 10893-9	100 % pipes	Table 3, class U2 Acc.to point 2.7.2.3. - 51)	PS/RS/0045
	UT of area adjacent to weld	ISO 3183.M:2012; EN ISO 10893-8		Table 2, class U2 Acc.to point 2.7.2.3. - 52)	PS/RS/0045
	UT of pipe ends	ISO 3183.M:2012; EN ISO 10893-8		Acc.to point 8.1	PS/RS/0045
	Residual magnetism	ISO 3183:2012	random once per 4 h	Acc.to point E7	PS/RS/0044
12.	PIPE ENDS				
	bevel and root face	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	100 % pipes	Acc.to point 9.12.5.2 Acc.to point 2.7.2.2- 9	PS/RS/0051
	grinding of weld bead	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	100 % pipes	Acc.to point 2.7.2.3 -16	PS/RS/0072
13.	WEIGHTING	ISO 3183-12+A1/18 2015-08-00-KRDD-D.PP-TS.1-1	100 % pipes	Acc.to point 9.14	PS/RS/0056 PBP/RS/0176

Vypracoval:

Ing. Vaňko Michal
Ing. Taraba Jozef

Posudzoval:

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Head Manager

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director RaR

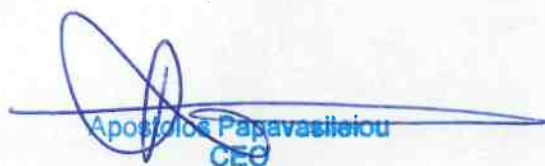
Dátum: 07.01.2019

mgr Michal Pietrek

mgr Marek Mazurek

 CORINTH PIPEWORKS PIPEWORKS & EQUIPMENT	QUALITY DEPARTMENT	PAGE 1/18
	THISVI PLANT	

TITLE	MANUFACTURING PROCEDURE SPECIFICATION																																																																		
DOCUMENT No.	MPS_02_19_SAWH																																																																		
REVISION No.	0																																																																		
PRODUCTION LINE	SAWH																																																																		
CUSTOMER	AMBER GRID																																																																		
PROJECT	INTERCONNECTION POLAND-LITHUANIA																																																																		
QUANTITY	<table border="1"> <thead> <tr> <th>Item</th> <th>Process (bare)</th> <th>OD (inch)</th> <th>WT (mm)</th> <th>Grade</th> <th>Qty (m)</th> <th>Coating</th> <th>Lining</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>SAWH</td> <td>28</td> <td>11</td> <td>L485ME</td> <td>17.290</td> <td>FBE: min 125µm ADH: min 150µm PE layer: 3725µm</td> <td>BARE</td> </tr> <tr> <td>20</td> <td>SAWH</td> <td>28</td> <td>11</td> <td>L415ME</td> <td>13.570</td> <td>FBE: min 125µm ADH: min 150µm PE layer: 3725µm</td> <td>BARE</td> </tr> <tr> <td>30</td> <td>SAWH</td> <td>28</td> <td>12,5</td> <td>L415ME</td> <td>3.000</td> <td>FBE: min 125µm ADH: min 150µm PE layer: 4725µm</td> <td>BARE</td> </tr> <tr> <td>40</td> <td>SAWH</td> <td>28</td> <td>8,8</td> <td>L415ME</td> <td>9.130</td> <td>FBE: min 125µm ADH: min 150µm PE layer: 3725µm</td> <td>BARE</td> </tr> <tr> <td>50</td> <td>SAWH</td> <td>28</td> <td>8</td> <td>L415ME</td> <td>124.300</td> <td>FBE: min 125µm ADH: min 150µm PE layer: 3725µm</td> <td>BARE</td> </tr> <tr> <td>70</td> <td>SAWH</td> <td>28</td> <td>11</td> <td>L485ME</td> <td>24</td> <td>BARE</td> <td>BARE</td> </tr> <tr> <td>80</td> <td>SAWH</td> <td>28</td> <td>8</td> <td>L415ME</td> <td>24</td> <td>BARE</td> <td>BARE</td> </tr> </tbody> </table>			Item	Process (bare)	OD (inch)	WT (mm)	Grade	Qty (m)	Coating	Lining	10	SAWH	28	11	L485ME	17.290	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE	20	SAWH	28	11	L415ME	13.570	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE	30	SAWH	28	12,5	L415ME	3.000	FBE: min 125µm ADH: min 150µm PE layer: 4725µm	BARE	40	SAWH	28	8,8	L415ME	9.130	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE	50	SAWH	28	8	L415ME	124.300	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE	70	SAWH	28	11	L485ME	24	BARE	BARE	80	SAWH	28	8	L415ME	24	BARE	BARE
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NAME / SIGNATURE	N. DANILOS ENGINEERING AND TECHNOLOGY ENGINEER	E. DOURDOUNIS TECHNICAL PROJECTS MANAGER																																																																	


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 CORINTH PIPEWORKS PIPELINES • FITTINGS • VALVES	MANUFACTURING PROCEDURE SPECIFICATION – SAWH		
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1. SCOPE

The present Manufacturing Procedure Specification (MPS) describes the basic manufacturing steps as well as quality control activities, which are involved with the production and inspection of *Spirally Submerged Arc Welded* steel pipes.

Applicable documents are:

ISO 3183:2012

Petroleum and natural gas industries — Steel pipe for pipeline transportation systems
Licensed

2015-08-00-KRDD-D.PP-BOQ

Bill of quantities of steel pipes

2015-08-00-KRDD-D.PP-TS.1-1

Technical requirements for steel pipes d711mm and d508mm

Pipe manufacturing shall be performed at the CPW SAWH mill, located at Thisvi, Domvrena, Greece.

2. STEEL MANUFACTURING PROCEDURE

Steel manufacturing procedure is analytically described in the steel supplier MPS.

3. IDENTIFICATION, HANDLING AND STORAGE OF STARTING MATERIALS

3.1 COILS

The coils are accompanied with supplier 3.1 certificates. Each coil is bearing a special identification label which includes the following information as a minimum:

- Dimensions and Grade
- Coil number
- Heat number
- Weight

An example of an identification label is presented in Figure 1.



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MANUFACTURING PROCEDURE SPECIFICATION - SAWH

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Figure 1

The coil receipt inspector is responsible to carry out the following inspections:

1. Check that the coil label includes the following information:

- Weight,
- Grade,
- Dimension,
- Heat number and coil number,
- Order number,
- Production date,
- Supplier

2. That the packaging has not been cut and is in good condition.
3. That the coils have not been damaged.
4. That there has been no serious rusting, especially from seawater.
5. That the external diameter shall not be greater than 2200mm and the internal diameter shall be between 710mm and 815mm (or $762 \pm 7\%$).
6. That the width of the coil corresponds to that written on the label.

If for whatever reason, one of the above diverges from acceptable levels then the Inspector

- Puts a red mark on the coil.

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MANUFACTURING PROCEDURE SPECIFICATION – SAWH

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- Notifies accordingly the Quality Control Mgr who decides whether a Non-Conformance label should be attached, after being appropriately filled-in.
- Places the coil on a special area of non-conforming products.
- The procurement dept. is notified for the change of the coils status in the system.

The operator at the mill entry station records all information from the coil label and performs dimensional checks (width and thickness measurements) as each coil is unwound and fed into the line.

The front-end of each coil (tongue) is cut off.

The new front-end of each coil is joined (submerged arc welded) with the tail end of the preceding one, thus forming a continuous *strip*, which is subsequently fed and forwarded to the production line.

3.2 WELDING CONSUMABLES

All materials are accompanied with supplier certificates. Each welding consumable batch/lot bears an identification label, which includes the characteristics of the material.

All materials are received in appropriate packages. Especially flux is received in moisture-proof bags.

Flux and wire are stored in sheltered warehouse and consumed based on the FIFO (First In – First Out) principle.

The Quality Control foreman inspects the packaging condition upon receipt. In case a bag is found to be opened or punctured prior to delivery, it is rejected for use and marked as "NC" (Non-conforming).

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4. DESCRIPTION OF EQUIPMENT

4.1 BASIC DESCRIPTION OF SAWH MILL PRODUCTION EQUIPMENT

UNIT	MAN/RER	YEAR	PIPE DIAM. (")	STRIP WIDTH (mm)	WALL THICKNESS (mm)	PIPE WEIGHT (Kgr/m)	PIPE LENGTH (m)	TACK WELDING (m/min)	MATERIAL QUALITY	WELDING SPEED (m/min)	TEST PRESSURE (BAR)	FACE PLATE SPEED (rpm)
SPM (1ST STEP) INCLUDING COIL FEEDING - DECOLLING – ID COIL END WELDING- EDGE MILLING - FORMING - TACK WELDING AND PIPE CUTTING	MEG	2000	24-100	1000- 1850	6-25	max 1580	8-18	9 max	max API 5L/ISO 3183 grade X-80M	4-9		
OFF LINE WELDING STATION 1,2,3	MEG	2001	24-100		6-25	max 1580	8-18			0,5-3		
OFF LINE WELDING STATION 4	MEG	2008	24-100		6-25	max 1580	8-18			0,5-3		
HYDROSTATIC TESTING MACHINE	MEG	2000	24-100		6-25	max 1580	8-18				up to 320	
PIPE END BEVELLING MACHINE	MEG	2000	24-100		6-25	max 1580	8-18					6-60

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4.2 BASIC DESCRIPTION OF SAWH MILL NON DESTRUCTIVE TESTING EQUIPMENT

UNIT	MANUFACTURER / TYPE	UT PROBES	YEAR OF PURCHASE	OTHER CHARACTERISTICS
WELD SEAM AND HAZ INSPECTION FOR LONGITUDINAL, TRANSVERSE AND CIRCUMFERENTIAL DEFECTS	KRAUTKRAMER SNUP/REP (s.n. 771733)	10 PROBES W45Z4NB18, 45°, 4MHz, 8x9mm W60Z4NB18, 60°, 4MHz, 8x9mm W70Z4NB18, 70°, 4MHz, 8x9mm IA-FG10.6X35A, 0°, 10MHz, 6X35mm	2001	• UNIVIS SYSTEM WITH 16 CHANNEL CAPACITY • PIPE DIAMETER: 24" – 100" • WALL THICKNESS: 5,0mm – 25,0 mm • SCANNING SPEED: 20 m/min max. • PULSE REPETITION FREQUENCY: 20.000Hz • ELECTRONIC STORAGE AND EVALUATION OF RESULTS
PIPE BODY UT INSPECTION FOR LAMINAR DEFECTS (FBUT)	KRAUTKRAMER OPR (s.n. 771733)	6 PROBES SEG 5NC, 0°, 5MHz, 6mm x 25mm	2001	• UNIVIS SYSTEM WITH 16 CHANNEL CAPACITY • PIPE DIAMETER: 24" – 100" • WALL THICKNESS: 5,0mm – 25,0 mm • SCANNING SPEED: 20 m/min max. • PULSE REPETITION FREQUENCY: 20.000Hz • ELECTRONIC STORAGE AND EVALUATION OF RESULTS
PORTABLE UT EQUIPMENT	KRAUTKRAMER USN 52 / USM 35 / StressTel FlawMike Olympus OMNISCAN MX2	45° (MWB45) / 60° (MWB60) / 70° (MWB70) 4MHz, 8x9mm MSEB4, 0° 4MHz, 3,5x10mm Phased Array Probes: 5L16-A10 / SA10-N55S 5L64-A12 / SA12-N55S	2001 – 2008 2013	
PIPE END RADIOGRAPHY	P. SEIFERT - ERESO 42MF2 (2 UNITS) P. SEIFERT - ERESO 42MF3 (1 UNIT)		2001 2004	• VOLTAGE MAX : 200kV • CURRENT MAX : 0,5-10 mA (4,5mA $\sigma\alpha$ 200kV)
FLUOROSCOPY	P. SEIFERT - ISOVOLT XS 225M2		2001	• REAL TIME RADIOGRAPHY AND MAGNETIC MEAN STORAGE • POWER: 225kV, 7mA • IMAGE INTENSIFIER • VISTAPLUS IMAGE ANALYSIS SOFTWARE
COMPUTED RADIOGRAPHY SCANNING SYSTEM	GE CRxVision		2015	• BSR: (MR) 70 μm / 80 μm (HR) 35 μm / 40 μm • TFT MONITOR, 2MP, 1500:1 CONTRAST RATIO, 420 cd/qm • BRIGHTNESS, 21.3 inch

