

Test report no.: 64093/04

Customer: Firat Plastik, Kaucuk San. ve TIC. A.S.
Türkobaköyü P.K. 12
34907 Büyükçekmece / Istanbul

TURKEY

Order: Tests according to DIN EN 1555-3:2003-04 "Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 3: Fittings" on tapping saddles made of Polyethylene PE 100 for pipes made of PE 80 for the supply of gaseous fuels
Dimensions: \varnothing 63 mm, \varnothing 110 mm and \varnothing 125 mm

Material: Finathene XS 10 B

Letter of: 2004-06-09 **Reference:** Mr Erdogan

Receipt of samples: 2004-05-18 **Sampling:** ---

Test period: 2004-05-27 to 2004-07-13

Result: See item 5 "Summary"

The test report comprises 10 pages.

Würzburg, 2004-07-29
Kro/Ha/schm

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1 Order

By its letter of 9 June 2004 the company Firat Plastik, Kaucuk San. ve TIC. A.S., Türkobaköyü P.K. 12, 34907 Büyükçekmece/Istanbul, Turkey, instructed the SKZ - TeConA GmbH to execute tests according to DIN EN 1555-3:2003-04, on tapping saddles made of PE 100 for pipes made of PE 80 for the supply of gaseous fuels. Dimensions: \varnothing 63 mm, \varnothing 110 mm and \varnothing 125 mm.

2 Test material

On 18 May 2004 the SKZ - TeConA GmbH received the following samples for testing:

Sample no.	Dimension [mm]	Quantity [piece]	Description	Receipt of samples
1	\varnothing 63	1	Testing tree with 3 tapping saddles outlet diameter 20, 32 and 63 mm	2004-05-18
2	\varnothing 110	1		2004-05-18
3	\varnothing 125	1		2004-05-18
4	\varnothing 63	1	Testing tree with 3 tapping saddles outlet diameter 20 mm	2004-05-18
5	\varnothing 110	1		2004-05-18
6	\varnothing 125	1		2004-05-18
7	\varnothing 63	1	Testing tree with 3 tapping saddles outlet diameter 32 mm	2004-05-18
8	\varnothing 110	1		2004-05-18
9	\varnothing 125	1		2004-05-18
10	\varnothing 63	1	Testing tree with 3 tapping saddles outlet diameter 63 mm	2004-05-18
11	\varnothing 110	1		2004-05-18
12	\varnothing 125	1		2004-05-18
13	\varnothing 63	1	Testing tree with 1 tapping saddle outlet diameter 20 mm	2004-05-18
14	\varnothing 110	1		2004-05-18
15	\varnothing 125	1		2004-05-18
16	\varnothing 63	1	Testing tree with 1 tapping saddle outlet diameter 32 mm	2004-05-18
17	\varnothing 110	1		2004-05-18
18	\varnothing 125	1		2004-05-18
19	\varnothing 63	1	Testing tree with 1 tapping saddle outlet diameter 63 mm	2004-05-18
20	\varnothing 110	1		2004-05-18
21	\varnothing 125	1		2004-05-18

3 Test procedure

Usually our reports are based on accredited standards. The list of all accredited standards is shown on the homepage at www.skz.de.

The tests were carried out according to DIN EN 1555-3: 2003-04 "Plastics piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 3: Fittings".

The long-term hydrostatic pressure test was carried out according to DIN EN 1555-3:2003-04, Tab. 5, with a test stress of 4.0 Mpa, for connections with pipes made of PE 80.

Unless not indicated otherwise all tests were carried out at standard atmosphere 23/50-2 according to DIN 50014:1985-07 "Climates and their technical application; standard atmospheres" and after a storage of at least 48 hours in this climate.

The following tests were carried out:

Serial no.	Tests
1	Marking
2	Surface structure and colour
3	Dimensions
4	Melt mass flow rate (MFR)
5	Thermal stability (Oxidation-induction time)
6	Long-term hydrostatic pressure test
7	Pressure drop test
8	Resistance to impact stress
9	Resistance to cohesion

4 Test results

4.1 Marking

Sample no.	Marking of the tapping saddles
1	Firat TS418-3 prEN12201-3 NT Ø63/63 ¹⁾ SDR11 PN16 A PE100 2/04
2	Firat TS418-3 prEN12201-3 NT Ø110/63 ¹⁾ SDR11 PN16 B PE100 4/04
3	Firat TS418-3 prEN12201-3 NT Ø125/63 ¹⁾ SDR11 PN16 A PE100 3/04

¹⁾ No differentiation regarding the outlet diameters.

4.2 Surface structure and colour

The samples were smooth and clean. Cracks, bubbles and inhomogeneities were not ascertained. The samples did not show any damage. The tapping saddles were coloured black.

