

3. TPI TEST REPORT (MPA & SUHAIMI)

Materialprüfungsamt Nordrhein-Westfalen

Prüfen · Überwachen · Zertifizieren

Certificate of Conformity

MPA NRW- 00631-01

(Version: 02)

This is to certify that the construction product:

Vitrified clay pipes and pipe joints for drains and sewers according to

- System F - nominal diameters DN 100 - DN 150

- System C - nominal diameters DN 200 - DN 1200

of the manufacturer:

Saudi Vitrified Clay Pipes Co., Ltd

P.O.Box 6415, Riyadh 11442, Kingdom of Saudi Arabia

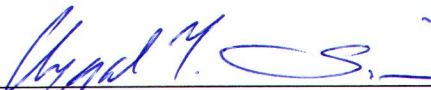
according to the MPA NRW assessment report no. **220000631-16** corresponds to the certification program **V202000** of the MPA NRW and meets the requirements of the standard:

DIN EN 295-1: 2013

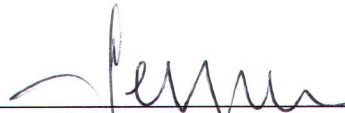
The assessment report is part of this certificate.

The certificate is valid until **18.04.2022**.

Dortmund, 19.04.2017


Dipl.-Ing. Tayyar Uysal Volkmar Seidel
Inspectors




Dipl.-Ing. Jürgen Jessen
Head of the certification body

This Certificate consists of 1 page.

This Certificate replaces the Certificate no. 220000631-1/3 dated
06.03.2014.

The original of this document was issued in German language. In case of
doubt only the German version is valid.



Test Report No.

22000631-17-U-01-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system F according to EN 295-1.
Designation: **DN 100 x 1000 - System F - 34 kN/m**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	100.8	101.6	102.1	≥ 96	--	+
	Socket	100.2	99.7	99.8			+
Length l [mm]	min.	1035	1033	1035	1000	+40 -10	+
	max.	1038	1038	1037			
Deviation from squareness of the ends [mm]	Spigot	2.1	1.6	4.1	≤ 6	--	+
	Socket	2.0	2.3	3.9			+
Deviation from straightness [mm/m]		1.2	2.7	1.4	≤ 5	--	+
Outside diameter d_3 [mm]	Spigot	130.8	132.1	132.2	131.0	± 1.5	+
Thickness of the wall s_1 [mm]	Spigot	15.1	14.8	15.2	--	--	--

+ = complies with requirement n = does NOT comply with requirement -- = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.14 and 5.9

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m^2).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m^2]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 42	45.3
2				40.5
3				40.6
Set values:	no leakage no wet areas	≤ 0.040	≥ 42	≥ 34
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO 236-95
 Manufacturer's identification: SVCP 2
 Date of manufacturing: 25.10.2016 - 25.10.2016 - 25.10.2016
 Nominal size: DN 100 MM
 Class: F - 34 KN/M
 Identification symbol of the third party certification body: --

2.5 Air tightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **5 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	5	yes

2.6 Water tightness of the pipe joint under angular deflection according to DIN EN 295-1, clause 6.2.2

Test performed according to DIN EN 295-1, clause 6.2.2 and DIN EN 295-3, clause 21.2 on the connection of two pipes.

DIN EN 295-1, clause 6.2.2	Test pressure [bar]	Test time [min]	Requirement fulfilled
DN 100-200 : 80mm/m	0.05 0.50	5	yes yes
DN 225-500 : 30mm/m			
DN 600-800 : 20mm/m			
DN > 800 : 10mm/m			

2.7 Water tightness of the pipe joint under shear load according to DIN EN 295-1, clause 6.2.3

Test performed according to EN 295-3, clause 21.3 on the connection of two pipes.