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graph TD
    Start([START]) --> CoilPrep[COIL PREPARATION]
    CoilPrep --> CoilFeeding[COIL FEEDING DGT1]
    CoilFeeding --> CrossWelding[CROSS WELDING]
    CrossWelding --> EdgeMilling[EDGE MILLING]
    EdgeMilling --> TackWelding[TACK WELDING]
    TackWelding --> Forming[FORMING]
    Forming --> PlasmaCutting[PLASMA CUTTING]
    PlasmaCutting --> PipeID[PIPE I.D. DGT2]
    PipeID --> VisualInspection1[VISUAL INSPECTION]
    VisualInspection1 --> Repair1{REPAIR?}
    Repair1 -- yes --> RepairWelding[REPAIR WELDING]
    Repair1 -- no --> ExistingCross{EXISTING CROSS?}
    ExistingCross -- yes --> IncludeCross{INCLUDE CROSS?}
    ExistingCross -- no --> PipeCleaning1[PIPE CLEANING]
    IncludeCross -- yes --> CutCross[OUT CROSS DGT4]
    IncludeCross -- no --> PipeCleaning1
    CutCross --> PipeCleaning1
    PipeCleaning1 --> TabRemoval[TAB REMOVAL]
    TabRemoval --> OfflineWelding[OFFLINE WELDING DGT 2.1,2.3]
    OfflineWelding --> TabWelding[TAB WELDING]
    TabWelding --> VisualInspection2[VISUAL INSPECTION DGT3]
    VisualInspection2 --> PipeCleaning2[PIPE CLEANING]
    PipeCleaning2 --> Sampling{SAMPLING?}
    Sampling -- yes --> SkelpWeld[SKELP WELD DGT5]
    Sampling -- no --> SkelpWeld2{SKELP WELD?}
    SkelpWeld2 -- yes --> SkelpWeld
    SkelpWeld2 -- no --> Pass1{PASS?}
    Pass1 -- yes --> Repair1a[REPAIR DGT6]
    Pass1 -- no --> EndsCut1[ENDS CUT DGT4]
    Repair1a --> EndsCut1
    EndsCut1 --> PipeEndsGrinding[PIPE ENDS GRINDING]
    PipeEndsGrinding --> Hydro1[HYDRO DGT8]
    Hydro1 --> Pass2{PASS?}
    Pass2 -- yes --> BodyUT{BODY UT?}
    Pass2 -- no --> Repair1b[REPAIR DGT6]
    BodyUT -- yes --> BodyUT1[BODY UT DGT9.1]
    BodyUT -- no --> Indications{INDICATIONS?}
    Indications --> ManualUT[MANUAL UT (pipe ends, evaluation of indications, repairs) DGT10]
    ManualUT --> Pass3{PASS?}
    Pass3 -- yes --> EndsXrays[ENDS X-RAYS DGT11]
    Pass3 -- no --> Repair2[REPAIR DGT6]
    EndsXrays --> ResultsXrays[RESULTS X-RAYS DGT13]
    ResultsXrays --> Pass4{PASS?}
    Pass4 -- yes --> Beveling[BEVELLING]
    Pass4 -- no --> EndsCut2[ENDS CUT DGT4]
    Beveling --> VisualInspection3[VISUAL INSPECTION DGT15]
    VisualInspection3 --> Pass5{PASS?}
    Pass5 -- yes --> FinalInspection[FINAL INSPECTION DGT16]
    Pass5 -- no --> Repair3[REPAIR PEAKING? DGT3]
    Repair3 -- yes --> RepairPeaking[REPAIR PEAKING DGT3]
    RepairPeaking --> Hydro2[HYDRO DGT8]
    Repair3 -- no --> Cut{CUT?}
    Cut -- yes --> EndsCut2
    Cut -- no --> Repair4[REPAIR DGT6]
    Repair4 --> Fluoroscopy[FLUROSCOPY DGT12]
    Fluoroscopy --> PipeEndsGrinding2[PIPE ENDS GRINDING]
    EndsCut2 --> PipeEndsGrinding2
    PipeEndsGrinding2 --> Hydro3[HYDRO DGT8]
    Hydro3 --> Storing[STORING]
    FinalInspection --> Tallying[TALLYING DGT17]
    Tallying --> Pass6{PASS?}
    Pass6 -- yes --> Marking[MARKING]
    Marking --> Storing2[STORING]
    Pass6 -- no --> Marking
    Marking --> CustomerInspection[CUSTOMER INSPECTION]
    CustomerInspection --> Storing3[STORING]
  
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Figure 2: Flow Chart

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mgr Michał Pietrek

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mgr Marek Mazurek



CORINTH PIPEWORKS S.A.
PIPE'S INDUSTRY AND REAL ESTATE

MANUFACTURING PROCEDURE SPECIFICATION – SAWH

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5.1 COIL PREPARATION AND FEEDING

Each coil is unwound and the front-end (tongue) is cut off. After that, the coil is ready to be fed on the forming machine.

5.2 CROSS WELDING

Objective of this procedure is the welding of the leading end of the new fed coil with the tail-end of the trailing coil which is already in the forming machine. Its purpose is the continuous feeding of the forming machine with raw material once the old coil has been consumed. The forming procedure is paused until the cross welding procedure is completed.

Before the welding procedure is begun, the ends of the two coils are width beveled in order to be created the necessary profile for the cross welding. The welding method used for the joint of the two ends is the Submerged Arc Welding method. The welding parameters are given by the Mill Director.

5.3 EDGE MILLING

Objective of this procedure is the *edge milling* of the coils edges in order to obtain the necessary profile (oxide-free cut) for welding. The edge milling process is also reducing the coil width to the exact size for forming. Using three pairs of milling heads of which two are straight cut and the last is corner cut. The coil is constantly fed in the pairs of milling heads where material is removed from each of its edges. The selection of parameters of this procedure as well as the appropriate heads is performed by the Mill Director.

5.4 EDGE BENDING-FORMING

Objective of this procedure is the edge bending of the coil before it proceeds to the forming phase. Its purpose is the avoidance of peaking deviation to the produced pipe's diameter.

The edge bending system is composed of a pair of wheels at each end of the coil. The wheels of each pair are internally and externally adjacent to the coil applying tension on the coil's vertical level, its edges are bended in a controlled manner. Depending on the strip width/diameter ratio, the proper spiral angle is determined within a range between 45° and 80°.

Pipe forming is performed in a forming cage where the coil is guided using the technique of three roller bending as shown in figure 3.

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mgr Michał Pietrek

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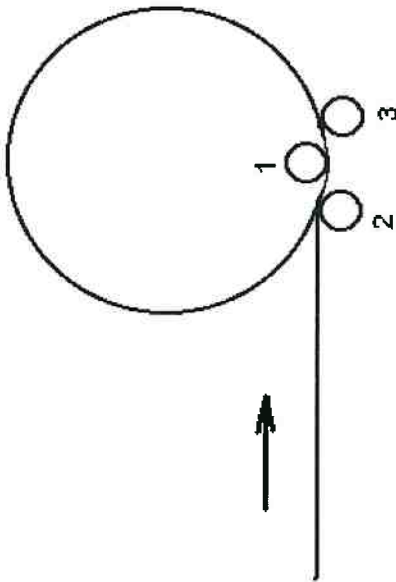


Figure 3

Marked with the numbers 1, 2 and 3 are the rollers which contain an important number of rolls are positioned as follows: No. 1 inside the pipe and No. 2 and 3 outside the pipe. The three rollers' axis' are positioned parallel to the pipe's axis. In addition to the previously mentioned rollers and for the full control of the pipe's geometry, inside the forming cage and around the pipe there are four rolls (No. 4, 5, 6 and 7) arranged as shown in figure 4.

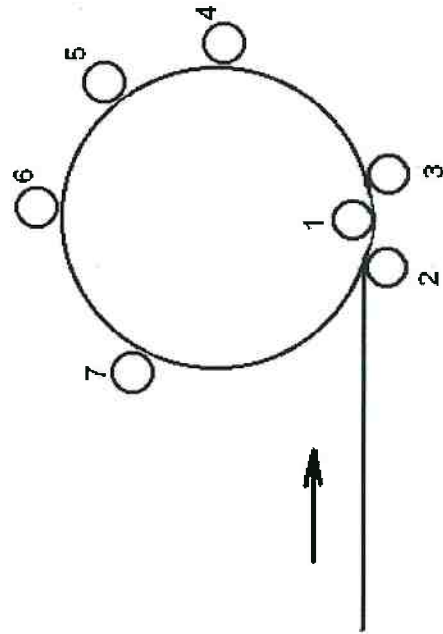


Figure 4

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COMMERCIAL DIRECTOR
mgr Michał Pietrek

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CEO

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The roller positionment in the area is made based on the following parameters:

L, A, a, B, b, C, Py, R1x, R1y, R2x, R2y, R3x, R3y, R4x, R4y, R5y, R6x, R6y, E, which are determined by calculation and their correspondence is shown in figure 3.

In order to achieve correct pipe forming the strip in entered in the cage in such a manner that its axis forms a specific angle θ_0 (forming angle) with the pipe's axis and this is achieved by the proper positioning of the feeding section of the SAW machine which is before the cage. The angle θ_0 is calculated as follows:

Forming angle (θ_0) = $\arccos [SW / (D-t)]$

Where:

SW: strip width after edge cross section [mm]

D: pipe outer diameter [mm]

t: strip width [mm]

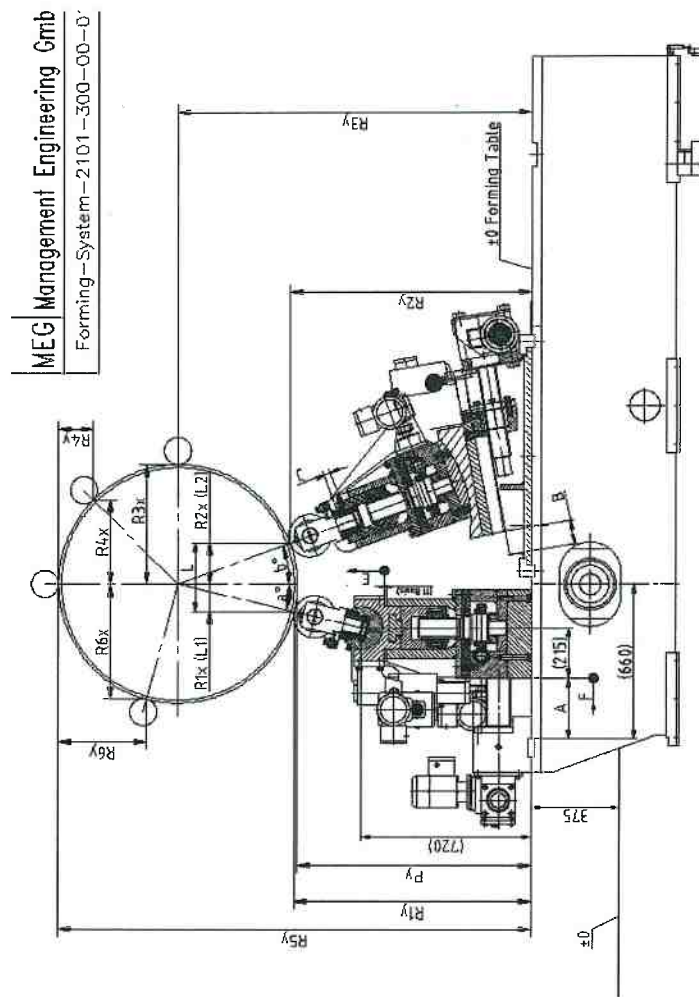


Figure 5



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5.5 TACK WELDING

Objective of this procedure is the temporary welding of the coil's edges right after forming, in order to create the necessary geometry of the produced pipe. The welding is performed only internally based on the parameters given by the Mill Director. The method used is that of Gas Metal Arc Welding (GMAW) where the electrode is fed through a protective layer of carbon dioxide (CO₂) which isolates the welding area from the atmosphere.

5.6. CUTTING-TO-LENGTH / PIPE IDENTIFICATION

Following tack-welding, the formed coil is cut to individual pipes of specified length by an automatic plasma cutting unit. The cutting unit is travelling parallel to the longitudinal axis of the pipe at the same speed while cuts the pipe to the desired length. Immediately after cutting, individual pipes are identified with a controlled manner by assigning to each of them a unique *pipe number*. This number is of the following format:

S X / Y - A / B / C

Where: S stands for SAWH Process Line.

X is the Process Sheet's Serial Number identifying the production of a specific diameter.

Y is the Process Sheet Sub-number.

A is the production serial number of the pipe. It indicates the number (sequence) of the pipe produced for a specific Process Sheet Number, starting from 1,2,3, etc.

B is the run coil(s) number. It indicates the number (sequence) of the coil from which the specific pipe has been produced linking the product with the supplier's Coil and Heat Nr. Run Coil Numbering starts from 1,2,3, etc and changes for each new coil.

C is the serial number of the pipe within the coil from which the specific pipe has been produced. This number starts from 1,2,3, etc and re-starts from 1 for the first pipe of each new Run Coil Number.

Note: A unique Process Sheet Sub-Number characterizes each production of pipes with the same diameter, wall thickness, and grade manufactured for a specific customer.

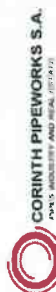
5.7 INSIDE CLEANING / END PREPARATION

The pipe ends are *tack welded*. The tack-welded pipes are subjected to internal cleaning in order to be free of debris such as scale and excess flux. Cleaning is performed by a rotating brush and an exhaust unit. Subsequently the pipe is subjected to visual inspection.

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COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

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5.8. SUBMERGED ARC WELDING

After pipe ends tab welding, pipes are forwarded to the off-line submerged arc welding stations. The full length of the already tack-welded seam is then subjected to submerged arc welding. Helical submerged welding takes place in two phases. The pipe is firstly welded internally (at 6 o' clock position) and secondly externally (at 12 o' clock), with the two welding points separated by a distance equal to half spiral length.

The spatial positioning of each welding head is controlled automatically during welding by the weld seam tracking system.

The welding begins and ends on the body of the already welded tabs, in order to be ensured the stabilization of the welding parameters prior to actual welding of the tack-welded seam.

Part of the flux solidifies and forms a crust that covers the weld, which is removed as soon as the metallic material of the weld has solidified. The rest of the flux is sucked and removed from the welding point in order to be recycled. The recycling procedure establishes a near constant ratio between new and recycled flux, preventing any deterioration of the flux mixture characteristics during welding. Oversize, sieving and ferromagnetic particles are continuously removed from the recycled flux with the use of a separator, both for the ID and OD welding flux handling systems.