4.3 Dimensions

Dim. outlet	Tapping saddle-outlet	Actual value [mm]		Set value [mm]	
		Minimal	Maximal	Minimal	Maximal
Ø 20 mm	Outside diameter D_1	20.2	20.3	20.0	20.3
	Wall thickness E_S	3.3	3.4	3.0	---

Dim. outlet	Tapping saddle-outlet	Actual value [mm]		Set value [mm]	
		Minimal	Maximal	Minimal	Maximal
Ø 32 mm	Outside diameter D_1	32.3	32.3	32.0	32.3
	Wall thickness E_S	3.0	3.8	3.0	---

Dim. outlet	Tapping saddle-outlet	Actual value [mm]		Set value [mm]	
		Minimal	Maximal	Minimal	Maximal
Ø 63 mm	Outside diameter D_1	63.3	63.4	63.0	63.4
	Wall thickness E_S	6.9	7.1	5.8	---

4.4 Melt mass flow rate (MFR)

Sample no.	MFR 190/5 [g/10 min]	
	Average value	Set value ¹⁾
1	0.30	0.24 – 0.36
2	0.30	0.24 – 0.36
3	0.29	0.24 – 0.36

1) MFR-value is given from the producer of the moulding material = 0,3 g/10 min, Set value = MFR ± 20%

4.5 Thermal stability (Oxidation-induction time)

Sample no.	Oxidation-induction time (OIT) at 200°C	
	Average value [min]	Set value [min]
1	> 40	> 20
2	> 40	> 20
3	> 40	> 20

4.6 Long-term hydrostatic pressure test

Sample no.	Test temperature [°C]	Test stress [MPa]	Time to failure [h]	
			Actual value	Set value
4	80	4.0	> 1000	≥ 1000
5	80	4.0	> 1000	≥ 1000
6	80	4.0	> 1000	≥ 1000
7	80	4.0	> 1000	≥ 1000
8	80	4.0	> 1000	≥ 1000
9	80	4.0	> 1000	≥ 1000
10	80	4.0	> 1000	≥ 1000
11	80	4.0	> 1000	≥ 1000
12	80	4.0	> 1000	≥ 1000

4.7 Pressure drop test

Medium air at a test pressure of 25 mbar.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m³/h]	Pressure drop - Δp [mbar]	Factor - F
13	2.00	1.17	0.06	0.0436
	3.12	1.83	0.03	0.0090
	3.69	2.16	0.09	0.0192
	4.17	2.44	0.17	0.0284
	4.91	2.88	0.22	0.0265
	6.01	3.52	0.14	0.0113
	6.91	4.05	0.34	0.0207
	8.03	4.71	0.57	0.0257

Table Pressure drop test continues.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m ³ /h]	Pressure drop - Δp [mbar]	Factor - F
14	1.82	1.07	-0.12 ¹⁾	-0.1053
	2.05	1.20	-0.11 ¹⁾	-0.0761
	2.41	1.41	-0.07 ¹⁾	-0.0351
	2.81	1.65	-0.02 ¹⁾	-0.0074
	3.09	1.81	0.05	0.0152
	3.63	2.13	0.07	0.0154
	4.18	2.45	0.13	0.0216
	4.83	2.83	0.25	0.0312
	5.60	3.28	0.38	0.0353
	6.42	3.76	0.56	0.0395
	7.63	4.47	0.78	0.0390
	8.82	5.17	1.08	0.0404

¹⁾ Pressure increase or no measurable pressure drop respectively.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m ³ /h]	Pressure drop - Δp [mbar]	Factor - F
15	2.32	1.36	-0.10 ²⁾	-0.0540
	2.70	1.58	-0.07 ²⁾	-0.0279
	3.09	1.81	-0.02 ²⁾	-0.0061
	3.45	2.02	0.01	0.0024
	3.85	2.26	0.08	0.0157
	4.30	2.52	0.18	0.0283
	5.03	2.95	0.26	0.0299
	5.68	3.33	0.43	0.0388
	6.74	3.95	0.65	0.0416
	7.85	4.60	0.91	0.0430
	9.35	5.48	1.08	0.0404

²⁾ Pressure increase or no measurable pressure drop respectively.