DIN EN 295-1, clause 6.2.3	Shear load [kN]	Test pressure [bar]	Test time [min]	Requirement fulfilled
25 N/mm nominal size in cl. 160	2.5	0.05 0.50	15	yes yes
31.25 N/mm nominal size in cl. 200				
37.5 N/mm nominal size in cl. 240				

2.8 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled
1	558.2	576.2	18.0	3.2	$\leq 6\%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 100 x 1000 - System F - 34 kN/m** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-03-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 200 SS x 1750 - System C - 32 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

The results of the tests refer exclusively to the samples named above.

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This report consists of 4 pages.

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	202.3	202.1	202.3	≥ 195	--	+
	Socket	201.2	200.3	200.8			+
Length l [mm]	min.	1760	1746	1755	1750	+70 -17.5	+
	max.	1763	1749	1758			
Deviation from squareness of the ends [mm]	Spigot	1.8	4.3	1.2	≤ 6	--	+
	Socket	2.1	3.2	4.2			+
Deviation from straightness [mm/m]		1.0	0.8	2.1	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		260.2	260.1	260.2	260.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	32.9	33.3	33.5	Difference ≤ 4	--	+
	a_m	30.7	31.0	30.2			
Thickness of the wall s_1 [mm]	Spigot	22.0	21.8	21.7	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 66	52.9
2				50.6
3				58.3
Set values:	no leakage no wet areas	≤ 0.040	≥ 66	≥ 32
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP
Date of manufacturing:	30.10.2017 - 30.10.2017 - 30.10.2017
Nominal size:	DN 200 SS - Class 160
Class:	C - Class 160 - 45 KN/M *
Identification symbol of the third party certification body:	--

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Bending moment resistance according to DIN EN 295-1, clause 5.11

The bending moment resistance was tested according to DIN EN 295-1, clause 5.11 and DIN EN 295-3, clause 9.3 by using a three-point longitudinal bending strength test. The test setup corresponded to DIN EN 295-3, figure 9.

Serial number of sample	Breaking force [kN]	Bending moment resistance [kNm]
1	51.6	20.0
2	51.5	20.0
3	45.1	17.5
Requirement	--	≥ 6,2
fulfills requirement	--	yes

2.6 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **5 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	5	yes

2.7 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1355.7	1369.2	13.5	0.9	$\leq 6\%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 200 SS x 1750 - System C - 32 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-06-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 250 ES x 2000 - System C - 60 kN/m - Class 240**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods“, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	252.6	252.2	252.5	≥ 244	--	+
	Socket	249.8	250.3	249.7			+
Length l [mm]	min.	2000	1995	1997	2000	+80 -20	+
	max.	2003	1998	1999			
Deviation from squareness of the ends [mm]	Spigot	1.6	3.8	1.6	≤ 6	--	+
	Socket	0.7	1.2	2.0			+
Deviation from straightness [mm/m]		0.8	1.8	1.4	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		341.7	341.7	341.6	341.5	± 0.5	+
Invert conformity [mm]	a_{sp-1}	47.6	48.1	47.3	Difference ≤ 4	--	+
	a_m	45.0	45.4	44.8			
Thickness of the wall s_1 [mm]	Spigot	32.5	32.3	32.3	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 66	100.8
2				85.2
3				84.4
Set values:	no leakage no wet areas	≤ 0.040	≥ 66	≥ 60
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP 2
Date of manufacturing:	08.04.2016 - 06.06.2016 - 11.04.2016
Nominal size:	DN 250 ES
Class:	C - Class 240 - 60 KN/M
Identification symbol of the third party certification body:	--

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **6 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	6	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1731.4	1797.3	65.9	3.8	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 250 ES x 2000 - System C - 60 kN/m - Class 240** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018
 By order

Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-09-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1:2013
Designation **DN 350 ES x 2000 - System C - 70 kN/m - Class 200**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	357.7	358.6	357.4	≥ 341	--	+
	Socket	355.0	356.2	355.5			+
Length l [mm]	min.	2000	2004	2005	2000	+80 -20	+
	max.	2002	2007	2007			
Deviation from squareness of the ends [mm]	Spigot	5.5	3.8	2.8	≤ 7	--	+
	Socket	0.6	1.6	2.2			+
Deviation from straightness [mm/m]		1.4	0.5	0.6	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		459.1	458.8	459.0	459.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	53.9	53.7	53.2	Difference ≤ 4	--	+
	a_m	50.3	50.9	50.7			
Thickness of the wall s_1 [mm]	Spigot	39.4	39.2	39.3	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 90	114.6
2				105.9
3				108.4
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 70
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP 2
 Date of manufacturing: 18.03.2017 - 18.03.2017 - 18.03.2017
 Nominal size: DN 350 ES
 Class: C - Class 200 - 70 KN/M
 Identification symbol of the third party certification body: --

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **7 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	8	yes

2.6 Water tightness of the pipe joint under angular deflection according to DIN EN 295-1, clause 6.2.2

Test performed according to DIN EN 295-1, clause 6.2.2 and DIN EN 295-3, clause 21.2 on the connection of two pipes.

DIN EN 295-1, clause 6.2.2	Test pressure [bar]	Test time [min]	Requirement fulfilled
DN 100-200 : 80mm/m DN 225-500 : 30mm/m DN 600-800 : 20mm/m DN > 800 : 10mm/m	0.05 0.50	5	yes yes

2.7 Water tightness of the pipe joint under shear load according to DIN EN 295-1, clause 6.2.3

Test performed according to EN 295-3, clause 21.3 on the connection of two pipes.

DIN EN 295-1, clause 6.2.3	Shear load [kN]	Test pressure [bar]	Test time [min]	Requirement fulfilled
25 N/mm nominal size in cl. 160 31.25 N/mm nominal size in cl. 200 37.5 N/mm nominal size in cl. 240	10.94	0.05 0.50	15	yes yes

2.8 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	2287.9	2347.7	59.8	2.6	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 350 ES x 2000 - System C - 70 kN/m - Class 200** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No.

220000631-17-U-12-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 450 ES x 2000 - System C - 72 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	454.6	454.9	455.5	≥ 439	--	+
	Socket	452.3	453.5	453.2			+
Length l [mm]	min.	2005	2005	2004	2000	+80 -20	+
	max.	2009	2008	2008			
Deviation from squareness of the ends [mm]	Spigot	2.9	2.2	2.4	≤ 8	--	+
	Socket	4.5	3.2	5.7			+
Deviation from straightness [mm/m]		0.7	0.5	0.8	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		579.4	579.4	579.3	579.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	65.3	65.1	65.4	Difference ≤ 4	--	+
	a_m	62.6	62.2	61.8			
Thickness of the wall s_1 [mm]	Spigot	49.2	49.3	49.2	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0,5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.009	≥ 90	200.8
2				201.7
3				201.9
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 72
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP 2
 Date of manufacturing: 31.07.2017 - 31.07.2017 - 31.07.2017
 Nominal size: DN 450 ES
 Class: C - Class 160 - 80 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **11 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	11	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	2790.3	2867.9	77.6	2.8	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 450 ES x 2000 - System C - 72 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No. 220000631-17-U-16-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 700 ES x 2000 - System C - 84 kN/m - Class 120**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	712.8	712.5	712.7	≥ 682	--	+
	Socket	709.7	710.2	710.4			+
Length l [mm]	min.	1995	1998	1995	2000	+80 -20	+
	max.	2000	2003	2000			
Deviation from squareness of the ends [mm]	Spigot	1.4	3.7	6.5	≤ 14	--	+
	Socket	2.1	1.4	2.7			+
Deviation from straightness [mm/m]		1.0	1.1	1.6	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		871.4	871.4	871.4	871.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	82.3	84.1	84.4	Difference ≤ 7	--	+
	a_m	78.4	79.7	79.5			
Thickness of the wall s_1 [mm]	Spigot	61.4	61.7	61.5	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.013	≥ 90	100.6
2				101.1
3				97.0
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 84
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 04.10.2017 - 05.10.2017 - 03.10.2017
 Nominal size: DN 700 ES
 Class: C - Class 120 - 90 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **17 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	17	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	3352.1	3527.8	175.7	5.2	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 700 ES x 2000 - System C - 84 kN/m - Class 120** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018
 By order

Tayyar Uysal

Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No.