After completion of the submerged arc welding, pipes are once more subjected to cleaning, visual inspection, welded tab removal and internal weld bead removal for 150mm from the end.

5.9 SAMPLING / LABORATORY TESTING

Test rings are cut from selected finished pipes according to the applicable test frequency. Rings are used for the preparation of specimens and samples that are forwarded to the laboratory for testing. In order to maintain traceability, all specimens and samples are identified throughout their preparation with the number of the pipe from which they were sectioned. Performed tests are:

1. Chemical analysis as per ISO 3183 Table M.1 ($Mn \leq 0.10\%$, $P_{cm} \leq 0.21\%$, $C \leq 0.10\%$, $S \leq 0.035\%$),
2. Mechanical testing (yield point, tensile strength, elongation, YP/TS)
3. Charpy impact testing ($T: -29^{\circ}C$, Pipe body, Weld, HAZ: min. avg. 55J / min. ind. 41J for items 10, 70 & min. avg. 40J / 30J min. ind. for items 20, 30, 40, 50, 80)
4. Metallographic examination
5. Hardness test
6. Guided bend test
7. DWTT ($T: -20^{\circ}C$, Min. avg. shear area: 85%)

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COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
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5.10 HYDROTESTING

Welded pipes are one by one subjected to hydro testing at pressure as per ISO 3183 for 10sec. The hydro tester is equipped with a recording chart that records for each pipe the exerted pressure and pressure holding time.

5.11 NON DESTRUCTIVE EXAMINATION (NDE)

Non Destructive Examination is performed after hydrotesting and comprises of:

- a) Ultrasonic inspection of laminar imperfections along the strip / coil edges, it is performed by using the same automatic ultrasonic system for weld seam and HAZ inspection acc. 10893-8:2011 acceptance level U2

The system shall inspect a 15mm wide zone along each side of the weld seam. At the indication of a defect or loss of coupling visual and acoustic signals are activated automatically as well as a spray gun that colour marks the suspect area. All the suspect (sprayed) areas shall be inspected manually with portable UT devices.

All the suspect (sprayed) areas shall be inspected manually with portable UT devices.

- b) Ultrasonic inspection of the full length of the weld zone and Heat Affected Zone for the detection of longitudinal and transverse defects. The ultrasonic system is equipped with:

- Weld tracking system for fully automatic guidance of the pipe under inspection,
- Automatic alarm system (audible, visual and spray marking) activated in cases where defects are detected and/or loss of coupling occurs, and
- Analogue display of received signals.

The portion of the weld zone that is not inspected by the automatic UT system shall be inspected by manual UT up to and including the radiographed area. The automatic system shall be calibrated on a calibration block that has diameter and wall thickness within the specification tolerances of the pipes to be inspected and the same acoustic properties. The artificial reflectors shall be separated in the calibration block by a sufficient distance, for separate and distinguishable indications to be produced while the ultrasonic system is moving at the normal test speed (dynamic condition).

- c) Ultrasonic inspection of the pipe body for laminations, is performed by a group of normal probes scanning over the pipe surface acc. ISO 10893-9:2011 acceptance level U2. The ultrasonic system is equipped with:

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 VICE PRESIDENT
 COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
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 CEO
mgr Marek Mazurek

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- Automatic alarm system (audible, visual and spray marking) activated in cases where defects/imperfections are detected and/or loss of coupling occurs, and
- Analogue display of received signals.

All the suspect (sprayed) areas shall be inspected manually with portable UT devices.

The calibration sensitivity of the portable units shall be based on the same artificial reflectors that are being used for the calibration of the automatic system.

- Ultrasonic inspection of laminar (25mm wide zone) acc. ISO 10893-8 is performed by using portable devices with normal probe for a minimum distance back from bevel, before bevelling.
- Radiographic examination of the weld seam at pipe ends and repairs with acceptance limits as per ISO 3183 § M.7.5.6.4.

5.12 END BEVELING

The ends of each pipe are beveled to the specified profile, using a beveling machine.

5.13 VISUAL-DIMENSIONAL INSPECTION

The pipes are subjected to visual (internal and external surface) and dimensional inspection.

- Pipe Surface Condition Inspection. Each pipe shall be visually inspected to detect surface defects with an illuminance according to the requirements of ISO 3183.
- Dimensional inspection of pipe.
 - Internal diameter of Pipe Body and Pipe Ends: The diameter is measured with an external circumferential tape (Pipe Body: $\pm 0,25\%$, Pipe Ends: $\pm 1,2\text{mm}$).
 - Out-Of-Roundness of Pipe Body: The OOR at pipe body is measured with a rod gauge (acc. ISO 3183 Table M.3).
 - Out-Of-Roundness of Pipe Ends: The OOR at pipe ends is measured with a caliper (max. 0,5%ID).
 - Wall thickness measurement: The wall thickness measurements are made on each pipe end with a properly calibrated ultrasonic inspection device of appropriate accuracy at 3 circumferential locations equally spaced (acc. ISO 3183 Table M.4)
 - Straightness: The straightness shall be measured with a tight string or a thin wire and a calibrated ruler.

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VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
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mgr Marek Mazurek

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- Geometric deviations at pipe ends (flat spots & peaks): Flat spots & peaks is measured using a template for end measurement 0.25D, maximum 200mm, perpendicular to the pipe axis
- Offset of Plate Edges: The offset is measured with calibrated weld gage (acc. ISO 3183 § M.6).
- Height of the Internal and the external weld bead: The weld bead height is measured with calibrated weld gage.
- Bevel of pipe ends: The angle of the bevel shall be measured with a calibrated protractor and the width of the root face of the bevel with a calibrated face gauge (30°, -0/+5° / 1,6mm ± 0,8mm).
- Out-of-squareness: The squareness shall be measured with a calibrated angle gage.
- Residual Magnetism of pipe: The Residual Magnetism measurement shall be done by a Hall-effect gaussmeter.

Laser end measuring may be utilized for dimensional inspection.

5.14 TREATMENT OF SURFACE IMPERFECTIONS AND DEFECTS

When required, any pipes found during NDE and/or visual inspection to need repair, are forwarded to the repair areas.

- Repair of surface defects by grinding. All dressable surface defects shall be dressed out by grinding. The grinding shall be carried out in such a way that the dressed area blends smoothly with the contour of the pipe. Complete removal of defects shall be verified by local visual inspection. To be acceptable, the wall thickness in the ground area shall be within the tolerances.
- Repair of weld defects by welding. Repairs on the weld area are performed only by qualified welders. The criteria stated in ISO 3183 with max. 3 repairs per 6m of pipe length.
- UT and X-ray inspection shall be carried out at the welded area

In case of a repaired area is out of tolerances then the section of the pipe containing the defect shall be cut off, or the entire pipe length shall be rejected.

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COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
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5.15 TALLYING

The length of each pipe is physically measured. The weight of each pipe is automatically measured. Both values are recorded in a computer database. At the end of production a *Tally Sheet* is printed that contains the following information for each individual pipe:

1. Pipe number,
2. Heat number,
3. Length ,and
4. Weight.

Additionally, total quantity (pieces, total length and weight) of production are given.

5.16 MARKING

All pipes which have successfully passed all inspections and controls are marked according to the requirements of the applicable specification. The pipes shall be paint-stencilled, after coating application, externally, at one pipe end, starting at 450mm from the end, with white contrast paint.

The marking shall include the following information:

CPW ISO 3183

711 WT GRADE E SAWH

PIPE NR: [.....], HEAT NR: [.....]

L: [.....] M

Item	WT	GRADE
10	11,0	L485ME PSL2
20	11,0	L415ME PSL2
30	12,5	L415ME PSL2
40	8,8	L415ME PSL2
50	8,0	L415ME PSL2
70	11,0	L485ME PSL2
80	8,0	L415ME PSL2

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VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
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Additionally, (a) low-stress die-stamping shall be applied at one pipe end (location: maximum 100mm from the pipe end and at least 25mm from pipe weld), (b) four (4) magnetic or adhesive barcode labels are set internally or externally in one pipe end and (c) the following ring-belts shall be applied on both pipe ends (width of belt~150mm, belt location ~1,0m from pipe ends).

Item	WT	GRADE	Ring Belt(s)
10	11,0	L485ME PSL2	One (1) blue ring-form belt on both pipe ends
20	11,0	L415ME PSL2	One (1) green ring-form belt on both pipe ends
30	12,5	L415ME PSL2	One (1) yellow ring-form belt on both pipe ends
40	8,8	L415ME PSL2	One (1) red ring-form belt on both pipe ends
50	8,0	L415ME PSL2	N/A
70	11,0	L485ME PSL2	N/A
80	8,0	L415ME PSL2	N/A

The final marking of the pipes to be coated should be performed after external and/or internal coating application.

5.17 RELEASE & FINAL DOCUMENTATION

5.17.1 PIPE RELEASE

Apart from Laboratory testing performed according to the applicable testing frequency, pipes have to go through a number of production/inspection stages in order to receive a final quality characterization.

All inspection results per each inspection stage are recorded "on line" as PASS or FAIL per Pipe Number and are available in real time. Any time during production, accordingly authorized personnel can identify the position of a specific pipe in the production line and see the results of the inspections that the pipe has gone through until that moment. Measured values for specific inspections (e.g. dimensional measurements) are recorded in the relevant reports issued per shift from the individual inspection station. Each report, for traceability reasons includes the following information:

- Process Sheet Number
- Date
- Reference number
- Shift issued
- Signature of operator

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VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

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The "on line" results of all inspections are combined in the electronic Quality Assurance System and each pipe receives the final quality characterization.

There are three possible final Quality characterizations for a pipe:

Accepted: Applied to pipes that fully conform to the applicable specification requirements, after completion of all inspections and laboratory testing. In order for a pipe to be finally characterized as "ACCEPTED", the electronic Quality Assurance System verifies that the test results from all previous DGT's are acceptable for this specific pipe.

Accepted pipes are internally marked with a white-coloured acceptance sign "QC OK". These pipes shall be marked with the marking of the specific Process Sheet and delivered to the customer.

Rejected: Applied to pipes that did not meet the requirements of the applicable specification. They are internally marked, in red color, with the rejection sign "REJECTED" and their bevel is painted red on both pipe ends. These pipes are stored in the yard in the specifically designated area for rejected pipes.

Excess: Applied to pipes that fully conform to the applicable specification requirements, but they are not included in the order as they are excessive in quantity or their length is shorter than required. These pipes are stored in the yard in the specifically designated area for excess pipes.

Based on the final quality characterization, each pipe is recorded in the relevant tally sheet (Accepted, Rejected, Excess) and sent to the specified storage area in the yard accordingly.

5.17.2 FINAL DOCUMENTATION

Based on the results of the inspections during production and the results of the Laboratory tests, the Quality Control Manager of SAWH mill issues the 3.1 certificate for the specific quantity of Accepted pipes referenced in the Accepted Pipes Tally Sheet. In case where pipe coating and lining are also applied, the quantity of Accepted pipes to be referenced in the 3.1 certificate is recorded in the Coating or Lining mill tally Sheet. The 3.1 certificate includes all the information required. The reference numbers of all mechanical tests and chemical analysis reports issued by the Quality Laboratory for this specific Process Sheet are mentioned in the 3.1 certificate and the relevant reports attached.

Figure 6 presents the interconnection between the basic documents of a Process Sheet showing the "traceability path" for tracing any length of pipe to the heat and coil from which it was produced and to all applicable chemical, mechanical and coating (when applicable) test results for a specific Process Sheet.

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

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	THISVI PLANT	

TITLE	MANUFACTURING PROCEDURE SPECIFICATION – PE COATING								
DOCUMENT No.	MPS_03_19_PE								
REVISION No.	0								
PRODUCTION LINE	TCP 40 / TCP 100								
CUSTOMER	AMBER GRID								
PROJECT	INTERCONNECTION POLAND-LITHUANIA								
SIZE/GRADE/ QUANTITY	Item	Option	Process (bare)	OD (inch)	WT (mm)	Grade	Qty (m)	Coating	Lining
	10		SAWH	28	11	L485ME	17.290	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE
	20		SAWH	28	11	L415ME	13.570	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE
	30		SAWH	28	12,5	L415ME	3.000	FBE: min 125µm ADH: min 150µm PE layer: 4725µm	BARE
	40		SAWH	28	8,8	L415ME	9.130	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE
	50		SAWH	28	8	L415ME	124.300	FBE: min 125µm ADH: min 150µm PE layer: 3725µm	BARE
	60		HFW	20	8	L415ME	323	FBE: min 125µm ADH: min 150µm PE layer: 3225µm	BARE
Quantity tolerance: TBD									
	ISSUED		APPROVED		CUSTOMER APPROVED				
DATE	08/01/2019		08/01/2019						
NAME	N. DADIOLOS		E. DOURDOUNIS						
	ENGINEERING AND TECHNOLOGY ENGINEER		TECHNICAL PROJECTS MANAGER						
SIGNATURE									

Postolop Papavasiliou
CEO

IZOSTAL S.A.
 VICE PRESIDENT
 COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
 CHAIRMAN OF THE BOARD
 CEO

mgr Marek Mazurek

Ioannis Stavropoulos

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1. SCOPE

The present *Manufacturing Procedure Specification (MPS)* describes the basic manufacturing steps as well as quality control activities which are involved with the production and inspection of steel pipes PE Coating for the Amber Grid "Interconnection Poland-Lithuania" Project, in accordance to ISO 21809-1 and Project Specification "2015-80-00-KRDD-D.PP-TS.2-1".