Table Pressure drop test continues.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m³/h]	Pressure drop - Δp [mbar]	Factor - F
16	1.63	3.12	-0.13 ¹⁾	-0.0134
	1.78	3.40	-0.10 ¹⁾	-0.0086
	2.09	3.99	-0.07 ¹⁾	-0.0044
	2.37	4.53	-0.04 ¹⁾	-0.0019
	2.72	5.20	0	0
	3.16	6.04	0.04	0.0011
	3.64	6.96	0.12	0.0025
	4.23	8.08	0.30	0.0046
	4.91	9.38	0.46	0.0052
	5.82	11.12	0.68	0.0055
	6.76	12.92	0.94	0.0056
	7.94	15.18	1.25	0.0054
	9.16	17.51	1.71	0.0056

¹⁾ Pressure increase or no measurable pressure drop respectively.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m³/h]	Pressure drop - Δp [mbar]	Factor - F
17	2.49	4.76	-0.07 ²⁾	-0.0031
	2.76	5.28	-0.05 ²⁾	-0.0018
	3.01	5.75	0.03	0.0009
	3.43	6.56	0.10	0.0023
	3.88	7.42	0.15	0.0027
	4.56	8.72	0.28	0.0037
	5.43	10.38	0.48	0.0045
	6.24	11.93	0.69	0.0049
	7.24	13.84	0.91	0.0048
	8.45	16.15	1.28	0.0049

²⁾ Pressure increase or no measurable pressure drop respectively.

Table Pressure drop test continues.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m³/h]	Pressure drop - Δp [mbar]	Factor - F
18	2.29	4.37	-0.08 ¹⁾	-0.0041
	2.45	4.68	-0.07 ¹⁾	-0.0032
	2.80	5.35	0.03	0.0010
	3.06	5.85	0.04	0.0012
	3.45	6.59	0.08	0.0018
	3.90	7.45	0.17	0.0031
	4.58	8.75	0.27	0.0035
	5.49	10.49	0.48	0.0044
	6.54	12.50	0.73	0.0047
	7.56	14.45	1.02	0.0049
	8.71	16.65	1.31	0.0047

¹⁾ Pressure increase or no measurable pressure drop respectively.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m³/h]	Pressure drop - Δp [mbar]	Factor - F
19	1.58	14.51	0.06	0.0003
	1.83	16.81	0.19	0.0007
	2.09	19.20	0.30	0.0008
	2.39	21.96	0.44	0.0009
	2.67	24.53	0.62	0.0010
	2.93	26.91	0.78	0.0011
	3.18	29.21	1.01	0.0012
	3.58	32.89	1.28	0.0012
	4.01	36.84	1.62	0.0012
	4.34	39.87	1.96	0.0012
	4.61	42.35	2.34	0.0013

A speed of $V \geq 7.5$ m/s at a used pressure of (25 ± 0.5) mbar was not obtained.

Table Pressure drop test continues.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m ³ /h]	Pressure drop - Δp [mbar]	Factor - F
20	0.19	1.75	0.04	0.0131
	0.40	3.67	0.13	0.0096
	0.59	5.42	0.22	0.0075
	0.84	7.72	0.32	0.0054
	1.08	9.92	0.44	0.0045
	1.41	12.95	0.64	0.0038
	1.79	16.44	0.88	0.0033
	2.29	21.04	1.21	0.0027
	2.69	24.71	1.55	0.0025

A speed of $V \geq 7.5$ m/s at a used pressure of (25 ± 0.5) mbar was not obtained.

Sample no.	Velocity of flow - V [m/s]	Flow rate - Q [m ³ /h]	Pressure drop - Δp [mbar]	Factor - F
21	1.02	9.37	0.04	0.0005
	1.24	11.39	0.12	0.0009
	1.50	13.78	0.24	0.0013
	1.75	16.08	0.39	0.0015
	2.06	18.92	0.59	0.0016
	2.39	21.96	0.78	0.0016
	2.71	24.89	0.98	0.0016
	3.19	29.30	1.41	0.0016
	3.62	33.25	1.82	0.0016

A speed of $V \geq 7.5$ m/s at a used pressure of (25 ± 0.5) mbar was not obtained.

4.8 Resistance to impact stress

Dim. outlet	Weight [kg]	Height [m]	Remark	Tightness
Ø 20 mm	2.5	2.0	no failure	yes
Ø 32 mm	2.5	2.0	no failure	yes
Ø 63 mm	2.5	2.0	no failure	yes

4.9 Resistance to cohesion (peeling)

As per test report no. 64267/04 this test was already carried out with a positive result.

5 Summary

Tapping saddles made of polyethylene PE 100 for pipes made of PE 80 for the supply of gaseous fuels, dimensions: Ø 63 mm, Ø 110 mm and Ø 125 mm, supplied by the company Firat Plastik, Kaucuk San. ve TIC. A.S., Istanbul, Turkey, were tested.

The tapping saddles meet - except for the missing differentiation of the outlet dimension regarding the marking - the requirements according to DIN EN 1555-3:2003-04.