22000631-17-U-02-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 150 x 1500 - System F - 34kN/m**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods“, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	150.4	150.8	150.9	≥ 146	--	+
	Socket	149.2	149.9	149.8			+
Length l [mm]	min.	1510	1505	1505	1500	+60 -15	+
	max.	1515	1510	1508			
Deviation from squareness of the ends [mm]	Spigot	4.3	2.5	1.3	≤ 6	--	+
	Socket	2.0	3.1	1.5			+
Deviation from straightness [mm/m]		1.4	0.7	1.3	≤ 4.5	--	+
Outside diameter d_3 [mm]	Spigot	187.4	185.9	184.8	186.0	± 2	+
Thickness of the wall s_1 [mm]	Spigot	17.1	16.9	17.1	--	--	--

+ = complies with requirement n = does NOT comply with requirement -- = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 42	52.7
2				52.3
3				48.1
Set values:	no leakage no wet areas	≤ 0.040	≥ 42	≥ 34
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP
Date of manufacturing:	05.06.2017 - 05.06.2017 - 05.06.2017
Nominal size:	DN 150 SS
Class:	F - 40 KN/M*
Identification symbol of the third party certification body:	--

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Bending moment resistance according to DIN EN 295-1, clause 5.11

The bending moment resistance was tested according to DIN EN 295-1, clause 5.11 and DIN EN 295-3, clause 9.3 by using a three-point longitudinal bending strength test. The test setup corresponded to DIN EN 295-3, figure 9.

Serial number of sample	Breaking force [kN]	Bending moment resistance [kNm]
1	28.7	8.8
2	27.5	8.5
3	30.5	9.4
Requirement	--	≥ 4.0
fulfills requirement	--	yes

2.6 Air tightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **5 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	5	yes

2.7 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1161.3	1168.2	6.9	0.5	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 150 x 1500 - System F - 34kN/m** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No. 22000631-17-U-04-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 200 ES x 2000 - System C - 48 kN/m - Class 240**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	199.8	199.4	200.5	≥ 195	--	+
	Socket	198.2	198.5	199.6			+
Length l [mm]	min.	2022	2010	2015	2000	+80 -20	+
	max.	2025	2012	2018			
Deviation from squareness of the ends [mm]	Spigot	3.8	1.8	2.2	≤ 6	--	+
	Socket	2.6	2.4	0.8			+
Deviation from straightness [mm/m]		1.6	1.4	1.1	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		275.2	275.2	275.3	275.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	42.9	43.3	43.6	Difference ≤ 4	--	+
	a_m	39.4	40.3	41.4			
Thickness of the wall s_1 [mm]	Spigot	28.9	28.8	29.2	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.008	≥ 66	83.8
2				94.1
3				91.8
Set values:	no leakage no wet areas	≤ 0.040	≥ 66	≥ 48
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP 2
 Date of manufacturing: 29.05.2017 - 29.05.2017 - 29.05.2017
 Nominal size: DN 200 ES
 Class: C - Class 240 - 60 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Bending moment resistance according to DIN EN 295-1, clause 5.11

The bending moment resistance was tested according to DIN EN 295-1, clause 5.11 and DIN EN 295-3, clause 9.3 by using a three-point longitudinal bending strength test. The test setup corresponded to DIN EN 295-3, figure 9.