2. COATING MATERIALS / RECEIVING INSPECTION

All materials to be used are selected from acknowledged and approved by Corinth Pipeworks suppliers and are compatible with each other for the formation of the three-layer system. Materials to be used shall be according to the specific project requirements.

The technical data sheets of the proposed materials for each component of the 3-layer PE system shall be submitted to the customer for review and approval.

Upon **delivery, storage** and handling of coating materials shall be as per **manufacturer's recommendations**. The personnel responsible for receiving inspection shall check the following:

- The packing is in good condition.
- The material bears a label with the code name of the **material, supplier's name, batch number** and other data, which help identify the material.
- During the summer months the epoxy powder must arrive in the plant in air conditioned containers. Upon delivery the epoxy powder is **immediately** stored in the **company's** air conditioned storage room.

Samples from the delivered materials shall be taken by Quality Control personnel to perform the relevant receiving inspection tests.

Coating materials to be delivered to CPW are accompanied by the relevant batch certificates issued by the coating materials manufacturer. The Quality Control Manager of the Coating mill reviews the material batch certificates and considering the results of the receiving inspection, verifies that the material properties are in accordance with the project requirements.

In case where during receiving inspection one of the above requirements is not met, the materials with the identified **problem** shall be marked and unloaded at a designated area. The Coating Quality Control manager shall be notified accordingly to assess whether a Non-Conformance should be issued.

3. PRELIMINARY INSPECTION

Pipes are fed onto the skids at the entry section of the external shot **blaster**, where the following preliminary pipe **inspections** and actions take place:

- Pipe number preservation.
- Sealing of pipe ends with suitable protective plugs to avoid internal deterioration of pipes during blasting and protect the bevel.
- Pipe surface visual inspection for dents, laps, defective bevels and any other defects. Defective pipe shall be marked for future identification and damage report shall be sent for client notification.
- The pipe surface is visually checked for contamination with oil or grease. Inspection for salt contamination of pipe surface is also performed. If contaminated pipes are detected they are sent for cleaning. The contaminated pipes are cleaned using potable water and sent for re-inspection.
- Ambient conditions (air temperature, relative humidity) and the steel surface temperature are measured and compared with the Dew Point. Pipe temperature shall be 3°C higher than Dew Point. The relative humidity shall be less than 85%. In case that moisture is present on the pipe surface or the pipe temperature is too low, burners are used for moisture removal and pre-heating of the pipe before blasting.

IZOSTAL S.A.
 VICE PRESIDENT
 COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
 CHAIRMAN OF THE BOARD
 CEO
mgr Marek Mazurek

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4. SURFACE PREPARATION / INSPECTION

The exterior pipe surface is subjected to abrasive cleaning by using dry blasting techniques. Abrasive material to be used is a suitable mixture of shot and grit. The maximum conductivity of abrasives shall be 60mS/cm.

The following inspections are taking place after blasting:

- The surface roughness is checked using the Stylus or Replica Tape method and should be 50-100µm.
- Before coating, the pipe surface is cleaned from dust, residues of abrasive process and foreign matter using clean dry compressed air free of oil. The blasted surface is checked according to ISO 8502-3 for dust contamination with a maximum Class 2. If contamination or dust is observed, the pipe shall be reprocessed.
- The cleanliness of the surface of each pipe shall be a minimum of Sa 2 ½ according to ISO 8501-1:2007.
- The salt contamination level is checked using ELCOMETER SCM400 and shall be less than 20mg/m².
- Systematic visual inspection of the clean surface is also performed. Slight surface imperfections (e.g. slivers, laminations, scratches etc), can be removed by superficial grinding provided that the final surface has a smooth contour and the remaining wall thickness is within the acceptable tolerances. Anchor pattern, specified above, shall be restored on grinding areas greater than 10 cm² per metre of pipe or 0.5% of the pipe surface, whichever is lower.

Blast cleaned pipes shall be coated within 4hours.

5. INDUCTION HEATING

Each pipe is subjected to *Induction Heating* at the temperature range recommended by the powder supplier (maximum pipe temperature 275°C). Uniform heating of the pipe is performed with the use of medium frequency, high power induction coil(s). Temperature is continuously monitored by optical pyrometer and recorded 4 times per shift. Additionally, temperature is checked with Tempilsticks.

6. 3LPE COATING APPLICATION

Immediately after heating, each pipe passes through the spraying booth where the fluidized epoxy powder (1st layer) is applied onto the heated pipe surface with the use of electrostatic spray guns. The number, position and deposition rate of nozzles, as well as travel speed are properly set to give the desired dry film and gel time.

Immediately after application of the FBE layer, pipes are wrapped through side extruders with the adhesive material (2nd layer) and the polyethylene coating (3rd layer). Adhesive material shall be applied within the FBE suppliers' recommended time and temperature. The extrusion temperatures of the adhesive and the PE material are continuously recorded.

The extrusion temperature for the adhesive and for the PE is set based on coating materials data sheets and communication with our suppliers.

The degree of overlap of the two layers is controlled in such a manner in order to provide final thickness of 4,0mm minimum for Items 10, 20, 40, 50, 5mm minimum for Item 30 and 3.5mm minimum for Item 60.

After coating application, pipes are controlled cooled by water spray down to temperature suitable for handling.

Full traceability of the batch numbers of the materials used is maintained as the batch number of each material fed for consumption is recorded together with the time of feeding on the "*Materials Consumption Sheet*" issued every shift.

7. INSPECTION AND TESTING

Coating Pre Production Qualification Testing (PQT) shall be performed during the first day of production Testing in accordance to ISO 21809-1 Annex L and shall include a coating resistivity report.

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mgr Michał Pietrek

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mgr Marek Mazurek

000251

 CORINTH PIPEWORKS S.A. PIPES INDUSTRY AND REAL ESTATE	MANUFACTURING PROCEDURE SPECIFICATION PE COATING	DOC NO	MPS_03_19_PE
		REVISION	0
		PAGE	4/6

7.1 Holiday Detection

Each coated pipe is subjected to an automatic *Holiday test* for the detection of any discontinuities or pores on the coated surface. The test voltage (maximum 25kV) is applied through a wire brush ring at an inspection speed of about 0,3m/sec. Voltage is checked at each start-up using an accurate high-voltage meter. The system covers the entire coated body of pipes and is equipped with an audible and visual alarm. Areas where defects detected are automatically marked (true position marking) with paint. The suspected areas are then evaluated by portable Holiday and repaired. In case were the defect size or the number of defects detected does not allow for repairs according to the applicable specification, the pipe is sent for rework. Once per day the operator calibrates the detector by means of a calibration block.

7.2 Thickness measurement

After the coating application, the coating thickness of every pipe is measured and recorded every ten (10) pipes.

Thickness measurements are performed with the *Electrophysik Minitest 4100* device based on the magnetic induction principle. At the beginning of every shift the thickness measurement device is calibrated using standard plastic shims of the same thickness as the nominal coating thickness.

7.3 Visual inspection of coated pipes

Each coated pipe is visually inspected for the detection of any surface defects such as irregularities, scratches, pinholes, blisters etc. Coating shall be uniform color and gloss without any surface defects or damages.

7.4 Tests on coated pipe

The following tests are performed within the coating mill or at the in-house laboratory:

- Peeling Resistance Test (CPW coating mill)
Acceptance Criteria: 150N/cm min (23°C) both pipe ends, 30N/cm min (80°C) one pipe end
- Impact Resistance Test (CPW coating mill)
Acceptance Criteria: >7J/mm, No holidays
- Indentation Test (CPW laboratory)
Acceptance Criteria: 0,2mm max @23°C, 0,4mm max@80°C),
- Elongation Test (CPW laboratory)
Acceptance Criteria: 400% min
- Degree Of Cure of Epoxy (CPW laboratory)
Acceptance Criteria: $\Delta T_g \leq 5^\circ\text{C}$
- Cathodic Disbondment (CPW laboratory)
Acceptance Criteria: 24h, $65 \pm 3^\circ\text{C}$, -3,5V, max radius 7mm
- In process degradation of PE
Acceptance Criteria: Max ΔMFR between raw and extruded PE 20%
- Hot water immersion Test (CPW laboratory)
Acceptance Criteria: Average $\leq 2\text{mm}$, Maximum $\leq 3\text{mm}$
- Flexibility Test (CPW laboratory)
Acceptance Criteria: No cracking at $2,0^\circ$ per pipe diameter length

The exact number, type and frequency of tests shall be in accordance to Table 9 of ISO 21809-1.

In addition a resistivity test report shall be included, with acceptance criteria: minimum $10^8 \Omega \text{ m}^2$.

8. ENDS PREPARATION (CUT BACK)

Coating material is removed from both pipe ends with the use of masking tapes, allowing for a cutback area with a smooth finish to the metallic surface (feathering). The cut back shall be minimum 150mm, the chamfer, measured in direction of pipe axis, max 30° and the FBE toe $15\text{mm} \pm 5\text{mm}$. The cut back shall be measured

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 COMMERCIAL DIRECTOR
mgr Michał Pietrek

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from the root face of the pipe to the beginning of the coating bevel.

9. REPAIRS / REWORKS

Pipes with unsatisfactory coating or excessive coating damages are sent for rework (stripping and re-coating), and pipes with minor defects are subjected to repair.

Repair material to be used is compatible with the original coating and it is applied according to **supplier's** recommendations and procedures.

Repairs will be performed using melt-sticks or patches according to the size of the area to be repaired. Repaired areas are subjected to a thickness examination/measurement and to a holiday test at the same voltage as for the production

The area of a single repair shall not be greater than 10cm², and the number of repairs on a single pipe shall not be greater than 3.

Each repair is recorded on the relevant report issued every shift by the quality control inspector.

10. MARKING

All pipes which have successfully passed all inspections and controls are marked according to the requirements of the applicable specification. The pipes shall be paint-stencilled, after coating application, externally, at one pipe end, starting at 450mm from the end, with white contrast paint.

The marking shall include the following information:

CPW ISO 3183

OD WT GRADE Pipe Mill

PIPE NR: [...], HEAT NR: [...]

L: [...] M

Item	Pipe Mill	OD	WT	GRADE
10	SAWH	28	11,0	L485ME PSL2
20	SAWH	28	11,0	L415ME PSL2
30	SAWH	28	12,5	L415ME PSL2
40	SAWH	28	8,8	L415ME PSL2
50	SAWH	28	8,0	L415ME PSL2
60	HFW	20	8,0	L415ME PSL2 E

Additionally, (a) low-stress die-stamping shall be applied at one pipe end (location: maximum 100mm from the pipe end and at least 25mm from pipe weld), (b) four (4) magnetic or adhesive barcode labels are set internally or externally in one pipe end and (c) the following ring-belts shall be applied on both pipe ends (width of belt~150mm, belt location ~1,0m from pipe ends).

Item	Ring Belt(s)
10	One (1) blue ring-form belt on both pipe ends
20	One (1) green ring-form belt on both pipe ends
30	One (1) yellow ring-form belt on both pipe ends
40	One (1) red ring-form belt on both pipe ends
50	N/A
60	N/A

 CORINTH PIPEWORKS S.A. PIPER INDUSTRY AND REAL ESTATE	MANUFACTURING PROCEDURE SPECIFICATION PE COATING	DOC NO	MPS_03_19_PE
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11. HANDLING / STORING

At the exit of the mill, pipes are lifted by forklifts or cranes using specially padded hooks not to damage the bevel face. The pipes are loaded on tracks and transported to the storage area. Metallic bevel protectors or plastic end caps shall be used for the protection of pipe ends at the final products.

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 VICE PRESIDENT
 COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
 CHAIRMAN OF THE BOARD
 CEO
mgr Marek Mazurek

000254

Customer / Contract No:

Plant: V.L.P.E. Thessaloniki - 320 10 Domvrena, Viotia
Tel: (+30) 22640 22777, 22388 Fax: (+30) 22640 22210

Pipe Spec. and description : SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018,
EN ISO 3183:2012 in grade L415ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

Dimension / Grade: 8 OD X WALL THICKNESS L415ME PSL2 COATING / LINING BARE/BARE

Quantity : PIECES: METERS: * WEIGHT IN M.TONS: *

Test results are indicated in the attached documents:

Impact report No:

Tensile, Guided bend and hardness test report No:

Chem. report No:

DWT report No:

- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.

- Guided bend test (root/face) with acceptable results.

- Macrographic and Metallographic test carried out according to specification with acceptable results.

- Residual Magnetism less than xxx Gauss.

- Alignment of internal and external weld seam was verified by macrographic testing.

- Visual / dimensional inspection carried out according to specification with acceptable results.

Ultrasonic test

- 100% of pipes on weld seam for longitudinal and transverse imperfections

- 100% on suspect areas identified during automatic UT inspection of the weld seam

- 100% of pipes on pipe body

X-Ray Inspection (IQI Wire No.:13)

- 100% of pipe end welds

- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

REMARKS

THIRD PARTY INSPECTOR

NAME:

DATE:

SIGNATURE:

CUSTOMER'S INSPECTOR

NAME:

DATE:

SIGNATURE:

CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

SIGNATURE:

* To be defined upon released lots of pipes

000255


Apostolos Papavasiliou
CEO

IZOTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOTAL S.A.
CHAIRMAN OF THE BOARD
mgr Marek Mazurek


Ioannis Zavaropoulos

Customer / Contract No:

Pipe Spec. and description SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D-PP-TS.1-1-Rev.A-10/07/2018,
EN ISO 3183:2012 in grade L485ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

ITEM 7 OD X WALL THICKNESS GRADE COATING / LINING

L485ME PSL2 BARE/BARE

Dimension / Grade: 7 711,2 mm X 11 mm

WEIGHT IN M.TONS: *

METERS: *

PIECES:

Test results are indicated in the attached documents:

Impact report No:
Tensile, Guided bend and hardness test report No:
Chem. report No:

DWT report No:

- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (root/face) with acceptable results.
- Macrographic and Metallographic test carried out according to specification with acceptable results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam was verified by macrographic testing.
- Visual / dimensional inspection carried out according to specification with acceptable results.

- Ultrasonic test**
- 100% of pipes on weld seam for longitudinal and transverse imperfections
- 100% on suspect areas identified during automatic UT inspection of the weld seam
- 100% of pipes on pipe body

- X-Ray Inspection (IQI Wire No.:13)**
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

REMARKS

THIRD PARTY INSPECTOR

NAME:

DATE:

SIGNATURE:

CUSTOMER'S INSPECTOR

NAME:

DATE:

SIGNATURE:

CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

SIGNATURE:

* To be defined upon released lots of pipes

000256

IZOTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOTAL S.A.
CHAIRMAN OF THE BOARD
mgr Marek Mazurek

IZOTAL S.A.
mgr

Customer / Contract No:

Plant: Vt, Pe, Thisvia - 320 10 Domvrena, Viotia
Tel. (+30-22640) 22777, 22388 Fax: (+30-22640) 22210

Pipe Spec. and description : LONGITUDINALLY HIGH FREQUENCY WELDED STEEL PIPES
ERW/HFI, According to 2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018,
2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018, EN ISO 3183:2012 in grade L415ME PSL2

Dimension / Grade: 6 **OD X WALL THICKNESS** 508 mm x 8 mm **GRADE** L415ME PSL2 **COATING / LINING** PE/BARE
Quantity : **PIECES:** **METERS : *** **WEIGHT IN M.TONS : ***

Certificate No:

Date:

Page :

Process Sheet No/subNo:

Test results are indicated in the attached documents:

Impact report No: Tensile, Guided bend and hardness test report No: Chem. report No: DWT report No:		REMARKS All the pipes have successfully passed the following tests	
- All pipes passed a hydrostatic test at xxx bar for xxx sec minimum. - Flattening test carried out according to specification with acceptable results. - All pipes have undergone a weld seam normalizing heat treatment. - Residual Magnetism less than xxx Gauss (average). - Visual / dimensional inspection according to specification with acceptable results. Pipe tolerances for diameter and out of roundness according specification with acceptable results. - Macro / micro examination according to specification with acceptable results.	Non Destructive Inspection - Ultrasonic inspection of weld seam area for longitudinal imperfections (calibration standard 2XN10 notches). - 100% of pipes on pipe body	We hereby certify that the material described herein has been manufactured and inspected in accordance with the applicable standard and the customer's requirements.	Internal Epoxy Coating Pipe inspection before blasting. Surface inspection after blasting (xxxxxxxxxxxxx). Control of Roughness (Min xxx mils, using surface profilometer). Uncoated pipe ends (xxx in). Visual inspection of coating. Holiday examination at xxxx kV min. Coating thickness xxxx mils min. Impact strength Indentation Peel strength Degree of cure of the epoxy Cathodic disbondment
THIRD PARTY INSPECTOR NAME: DATE: SIGNATURE:	CUSTOMER'S INSPECTOR NAME: DATE: SIGNATURE:	CLIENT / CLIENT'S REPRESENTATIVE NAME: DATE: SIGNATURE:	SIGNATURE:

* To be returned upon released lots of pipes

00257

Apollonios Papavasiliou
CEO

IZOTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Majurek

Ioannis Savopoulos

Customer / Contract No:

Plant: Vi.Pe. Thisvis - 320 10 Domvrena, Viotia
Tel (+30-22640) 22777, 22388 Fax: (+30-22640) 22210

Pipe Spec. and description SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D-PP-TS.1-1-Rev.A-10/07/2018, 2015-08-00-KRDD-D-PP-TS.1-1-
Rev.A-10/07/2018, EN ISO 3183:2012 in grade L415ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

ITEM 5 OD X WALL THICKNESS 711,2 mm X 8 mm GRADE L415ME PSL2 COATING / LINING 3LPE/BARE

Quantity: PIECES: METERS: * WEIGHT IN M.TONS: *

Test results are indicated in the attached documents:

Impact report No:
Tensile, Guided bend and hardness test report No:
Chem. report No:
DWT report No:

- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (roof/face) with acceptable results.
- Macrographic and Metallographic test carried out according to specification with acceptable results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam was verified by macrographic testing.
- Visual / dimensional inspection carried out according to specification with acceptable results.

Ultrasonic test
- 100% of pipes on weld seam for longitudinal and transverse imperfections
- 100% on suspect areas identified during automatic UT inspection of the weld seam
- 100% of pipes on pipe body

X-Ray Inspection (IQI Wire No.:13)
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

All the pipes have successfully passed the following tests

Internal Epoxy Coating

External 3LPE Coating

Pipe inspection before blasting.
Surface inspection after blasting (xxxxxxxxxxxxxx).
Control of Roughness (Min xxx mils, using surface profilometer).
Uncoated pipe ends (xxx in).
Visual inspection of coating.
Holiday examination at xxxx kV min.
Coating thickness xxxx mils min.
Impact strength
Indentation
Peel strength
Degree of cure of the epoxy
Cathodic disbondment

THIRD PARTY INSPECTOR CUSTOMER'S INSPECTOR CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

* To be defined upon released lots of pipes

000258

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
mgr Marek Mazurek

Ioannis Stamatopoulos

Customer / Contract No:

 Pipe Spec. and description: SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
 2015-08-00-KRDD-D-PP-TS.1-1-Rev.A-10/07/2018, 2015-08-00-KRDD-D-PP-TS.1-1-
 Rev.A-10/07/2018, EN ISO 3183:2012 in grade L415ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

WEIGHT IN M.TONS: *

METERS: *

Quantity: PIECES:

Test results are indicated in the attached documents:

Impact report No:

Tensile, Guided bend and hardness test report No:

Chem. report No:

DWT report No:

- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (root/face) with acceptable results.
- Macrographic and Metallographic test carried out according to specification with acceptable results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam was verified by macrographic testing.
- Visual / dimensional inspection carried out according to specification with acceptable results.

- Ultrasonic test**
- 100% of pipes on weld seam for longitudinal and transverse imperfections
- 100% on suspect areas identified during automatic UT inspection of the weld seam
- 100% of pipes on pipe body

- X-Ray Inspection (IQI Wire No.:13)**
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

REMARKS

All the pipes have successfully passed the following tests

Internal Epoxy Coating

External 3LPE Coating

- Pipe inspection before blasting.
- Surface inspection after blasting (xxxxxxxxxxxx).
- Control of Roughness (Min xxx mils, using surface profilometer).
- Uncoated pipe ends (xxx in).
- Visual inspection of coating.
- Holiday examination at xxxx kV min.
- Coating thickness xxxx mils min.
- Impact strength
- Indentation
- Peel strength
- Degree of cure of the epoxy
- Cathodic disbondment

THIRD PARTY INSPECTOR CUSTOMER'S INSPECTOR CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

* To be defined upon released lots of pipes

000259

 Apostolos Karamanlidou
 CEO

 IZOTAL S.A.
 (VICE) PRESIDENT
 COMMERCIAL DIRECTOR
 mgr Michal Pietrek

 IZOTAL S.A.
 CHAIRMAN OF THE BOARD
 CEO
 mgr Marek Mazurek

Ioannis Stylianopoulos

Customer / Contract No:

Plant: VtPe, Thisvis - 320 10 Domvrena, Viotia
Tel: (+30 -22640) 22777, 22388 Fax: (+30-22640) 22210

Pipe Spec. and description SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018, 2015-08-00-KRDD-D.PP-TS.1-1-
Rev.A-10/07/2018, EN ISO 3183:2012 in grade L415ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

ITEM 3 OD X WALL THICKNESS 711,2 mm X 12,5 mm GRADE L415ME PSL2 COATING / LINING 3LPE/BARE

Quantity : PIECES: METERS: * WEIGHT IN M.TONS: *

Test results are indicated in the attached documents:

Impact report No:
Tensile, Guided bend and hardness test report No:
Chem. report No:

DWT report No:

- All pipes passed a hydrostatic test at minimum
xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (root/face) with acceptable
results.
- Macrographic and Metallographic test carried
out according to specification with acceptable
results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam
was verified by macrographic testing.
- Visual / dimensional inspection carried out ac-
cording to specification with acceptable results.

Ultrasonic test
- 100% of pipes on weld seam for
longitudinal and transverse
imperfections
- 100% on suspect areas identified
during automatic UT inspection of the
weld seam
- 100% of pipes on pipe body

X-Ray Inspection (IQI Wire No.:13)
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material
described herein has been made
in accordance with the applicable
standard and the customer's
requirements

REMARKS

All the pipes have successfully passed the following tests

Internal Epoxy Coating

External 3LPE Coating

Pipe inspection before blasting.
Surface inspection after blasting (xxxxxxxxxxxx).
Control of Roughness (Min xxx mils, using surface profilometer).
Uncoated pipe ends (xxx in).
Visual inspection of coating.
Holiday examination at xxxx kV min.
Coating thickness xxxx mils min.
Impact strength
Indentation
Peel strength
Degree of cure of the epoxy
Cathodic disbondment

THIRD PARTY INSPECTOR

CUSTOMER'S INSPECTOR

CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

NAME:

DATE:

SIGNATURE:

* To be defined upon released lots of pipes

000200

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VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

IZOSTAL S.A.
mgr Marek Mazurek

Customer / Contract No:

Plant: Vt/Pe, Thivris - 320 10 Domvrena, Viola
Tel: (+30-22640) 22777, 22388 Fax: (+30-22640) 22210

Pipe Spec. and description SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018, 2015-08-00-KRDD-D.PP-TS.1-1-
Rev.A-10/07/2018, EN ISO 3183:2012 in grade L415ME PSL2

Dimension / Grade: 2 **ITEM** **OD X WALL THICKNESS** **GRADE** **COATING / LINING**
711,2 mm X 11 mm L415ME PSL2 3LPE/BARE

Quantity : **PIECES:** **METERS :** * **WEIGHT IN M.TONS.:** *

Certificate No:
Date:
Page :
Process Sheet No/subNo:

Test results are indicated in the attached documents:

Impact report No:
Tensile, Guided bend and hardness test report No:
Chem. report No:
DWT report No:
- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (root/face) with acceptable results.
- Macrographic and Metallographic test carried out according to specification with acceptable results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam was verified by macrographic testing.
- Visual / dimensional inspection carried out according to specification with acceptable results.

Ultrasonic test
- 100% of pipes on weld seam for longitudinal and transverse imperfections
- 100% on suspect areas identified during automatic UT inspection of the weld seam
- 100% of pipes on pipe body

X-Ray Inspection (IQI Wire No.:13)
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

REMARKS

All the pipes have successfully passed the following tests

Internal Epoxy Coating

External 3LPE Coating

Pipe inspection before blasting.
Surface inspection after blasting (xxxxxxxxxxxxx).
Control of Roughness (Min xxx mils, using surface profilometer).
Uncoated pipe ends (xxx in).
Visual inspection of coating.
Holiday examination at xxxx kV min.
Coating thickness xxxx mils min.
Impact strength
Indentation
Peel strength
Degree of cure of the epoxy
Cathodic disbondment

THIRD PARTY INSPECTOR

NAME:
DATE:
SIGNATURE:

CUSTOMER'S INSPECTOR

NAME:
DATE:
SIGNATURE:

CLIENT / CLIENT'S REPRESENTATIVE

NAME:
DATE:
SIGNATURE:

SIGNATURE:

* To be defined upon released lots of pipes

000261

APOSTOLOS PAPAVASILIOU
CEO

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

IOANNIS STAMBOPOULOS

Customer / Contract No:

Plant: V.I.Pe. Thisvris - 320 10 Dornvrena, Viotia
Tel: (+30) 22640 22777, 22388 Fax: (+30) 22640 22210

Pipe Spec. and description: SPIRAL SUBMERGED ARC WELDED HSAW STEEL PIPES ACCORDING TO
2015-08-00-KRDD-D.PP-TS.1-1-Rev.A-10/07/2018, 2015-08-00-KRDD-D.PP-TS.1-1-
Rev.A-10/07/2018, EN ISO 3183:2012 in grade L485ME PSL2

Certificate No:

Date:

Page:

Process Sheet No/subNo:

COATING / LINING

3LPE/BARE

GRADE

L485ME PSL2

OD X WALL THICKNESS

711,2 mm X 11 mm

ITEM

1

WEIGHT IN M.TONS: *

METERS: *

PIECES:

Test results are indicated in the attached documents:

Impact report No:
Tensile, Guided bend and hardness test report No:
Chem. report No:
DWT report No:

- All pipes passed a hydrostatic test at minimum xxxbar (xxx% SMYS) for xxxsec minimum.
- Guided bend test (root/face) with acceptable results.
- Macrographic and Metallographic test carried out according to specification with acceptable results.
- Residual Magnetism less than xxx Gauss.
- Alignment of internal and external weld seam was verified by macrographic testing.
- Visual / dimensional inspection carried out according to specification with acceptable results.