Serial number of sample	Breaking force [kN]	Bending moment resistance [kNm]
1	52.6	20.4
2	59.3	23.0
3	50.6	19.6
Requirement	--	≥ 8.6
fulfills requirement	--	ja

2.6 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **5 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	5	yes

2.7 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1825.8	1876.4	50.6	2.8	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 200 ES x 2000 - System C - 48 kN/m - Class 240** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-05-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 250 SS x 2000 - System C - 40 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	247.4	247.7	248.2	≥ 244	--	+
	Socket	246.7	246.3	245.8			+
Length l [mm]	min.	2005	2000	2010	2000	+80 -20	+
	max.	2008	2004	2012			
Deviation from squareness of the ends [mm]	Spigot	3.3	2.5	1.4	≤ 6	--	+
	Socket	1.1	1.8	1.9			+
Deviation from straightness [mm/m]		2.3	1.1	1.4	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		317.4	317.3	317.4	317.5	± 0.5	+
Invert onformity [mm]	a_{sp-1}	38.7	38.8	39.6	Difference ≤ 4	--	+
	a_m	35.2	36.7	37.0			
Thickness of the wall s_1 [mm]	Spigot	23.0	23.4	23.5	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 42	54.6
2				62.8
3				59.1
Set values:	no leakage no wet areas	≤ 0.040	≥ 42	≥ 40
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP 2
Date of manufacturing:	08.06.2017 - 08.06.201 - 08.06.2017
Nominal size:	DN 250 SS
Class:	C - Class 160 - 50 KN/M *
Identification symbol of the third party certification body:	--

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **6 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	6	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	989.4	1002.7	13.3	1.3	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 250 SS x 2000 - System C - 40 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-07-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1:2013
Designation **DN 300 SS x 2000 - System C - 48 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	297.8	297.4	298.1	≥ 293	--	+
	Socket	295.5	296.1	295.7			+
Length l [mm]	min.	2005	2020	2010	2000	+80 -20	+
	max.	2008	2022	2013			
Deviation from squareness of the ends [mm]	Spigot	2.2	1.9	0.6	≤ 6	--	+
	Socket	1.4	1.0	0.3			+
Deviation from straightness [mm/m]		1.1	0.9	0.3	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		371.8	371.8	371.7	371.5	± 0.5	+
Invert conformity [mm]	a_{sp-1}	41.9	40.5	41.4	Difference ≤ 4	--	+
	a_m	38.6	37.1	38.5			
Thickness of the wall s_1 [mm]	Spigot	27.9	27.8	27.8	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0,5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.011	≥ 66	51.7
2				57.8
3				58.3
Set values:	no leakage no wet areas	≤ 0.040	≥ 66	≥ 48
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 03.11.2017 - 03.11.2017 - 03.11.2017
 Nominal size: DN 300 SS
 Class: C - Class 160 - 55 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **7 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	7	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1730.0	1799.4	69.4	4.0	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 300 SS x 2000 - System C - 48 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-08-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1:2013
Designation **DN 300 ES x 2000 - System C - 72 kN/m - Class 240**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods“, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	305.2	304.8	306.3	≥ 293	--	+
	Socket	302.7	303.3	304.2			+
Length l [mm]	min.	2018	2005	2016	2000	+80 -20	+
	max.	2020	2010	2018			
Deviation from squareness of the ends [mm]	Spigot	4.3	2.7	1.9	≤ 6	--	+
	Socket	1.8	1.5	2.6			+
Deviation from straightness [mm/m]		0.1	0.7	0.4	≤ 4	--	+
Socket fairing internal diameter d_4 [mm]		3988	398.8	398.7	398.5	± 0.5	+
Invert conformity [mm]	a_{sp-1}	47.4	48.6	48.5	Difference ≤ 4	--	+
	a_m	44.2	45.4	45.6			
Thickness of the wall s_1 [mm]	Spigot	36.2	36.3	35.9	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m^2).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m^2]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 90	88.3
2				87.2
3				88.6
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 72
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 06.11.2017 - 06.11.2017 - 06.11.2017
 Nominal size: DN 300 ES
 Class: C - Class 240 - 72 KN/M
 Identification symbol of the third party certification body: --

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **7 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	7	yes

2.6 Water tightness of the pipe joint under angular deflection according to DIN EN 295-1, clause 6.2.2

Test performed according to DIN EN 295-1, clause 6.2.2 and DIN EN 295-3, clause 21.2 on the connection of two pipes.