- Ultrasonic test**
- 100% of pipes on weld seam for longitudinal and transverse imperfections
- 100% on suspect areas identified during automatic UT inspection of the weld seam
- 100% of pipes on pipe body

- X-Ray Inspection (IQI Wire No.:13)**
- 100% of pipe end welds
- 100% on weld seam repairs

We hereby certify that the material described herein has been made in accordance with the applicable standard and the customer's requirements

All the pipes have successfully passed the following tests

Internal Epoxy Coating

External 3LPE Coating

- Pipe inspection before blasting.
- Surface inspection after blasting (xxxxxxxxxxxx).
- Control of Roughness (Min xxx mils, using surface profilometer).
- Uncoated pipe ends (xxx in).
- Visual inspection of coating.
- Holiday examination at xxxx kV min.
- Coating thickness xxxx mils min.
- Impact strength
- Indentation
- Peel strength
- Degree of cure of the epoxy
- Cathodic disbondment

NAME:

DATE:

SIGNATURE:

THIRD PARTY INSPECTOR

NAME:

DATE:

SIGNATURE:

CUSTOMER'S INSPECTOR

NAME:

DATE:

SIGNATURE:

CLIENT / CLIENT'S REPRESENTATIVE

NAME:

DATE:

SIGNATURE:

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* To be defined upon released bts of pipes


Spyros Kapanavasilou
CEO

IZOTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michal Pietrek

IZOTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek


George Stamopoulos

Application Procedure Specification

APS FOR 3LPE COATING ACC TO EN ISO 21809-1:2011 STANDARD
=WDŚ=

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VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
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CEO
mgr Marek Mazurek

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IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO

000264 mgr Michal Pietrek

mgr Marek Mazurek

1. INCOMING INSPECTION OF PIPES AND PIPE TRACKING.

During incoming bare pipe acceptance, each pipe is checked for surface condition (diameter, wall thickness, shape and identification marking). Surface corrosion shall be qualified and must match with class A or B acc. to ISO 8501-1. If all the properties fulfil purchase requirements, a pipe acceptance list is prepared where according to mill marking on pipe ends and mill's certificates, pipe **number**, length and heat number are introduced. Each pipe gets a corresponding and unique Applicator's pipe number. The **number** is applied over the inner surface of the pipe. All the data is being introduced to a computer ERP class database system (IFS), and then pipes are transferred to coating application process. This provides pipe ID tracking on every stage of coating application, handling and storage. Eventually, the list is converted to a production pipe record and given out to the coating plant prior to the process start.

2. CERTIFICATION, RECEIPT, HANDLING AND STORAGE OF MATERIALS FOR COATING AND ABRASIVE BLASTING.

For every raw and base material delivery the supplier provides a Batch Certificate. The document confirms all the properties of the material required according to the standard.

Each material is handled and stored in compliance with material's data sheets.

Abrasive, epoxy powders and **adhesive** are stored in closed storage or silo systems. It is allowed to keep PE material in open area, in unopened and undamaged packages, with an additional protecting canvas over it.

At the moment of collecting each raw material is kept physically separated from approved materials until **compliance** with specified requirements has been confirmed. Any material checked and found non-conforming shall be respectively marked and quarantined. By the moment of use all raw materials shall be contained in their **original** packing and shall be adequately marked, including:

- manufacturer's name
- material type
- batch/lot number
- weight (for materials in drums, bags or similar)
- date of manufacturing (and shelf life, if applicable)
- manufacturing standard (if applicable)

Type and brand name, as well as batch numbers of specific raw material used for coating process are introduced to production pipe lists which in consequence allow to give an appropriate information about material being used in production logs or daily reports and finally coating certificates.

3. CLEANING PROCEDURE FOR ALL APPLICATION EQUIPMENT.

All the coating installation and associated equipment is well maintained and cleaned in everyday routine by means of vacuum cleaners, "wet" rags and brushes. To limit dust migration in the surrounding area down to minor appearance, the concrete floor of the plant is being water washed every day.

For epoxy application system, at every raw material change (if required) and after every production shift cleaning procedure is carried out by means of compressed air flush. In addition, a separate vacuum cleaner is used to remove residues of the powder from within fluid bed system, filter hoppers and spray booths.

When changing granule raw material (eg. PP/PE, adhesive in extrusion process) the vacuum supply system is unloaded to empty state and material residues are removed by means of compressed air flush. Concerning extruders and extrusion die "old material" is pushed out by an appropriate amount of "new" material to achieve a complete changeover. In addition, if necessary the die is dismantled into parts and cleaned manually by means of bronze scrapers and brushes to free of material surface state.

4. PREPARATION OF THE STEEL SURFACE INCLUDING MONITORING OF ENVIRONMENTAL PARAMETERS, METHODS AND TOOLS FOR INSPECTION, GRINDING OF PIPE SURFACE DEFECTS AND TESTING OF SURFACE PREPARATION.

During surface preparation and abrasive cleaning environmental parameters like: actual air temperature, dew point temperature and humidity are monitored continually by means of electronic sensors and a display device is presenting measurement results. If any of these values exceed allowed process limits, the unit sets off an acoustic alarm.

Surface cleaning begins with removal of severe dust, sand accumulation, ice or snow (in winter conditions), oil and grease (if occur) and any unwanted objects. Next, drying process in induction oven. Then, by means of an automatic roller conveyor, pipes run through an external blasting machine where the abrasive cleaning process takes place. Speed of the conveyor is adjusted prior the process start so following results are achieved:

- cleanliness rate: Sa 2 ^{1/2} (according ISO 8501-1) – visually inspected with a pattern sample
- roughness of blasted surface: Ry₅ = 50 - 100µm (according ISO 8504-3) – tested by means of electronic roughness measurement device
- dust presence after blasting and dust removal: max. class 2 (according to ISO- 8502-3) – visually inspected with a pattern sample and set of transparent stick tape pieces
- soluble salt after blasting: max 20 mg/m² (according to ISO- 8502-9) – testing set with electronic conductivity measurement device
- Water-soluble contamination of abrasives: max 60 mS/cm (according to ASTM D4940) – testing set with electronic conductivity measurement device

In addition, a general visual **inspection** of blasted surface is being conducted against possible damages (spikes, delamination, scars, other defects). If any occurred in limits of ITP, a repair is possible by means of machine or hand grinding. When exceeding the limits of ITP defects shall be removed and the pipe is returned to **repeat** the blasting process. If the damage cannot be qualified to repair (major defects, WT reduction, material inconsistency, the pipe is removed out of line and transported back to storage for warranty claim.

5. COATING APPLICATION, INCLUDING TOOLS/EQUIPMENT FOR CONTROL PROCESS PARAMETERS ESSENTIAL FOR THE QUALITY OF THE COATING.

Coating application process consists of following steps:

- I. Surface preparation and cleaning according to APS paragraph 4, followed by pipe interior cleaning by means of an air blow-out unit.
- II. Coating layers application in three stages:
 - A. Epoxy powder spraying by means of a compressed air/electrostatic pistol system (Nordson). Prior to powder application, pipes are heated in an induction oven up to temperature in **recommended** range given in data sheets of the raw material and so called "application time window" (prepared for the specific epoxy material). The latter designates temperature value, typically 165-220 degC, depending on the process speed and distance between epoxy and adhesive application, to assure a proper over-coat time. Temperature is monitored continually by means of an optical pyrometer which results are presented on the operators' main panel, and controlled periodically with a contact thermometer. At start of every production shift, a dry film thickness measure is carried out according to ITP. In addition, during production, verifying measurements of the wet film are carried out as well.

Control and test devices:

- pipe temperature: approved optical pyrometer and contact thermometer
 - DFT: non destructive, electronical gauge
 - WFT: hand tool according to ISO 2808, Method 1A
 - volume of powder to be applied: adjusted and controlled "online" by epoxy unit control system (SIMATIC), operator's main screen
 - speed of process: adjusted and controlled "online" by epoxy unit control system (**SIMATIC**), operator's main screen
- B. Adhesive tape extrusion by means of an extruder equipped with flat die. The adhesive is wrapped over the epoxy layer on pipe and pressed towards the pipe surface by means of a **pressure** roller. The distance between the die and epoxy spraying booth is adjusted according to "time window application" to

assure a proper inter-coating time. Melt temperature along specific extruder's heating zones is **adjusted** according to data sheets of the material, typically 200-230 degC. At start of every production shift, a dry film thickness measure is carried out according to ITP.

Control and test devices:

- DFT: non destructive, electronical gauge
- material output: adjusted and controlled "online" by extruder control system (SIMATIC), operator's main screen
- speed of process: adjusted and controlled "online" by extruder unit control system (SIMATIC), operator's main screen

- C. PE tape extrusion by **means** of an extruder equipped with flat die. The PE tape is wrapped over the adhesive layer on pipe and pressed towards the pipe surface by means of a special pressure roller. PE layer of appropriate thickness is applied according to ITP. Melt temperature along specific extruder's heating zones is adjusted according to data sheets of the material, typically 190-240 degC

Control and test devices:

- DFT: non destructive, electronical gauge
- material output: adjusted and controlled "online" by extruder control system (SIMATIC), operator's main screen
- speed of process: adjusted and controlled "online" by epoxy unit control system (SIMATIC), operator's main screen

- III. Cooling process of applied coating in a water quench. Temperature of the pipe and coating is reduced down to a level which assures safe handling and prevents potential PE layer damage. At the end of cooling quench a holiday detector unit is built in to check the consistency of the coating. In case of flaw detection, the unit sets off an acoustic and light alarm.

Control and test devices:

- pipe temperature: contact thermometer
- coating consistency: holiday detector at 25kV

- IV. Coating cutback (see paragraph 10)

- V. **Marking** (see paragraph 11)

6. FLOW DIAGRAM FOR THE COATING PLANT.

Flow diagram for the coating plant – see Annex no. 1.

7. METHODS AND TOOLS/EQUIPMENT FOR INSPECTION AND TESTING OF THE APPLIED COATING

As a part of product acceptance, 3LPE coating tests are to be carried out according to the following table:

Item	Type of tests / measurements	EN ISO 21809-1: 2011	
		Test method	Equipment
1.	Minimum epoxy thickness	See Paragraph 5.II.A of the APS	See Paragraph 5.II.A of the APS
2.	Minimum adhesive thickness	See Paragraph 5.II.B of the APS	See Paragraph 5.II.B of the APS
3.	Continuity	Annex B – PN-EN ISO 21809-1:2011	Holiday detector (in coating line)
4.	Total thickness of coating	See Paragraph 5.II.C of the APS	See Paragraph 5.II.C of the APS
5.	Peel strength	Annex C – PN-EN ISO 21809-1:2011	Testing machine
6.	Degree of cure FBE	Annex D – PN-EN ISO 21809-1:2011 (ISO 11357-2)	Differential scanning calorimeter (DSC)
7.	Impact resistance	Annex E – PN-EN ISO 21809-1:2011	Drop-weight testing machine
8.	Indentation	Annex F – PN-EN ISO 21809-1:2011	Penetrometer
9.	Elongation at break	ISO 527	Testing machine
10.	Cathodic disbondment	Annex H – PN-EN ISO 21809-1:2011	Cathodic disbondment test unit
11.	Hot water immersion test	Annex M – PN-EN ISO 21809-1:2011	Thermostating bath water
12.	Flexibility	Annex I – PN-EN ISO 21809-1:2011	Hydraulic press + bending mandrels
13.	Coating resistivity	DIN 30670:2012, clause 5.3.7	Resistivity meter
14.	In process degradation of PE	ISO 1133	Plastometer
15.	Cutbacks	Measuring	Hand tools for angle and length measure
16.	Coating repairs	Point No. 12 PN-EN ISO 21809-1:2011	Thickness meter Holiday detector

8. REPAIRS OF DAMAGED COATINGS

Maximum area of single damage subject to repair equals 10 cm². Total number of defects shall not exceed 1 defect per meter length of pipe. Beyond these limitations pipe coating needs to be reapplied.

Eligibility 3LPE coating damage to be repaired:

- Class I - damage to the coating without thickness reduction below ITP desired value (PE surface minor damages like: scars, equipment markings, spikes, etc.)
- Class II - damage to the coating, which reduces coating's thickness below ITP desired value but does not reveal the epoxy layer,
- Class III - damage to the coating, which reveals a layer of epoxy or reaches the surface of the metal.

Preparation of damage spot for repair:

- at damage of class II, preparation of the coating prior to repair consists in refinement of damage from loose elements of isolation (if they such occurred) and cleaning damage surrounding area with sand paper,
- at damage of class III, surface of the pipe shall be cleaned by means of grinding and polishing tools to required cleanness class. In addition, edge and surrounding area of the PE layer shall be refined with sand paper.

Repair procedures:

- damages of class I by means of fine scraper tools, to achieve smooth surface of coating.
- damages of class II are repaired by mastic filler application, and hot application of repair patch or PE melt stick, or shrinking sleeve,
- damages of class III are repaired through:
 - application of epoxy primer over the cleaned surface inside damage spot,
 - application of adhesive filler (mastic filler),
 - application of repair patch or shrinking sleeve.

Each repair material must be compatible with relevant type of basic coating material.

After cooling down to ambient temperature the repaired coating area shall be controlled with following methods:

- total coating thickness,
- holiday test at 25kV preset voltage,
- assessment of appearance of coating,

After positive control, appropriate records must be introduced into production checklists, with pipe number indicated.

9. STRIPPING OF DEFECTIVE COATING.

The coating shall be removed, if damages are exceeding standard's requirements and each time for a pilot pipe.

On a special stand, the pipe is heated by means of a gas burner or induction heater (if necessary) until the coating is softened. The coating is cut with a sharp tool then and torn off the pipe's surface. A blasting of the pipe is the final stage of coating stripping off. The cleaned pipe is introduced for re-coating. Cause of coating removal for each pipe is documented in control report.

10. PREPARATION OF COATING CUTBACK AREAS.

The cutback shall be prepared according to the standard or upon agreement according to customer's specification. Quality is approved by visual inspection and by means of hand measurement tools to check the angle and length of a cutback.

11. MARKING AND TRACEABILITY.

The coating shall be marked in a visible and durable manner. The coating marking shall be applied according to the standard or upon agreement according to customer's specification.

Identification of pipes applied before the coating process is clear throughout the process and delivery of pipes for the client.

According to pipe lists, batch numbers of particular material used for coating are indicated in daily reports and coating test certificates.

Non-standard identification measures shall be agreed upon purchase order.

12. HANDLING AND STORAGE OF PIPES.

Pipes conveyed with a crane are stored on wooden supports with elastic material. The layers shall be separated with wood inter-supports.

In case of coated pipes storing in an open area for more than half a year, the coating is protected against UV radiation by applying a UV reflective cover.

13. ANY SPECIAL CONDITIONS FOR DISPATCH OF COATED PIPES, INCLUDING PROTECTION OF PIPE ENDS.

If you have previously agreed, pipes can be protected with a cap at its both ends, to protect the internal surface as well as the pipe end bevels against damage, also facilitating lifting and conveyance.

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14. DOCUMENTATION.

Together with coated pipes following documents shall be delivered to the purchaser:

- Packing list,
- Inspection Certificate type 3.1 (in accordance EN 10204:2004) for steel pipe,
- Inspection Certificate type 3.1 (in accordance EN 10204:2004) for coating, confirming compliance with EN ISO 21809-1:2011

A unique pipe number given at incoming pipes inspection (see APS paragraph 1), together with dependency to the mill's pipe and heat numbers, is to be found in packing lists and inspection certificates for coating. Therefore, a full traceability of pipes is provided.

15. ATTACHMENT.

- Annex no. 1 - flow diagram for 3LPE coating process

Creation date: *May 2018*

Ed. No. 3

Prepared by:

IZOSTAL S.A.
Główny Technolog
Smadzich
Waldemar Smadzich
.....
Technology Specialist

Verified by:

IZOSTAL S.A.
Research and Development
Center Director
Bok
Adam Bok
.....
R&D Director

Approved by:

IZOSTAL S.A.
Dyrektor Produkcyjno - Techniczny
Smieszko
Robert Smieszko
.....
P&T Director

IZOSTAL S.A., Application Procedure Specification,
3LPE COATING ACC to EN ISO 21809-1:2011 Standard

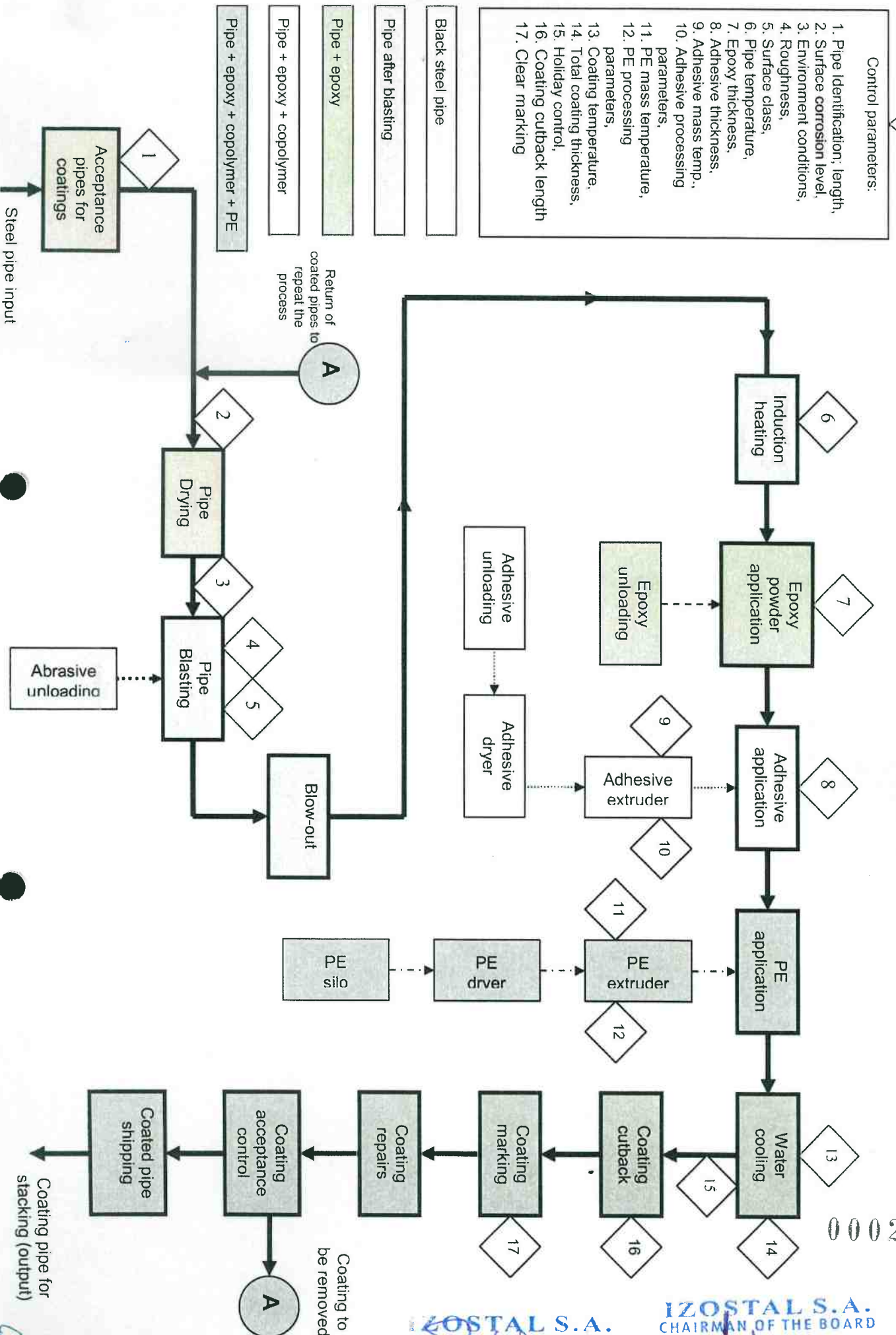
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IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
Pietrek
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
Mazurek
mgr Marek Mazurek

Page 10

FLOW DIAGRAM FOR 3LPE COATING PROCESS

Annex no. 1



IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR
mgr Michał Pietrek

IZOSTAL S.A.
CHAIRMAN OF THE BOARD
CEO
mgr Marek Mazurek

A ZAMAWIAJĄCY/CUSTOMER/BESTELLER		
Nazwa i adres/ Name and Address/ Name und Adresse		
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Ilość sztuk/Pieces/ Stückzahl:	195	Długość/Length/Länge[m]: 2638,190
B RURA/PIPE/ROHRE		
Symbol rury/Pipe/Rohrsymbol		
SAWH 711x12,5 L415ME ISO 3183		
Czystość powierzchni rury/ Purity of pipes surface/ Reinheitsgrad der Rohroberfläche		
Sa 2 1/2 PN-ISO 8501-1		
C POWŁOKA/COATING/UMHÜLLUNG		
Typ powłoki/The coating type/ Umhüllungstyp		
3LPE B3 – PN-EN ISO 21809-1:2011		
D WYNIKI BADAŃ/TEST RESULTS/ERGEBNIS DER PRÜFUNGEN		
RODZAJ BADANIA/ KIND OF THE TEST/PRÜFART	WYNIK WYMAGANY/RESULTS REQUIRED/SOLLWERT	WYNIK UZYSKANY/RESULTS ACHIEVED/ ISTWERT
GRUBOŚĆ POWŁOKI COATING THICKNESS UMHÜLLUNG SCHICHTDICKE	Min. 5,00 mm	> 5,00 mm
SZCZELNOŚĆ POWŁOKI 25KV HOLIDAY DETECTION TEST 25KV PORENTTEST 25KV	Brak nieciągłości Absence of discontinuities Fehlen Diskontinuitäten	Pozytywny/Positive/Positiv
SIŁA PRZYPĘCENNOŚCI POWŁOKI DO RURY COATING'S ADHESIVE STRENGTH TO PIPE SCHWÄLWIDERSTAND DER POLYETHYLEN UMHÜLLUNG	Min. 150 N/cm	> 150 N/cm

NINIEJSZE ŚWIADECTWO ODBIORU POTWIERDZA, ŻE RURY ZOSTAŁY ZAIZOLOWANE ZGODNIE Z WYMAGANAMI SPECYFIKACJI WYMIENIONEJ W SEKCJI "C". WYNIKI PEŁNYCH BADAŃ LABORATORYJNYCH POWŁOKI PARTII RURI OBJĘTYCH ŚWIADECTWEM ODBIORU MOŻEMY DOSTARCZYĆ NA ŻYCZENIE ZAMAWIAJĄCEGO. DANE IDENTYFIKACYJNE RUR OBJĘTYCH ŚWIADECTWEM ODBIORU PODANO W SPECYFIKACJI

THE ABOVE INSPECTION CERTIFICATE CONFIRMS, THAT THE STEEL PIPES HAVE BEEN COATED IN ACCORDANCE WITH SECTION "C". THE RESULTS OF COMPLETE LABORATORY TESTS OF THE PIPES EMBRACED BY RECEIPT WE MAY DELIVER ON REQUEST. IDENTIFICATION DATA OF THE PIPES EMBRACED BY THE CERTIFICATE ARE GIVEN IN APPENDIX.

DIESES PRÜFZEUGNIS BESTÄTIGT, DASS DIE UMHÜLLUNG DER STAHLROHRE IN ÜBEREINSTIMMUNG MIT DEN PUNKT "C" DIE VOLLSTÄNDIGEN LABORERGEBNISSE VON PRÜFUNGEN DER UMHÜLLUNG AN ROHREN DIE INHALT DES WERKSZEUGNISSES BILDEN. KOENNEN WIR AUF WUNSCH DES BESTELLERS NACHSENDEN. DIE IDENTIFIKATIONSNUMMERN DER ROHRE SIND IN DER ANLAGE AUFGEFÜHRT.

ZATWIERDZIL / APPROVED / GENEHMIGT

IZOSTAL S.A.
 VICE PRESIDENT
 COMMERCIAL DIRECTOR
 mgr Michał Pietrek

IZOSTAL S.A.
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ZATWIERDZIL / APPROVED / GENEHMIGT

IZOSTAL S.A.
VICE PRESIDENT
COMMERCIAL DIRECTOR

mgr Michał Pietrek

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NINERZE ŚWIADECTWO ODBIORU POTWIERDZA, ŻE RURY ZOSTAŁY ZAŁOŻONE ZGODNIE Z WYMAGANIAMI SPECYFIKACJI WYMIENIONEJ W SEKCJI "C". WYNIKI PEŁNYCH BADAŃ LABORATORYJNYCH POWŁOKI PARTI RURI
OBIĘTYCH ŚWIADECTWEM ODBIORU MOŻEMY DOSTARCZYĆ NA ŻYCZENIE ZAMAWIAJĄCEGO. DANE IDENTYFIKACYJNE RUR OBIĘTYCH ŚWIADECTWEM ODBIORU PODANO W SPECYFIKACJI

THE ABOVE INSPECTION CERTIFICATE CONFIRMS, THAT THE STEEL PIPES HAVE BEEN COATED IN ACCORDANCE WITH SECTION "C". THE RESULTS OF COMPLETE LABORATORY TESTS OF THE PIPES EMBRACED BY RECEIPT WF MAY
DELIVERON REQUEST IDENTIFICATION DATA OF THE PIPES EMBRACED BY THE CERTIFICATE ARE GIVEN IN APPENDIX.

DIESES PRÜFZEUGNIS BESTÄTIGT, DASS DIE UMHÜLLUNG DER STAHLROHRE IN ÜBEREINSTIMMUNG MIT DEN PUNKT "C". DIE VOLLSTÄNDIGEN LABORATORIERESULTS VON PRÜFUNGEN DER UMHÜLLUNG AN ROHREN DIE INHALT DES WERKSZEUGNISSES
BILDEN, KÖNNEN WIR AUF WUNSCH DES BESTELLERS NACHSENDEN. DIE IDENTIFIKATIONSNUMMERN DER ROHRE SIND IN DER ANLAGE AUFGEFÜHRT

ZATWIERDZIL / APPROVED / GENEHMIGT

IZOSTAL S.A.
 VICE PRESIDENT
 COMMERCIAL DIRECTOR
 mgr Michał Pietrek

IZOSTAL S.A.
 CHAIRMAN OF THE BOARD
 CEO
 mgr Marek Mazurek

A ZAMAWIAJĄCY/CUSTOMER/BESTELLER

Nazwa i adres/ Name and Address/ Name und Adresse

 AB Amber Grid
 Savanoriu ave. 28
 LT-03116 Vilnius
 LT - LITWA

Nr zamówienia/Order No./Bestell-Nr.