DIN EN 295-1, clause 6.2.2	Test pressure [bar]	Test time [min]	Requirement fulfilled
DN 100-200 : 80mm/m DN 225-500 : 30mm/m DN 600-800 : 20mm/m DN > 800 : 10mm/m	0.05 0.50	5	yes yes

2.7 Water tightness of the pipe joint under shear load according to DIN EN 295-1, clause 6.2.3

Test performed according to EN 295-3, clause 21.3 on the connection of two pipes.

DIN EN 295-1, clause 6.2.3	Shear load [kN]	Test pressure [bar]	Test time [min]	Requirement fulfilled
25 N/mm nominal size in cl. 160 31.25 N/mm nominal size in cl. 200 37.5 N/mm nominal size in cl. 240	11.25	0.05 0.50	15	yes yes

2.8 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	2363.9	2465.3	101.4	4.3	$\leq 6 \%$	yes

4 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 300 ES x 2000 - System C - 72 kN/m - Class 240** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-10-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 400 SS x 2000 - System C - 48 kN/m - Class 120**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	401.5	401.7	401.3	≥ 390	--	+
	Socket	399.3	398.9	399.5			+
Length l [mm]	min.	2020	2023	2022	2000	+80 -20	+
	max.	2025	2024	2025			
Deviation from squareness of the ends [mm]	Spigot	1.1	5.7	1.5	≤ 8	--	+
	Socket	3.2	1.5	2.3			+
Deviation from straightness [mm/m]		0.6	0.7	1.3	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		483.7	483.7	483.8	483.5	± 0.5	+
Invert conformity [mm]	$a_{sp}-1$	43.5	43.2	43.9	Difference ≤ 4	--	+
	a_m	41.3	41.2	41.5			
Thickness of the wall s_1 [mm]	Spigot	29.3	29.4	29.3	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.004	≥ 66	70.9
2				68.6
3				64.2
Set values:	no leakage no wet areas	≤ 0.040	≥ 66	≥ 48
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP
Date of manufacturing:	07.06.2017 - 07.06.2017 - 08.06.2017
Nominal size:	DN 400 SS
Class:	C - Class 120 - 64 KN/M *
Identification symbol of the third party certification body:	--

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **10 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	10	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1639.8	1693.0	53.2	3.2	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 400 SS x 2000 - System C - 48 kN/m - Class 120** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

220000631-17-U-11-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 400 ES x 2000 - System C - 80 kN/m - Class 200**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	402.6	401.8	401.9	≥ 390	--	+
	Socket	400.1	399.6	398.5			+
Length l [mm]	min.	2011	2010	2005	2000	+80 -20	+
	max.	2015	2013	2008			
Deviation from squareness of the ends [mm]	Spigot	2.9	2.7	3.7	≤ 8	--	+
	Socket	5.4	3.4	2.9			+
Deviation from straightness [mm/m]		1.1	0.9	0.4	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		515.8	515.8	515.7	515.5	± 0.5	+
Invert conformity [mm]	a_{sp-1}	61.4	60.2	60.9	Difference ≤ 4	--	+
	a_m	57.5	56.8	57.9			
Thickness of the wall s_1 [mm]	Spigot	45.7	45.8	45.8	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.006	≥ 90	116.9
2				122.4
3				103.9
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 80
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 18.11.2017 - 16.11.2017 - 19.11.2017
 Nominal size: DN 400 ES
 Class: C - Class 200 - 96 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **10 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	10	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	2610.0	2694.4	84.4	3.2	$\leq 6\%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 400 ES x 2000 - System C - 80 kN/m - Class 200** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No.