Nr zlecenia/Confirmation No./Werks-Nr.

Ilość sztuk/Pieces/ Stückzahl:

195

Długość/Length/Länge[m]:

2638,190

B RURA/PIPE/ROHRE

Symbol rury/Pipe/Rohrsymbol

SAWH 711x8,8 L415ME ISO 3183

Czystość powierzchni rury/ Purity of pipes surface/ Reinheitsgrad der Rohroberfläche

Sa 2 1/2 PN-ISO 8501-1

C POWŁOKA/COATING/UMHÜLLUNG

Typ powłoki/The coating type/ Umhüllungstyp

3LPE B3 – PN-EN ISO 21809-1:2011

D WYNIKI BADAŃ/TEST RESULTS/ERGEBNIS DER PRÜFUNGEN

RÓDZAJ BADANIA/ KIND OF THE TEST/PRÜFART	WYNIK WYMAGANY/RESULTS REQUIRED/SOLLWERT	WYNIK UZYSKANY/RESULTS ACHIEVED/ ISTWERT
GRUBOŚĆ POWŁOKI COATING THICKNESS UMHÜLLUNG SCHICHTDICKE	Min. 4,00 mm	> 4,00 mm
SZCZELNOŚĆ POWŁOKI 25kV HOLIDAY DETECTION TEST 25KV PORENTTEST 25Kv	Brak nieciągłości Absence of discontinuities Fehlen Diskontinuitäten	Pozytywny/Positive/Positiv
SILA PRZYPĘCNOŚCI POWŁOKI DO RURY COATING'S ADHESIVE STRENGTH TO PIPE SCHWÄLWIDERSTAND DER POLYETHYLEN UMHÜLLUNG	Min. 150 N/cm	> 150 N/cm

 NINIEJSZE ŚWIADECTWO ODBIORU POTWIERDZA, ŻE RURY ZOSTAŁY ZAŁOŻONE ZGODNIE Z WYMAGANAMI SPECYFIKACJI WYMIENIONEJ W SEKCJI "C". WYNIKI PEŁNYCH BADAŃ LABORATORYJNYCH POWŁOKI PARTI RUR
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Ilość sztuk/Pieces/ Stückzahl:	195	Długość/Length/Länge[m]: 2638,190
B RURA/PIPE/ROHRE		
Symbol rury/Pipe/Rohrsymbol		
SAWH 711x8,0 L415ME ISO 3183		
Czystość powierzchni rury/ Purity of pipes surface/ Reinheitsgrad der Rohroberfläche		
Sa 2 1/2 PN-ISO 8501-1		
C POWŁOKA/COATING/UMHÜLLUNG		
Typ powłoki/The coating type/ Umhüllungstyp		
3LPE B3 – PN-EN ISO 21809-1:2011		
D WYNIKI BADAŃ/TEST RESULTS/ERGEBNIS DER PRÜFUNGEN		
RODZAJ BADANIA/ KIND OF THE TEST/PRÜFART	WYNIK WYMAGANY/RESULTS REQUIRED/SOLLWERT	WYNIK UZYSKANY/RESULTS ACHIEVED/ ISTWERT
GRUBOŚĆ POWŁOKI COATING THICKNESS UMHÜLLUNG SCHICHTDICKE	Min. 4,00 mm	> 4,00 mm
SZCZELNOŚĆ POWŁOKI 25KV HOLIDAY DETECTION TEST 25KV PORENTTEST 25Kv	Brak nieciągłości Absence of discontinuities Fehlen Diskontinuitäten	Pozytywny/Positive/Positiv
SILA PRZYZEPNOŚCI POWŁOKI DO RURY COATING'S ADHESIVE STRENGTH TO PIPE SCHWÄLWIDERSTAND DER POLYETHYLEN UMHÜLLUNG	Min. 150 N/cm	> 150 N/cm

Niniejsze świadectwo odbioru potwierdza, że rury zostały zaizolowane zgodnie z wymaganiami specyfikacji wymienionej w sekcji "C". Wyniki pełnych badań laboratoryjnych powłoki partii rur objętych świadectwem odbioru możemy dostarczyć na życzenie zamawiającego. Dane identyfikacyjne rur objętych świadectwem odbioru podano w specyfikacji.

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RODZAJ BADANIA/ KIND OF THE TEST/PRÜFART	WYNIK WYMAGANY/RESULTS REQUIRED/SOLLWERT	WYNIK UZYSKANY/RESULTS ACHIEVED/ ISTWERT
GRUBOŚĆ POWŁOKI COATING THICKNESS UMHÜLLUNG SCHICHTDICKE	Min. 3,50 mm	> 3,50 mm
SZCZELNOŚĆ POWŁOKI 25KV HOLIDAY DETECTION TEST 25KV PORENTTEST 25KV	Brak nieszczelności Absence of discontinuities Fehlen Diskontinuitäten	Pozytywny/Positive/Positiv
SILA PRZYPĘCNOŚCI POWŁOKI DO RURY COATING'S ADHESIVE STRENGTH TO PIPE SCHWÄLWIDERSTAND DER POLYETHYLEN UMHÜLLUNG	Min. 150 N/cm	> 150 N/cm

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To:

AB Amber Gird

Savanoriu pr..28,

LT-03116, Vilnius

Lithuania

Explanation regarding barcode (BAR, QR) scanners

For purpose of "Open Procedure No. 391469 of 18/7/2018"

In order to fulfill the delivery requirement regarding (BAR, QR) scanners for the delivery of the possible contract resulting from the public tender of supply of coated steel pipes "Open Procedure with publication of a contract notice 18/7/2018 published in the Central Public Procurement Information System, Procurement No 391469 and in the Official Journal of the European Union appendix (OL/S) 2018/S 136-311679" organized by AB Amber Grid, we would like to use the Zebra OMNII™ XT15f code scanner the product spec. sheet is attached to the offer. Further please find examples of the labels with QR codes used in our company:



Should you have additional questions please contact us as soon as possible.

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PRODUCT SPEC SHEET
Zebra OMNII™ XT15f



ZEBRA

Zebra OMNII™ XT15f

READY FOR YOUR COLDEST ENVIRONMENTS

Give your workers the real-time information they need to streamline inventory management in your coldest environments with the Omnii XT15f. The Omnii XT15f builds on the Omnii adaptable platform, adding features that enable your workers to achieve flawless fulfillment in the coldest corners of your supply chain — from the loading dock to a freezer in an ice cream manufacturing plant to an outdoor yard in the arctic cold of a wintery day.

FEATURES AND BENEFITS

The right mobile device for different cold chain environments with Chiller and Arctic models

The condensation-resistant Chiller model is built for -4° F/-20° C environments, while the condensation-free Arctic model is ideal in -22° F/-30° C freezers and for workers moving between cold and warm environments. Both models offer frost-free scanning technology — a heated scan window that prevents internal fogging to ensure successful scanning in condensing environments. Both models also offer a specialized keyboard that is tested and proven to overcome ice buildup and prevent keys from freezing. The Arctic model includes two additional features that maintain display performance in extreme cold: optical bonding prevents internal fogging on the display, while an automatic display heater prevents the deterioration of screen refresh rates common in lower temperatures.

Rugged design for superior reliability and TCO

With a dual IP65 and IP67 sealing, workers can spill water on or even drop the device in a puddle of water — or work out in the pouring rain. And even a 6.5 ft./2 m drop to concrete won't impact operation.

A class-leading keyboard and display deliver superior usability

The large high-resolution color touchscreen makes it easy for workers to interact with applications. Key size and placement make data entry easy with one hand, gloved or ungloved. The display is easy to see in just about any lighting condition, including bright sunlight. With plenty of single-press "F" keys, both the 58-key alphanumeric and 34-key numeric keyboards bring push-button simplicity to complex applications.

Industry leading bar code scanning

Three best-in-class scanning options allow you to capture the bar codes you use today and in the future — 1-D or 1-D/2-D. Our extraordinary extended range 2-D imager delivers true laser speed on all bar codes, from near contact to over 30 ft./9.14 m away. And with Zebra's superior bar code technology, workers can even capture bar codes that are damaged, scratched, under shrinkwrap or on items that are on the highest shelf of a warehouse rack.

Flexible wireless connectivity options

802.11a/b/g/n Wi-Fi provides compatibility with virtually any wireless LAN; support for 'N' provides plenty of bandwidth to support any application — from terminal emulation to today's graphics-intensive web-based Warehouse Management Systems.

Maximize value with maximum uptime

Field serviceability and our support program options help you keep the Omnii XT15f in service and in the hands of your workers. You can change the display, the keyboard and the scanner, right in your facility — no need to send the

WHERE IS THE OMNII XT15f AT HOME?

Refrigerated warehouses/freezers in:

- Food processors/manufacturers
- Pharmaceutical manufacturers
- 3rd party logistics providers

Outdoor inventory management applications in cold climates:

- Airports (baggage handlers)
- Railway yards and seaports (container management)

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device to a service depot. And our optional support services cover everything, including accidental damage and wear and tear.

ACHIEVE FLAWLESS FULFILLMENT IN YOUR COLD CHAIN TODAY WITH THE OMNII XT15F.

For more information, please visit: www.zebra.com/omniixt15f

SPECIFICATIONS

	CHILLER	ARCTIC
PHYSICAL CHARACTERISTICS		
Dimensions	8.89 in. L x 3.86 in. W x 3.2 in. D at display (grip area 1.22 in. D) ; 226 mm L x 98 mm W x 82 mm D at display (grip area 31 mm D)	
Weight	1.8 lbs./834 g (unit with SE965HP laser — weight includes battery and pistol grip)	
Keyboard Options	Two high-reliability keypads with specially designed keyboards that resist freezing due to ice build-up in condensing environments: 58-key full alphanumeric with 6 single-push "F" keys; 34-key numeric with 12 single-push "F" keys	
Power	 PowerPrecision Lithium ion batteries Two Options: High Capacity 5000 mAh (not available on Arctic model) or 5300 mAh High Capacity Smart Freezer battery designed for high performance in low temperatures	
Display	3.7 in. VGA (640 x 480) transreflective color/touch display in two variants:	
	Extreme Duty for rugged environments as low as -4° F/- 20° C: improved impact resistance (1.25 Joule impact); better abrasion resistance; 160 cd/m2 brightness	Extreme Duty for rugged environments as low as to -22° F /-30° C: improved impact resistance (1.25 Joule impact); better abrasion resistance; 160 cd/m2 brightness; optical bonding prevents internal display fogging in condensing environments; display heater maintains screen refresh rate
Heater	Single core heater control logic board that dynamically heats scan window	Multi-core heater control logic board that dynamically heats scan window and LCD display
Audio	Integrated microphone and speaker; high volume 95dBA beeper; vibration feedback	
PERFORMANCE CHARACTERISTICS		
CPU	TI OMAP 3, 800 MHz	
Operating System	Windows® CE 6.0; Windows® Embedded Handheld 6.5	
Memory	512MB RAM and 1GB Flash	
Bar Code Scanner	SE965 1-D standard range laser; SE1524-ER 1-D extended range laser ; SE4600 2-D long range imager	
Application Software	Windows CE 6.0: Internet Explorer Embedded; Microsoft Wordpad Windows Embedded Handheld 6.5: Windows® Office Mobile 2010, includes Word, Excel, PowerPoint, OneNote and SharePoint; Internet Explorer Mobile; Windows Office Outlook Mobile; Windows Media Player Mobile	

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Terminal Emulation	TekTerm; Wavelink	
Mobile VPN	NetMotion Mobility XE VPN	
Device Mgmt	Mobile Control Center (MCC)	
Software Utilities	Kiosk Mode; Total Recall; Tweakit; Dr. Debug	
USER ENVIRONMENT		
Operating Temp.	-4° to 122° F/-20° to 50° C	-22° to 122° F/-30° to 50° C
Storage Temp.	-40° to 140° F/-40° to 60° C	-40° to 140° F/-40° to 60° C
Humidity	5% to 95% non-condensing (condensation-resistant)	Condensing (condensation-free using internal heaters)
Sealing	IP65, IP67, IEC 60759	
Drop Specification	Multiple 6.5 ft./2 m drops to polished concrete	
Integrated Sensors	Motion (accelerometer); digital compass	
ESD	±15kV air discharge, ±8kV contact	
WIRELESS DATA COMMUNICATION		
WLAN	IEEE 802.11a/b/g/n (CCX V4 compliant) with 802.1X, WPA/WPA2-Enterprise; FAST-MSCHAPv2; PEAPv0-MSCHAPv2; PEAPv1-GTC; TLS; 64/128 WEP; AES-CCMP; TKIP	
WPAN	Bluetooth® V2.0 + EDR	
REGULATORY		
Worldwide Safety, EMC, RF, Laser approvals; CE Mark; E Mark (vehicle cradles); RoHS compliant; WEEE compliant; REACH compliant		
WARRANTIES		
Subject to the terms of Zebra's hardware warranty statement, the Omnii XT15f is warranted against defects in workmanship and materials for a period of 1 (one) year from the date of shipment. For complete warranty statement, go to: http://www.zebra.com/warranty		
RECOMMENDED SERVICES		
Primary Services; Modular Services		



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ZEBRA TECHNOLOGIES

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