220000631-17-U-13-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 500 SS x 2000 - System C - 60 kN/m - Class 120**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	497.8	499.4	499.2	≥ 487	--	+
	Socket	495.5	496.3	496.8			+
Length l [mm]	min.	1995	2005	2000	2000	+80 -20	+
	max.	1998	2007	2004			
Deviation from squareness of the ends [mm]	Spigot	2.4	1.4	4.0	≤ 10	--	+
	Socket	2.5	5.9	5.4			+
Deviation from straightness [mm/m]		1.1	0.8	1.0	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		605.4	605.5	605.4	605.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	52.6	53.4	53.3	Difference ≤ 5	--	+
	a_m	50.2	50.6	49.9			
Thickness of the wall s_1 [mm]	Spigot	36.8	36.5	36.7	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.006	≥ 90	87.9
2				99.7
3				91.1
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 60
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP 2
 Date of manufacturing: 10.04.2017 - 11.04.2017 - 10.04.2017
 Nominal size: DN 500 SS
 Class: C - Class 120 - 65 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **12 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	12	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	1991.3	2059.4	68.1	3.4	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 500 SS x 2000 - System C - 60 kN/m - Class 120** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018
 By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-14-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 500 ES x 2000 - System C - 80 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	502.8	502.5	502.7	≥ 487	--	+
	Socket	500.6	500.2	500.3			+
Length l [mm]	min.	1998	1996	2000	2000	+80 -20	+
	max.	2000	2000	2005			
Deviation from squareness of the ends [mm]	Spigot	3.8	3.4	4.8	≤ 10	--	+
	Socket	3.1	2.0	1.0			+
Deviation from straightness [mm/m]		1.4	0.8	0.4	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		637.3	637.4	637.4	637.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	69.0	69.8	69.3	Difference ≤ 5	--	+
	a_m	65.3	66.9	65.8			
Thickness of the wall s_1 [mm]	Spigot	53.1	53.0	53.2	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.008	≥ 90	109.2
2				136.8
3				140.1
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 80
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP 2
Date of manufacturing:	02.09.2017 - 10.08.2017 - 02.08.2017
Nominal size:	DN 500 ES
Class:	C - Class 160 - 80 KN/M
Identification symbol of the third party certification body:	--

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **12 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	12	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	2495.6	2577.1	81.5	3.3	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 500 ES x 2000 - System C - 80 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

22000631-17-U-15-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 600 ES x 2000 - System C - 96 kN/m - Class 160**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	612.7	611.6	612.9	≥ 585	--	+
	Socket	608.4	609.3	608.8			+
Length l [mm]	min.	2010	2010	2012	2000	+80 -20	+
	max.	2015	2014	2015			
Deviation from squareness of the ends [mm]	Spigot	4.2	3.8	2.6	≤ 12	--	+
	Socket	2.8	3.8	3.2			+
Deviation from straightness [mm/m]		1.8	1.3	1.1	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		758.3	758.3	758.2	758.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	76.6	76.3	76.9	Difference ≤ 6	--	+
	a_m	72.4	71.0	72.8			
Thickness of the wall s_1 [mm]	Spigot	58.2	58.1	58.2	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m^2).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W_{15} [l/m^2]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.013	≥ 90	136.3
2				144.1
3				115.3
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 96
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 09.09.2017 - 28.08.2017 - 13.08.2017
 Nominal size: DN 600 ES
 Class: C - Class 160 - 96 KN/M
 Identification symbol of the third party certification body: --

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **14 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	14	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	3178.0	3321.7	143.7	4.5	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 600 ES x 2000 - System C - 96 kN/m - Class 160** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Test Report No.

220000631-17-U-17-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 800 ES x 2000 - System C - 96 kN/m - Class 120**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Require- ment fulfilled ?
Minimum bore d_1 [mm]	Spigot	811.6	810.9	811.2	≥ 780	--	+
	Socket	807.4	809.1	808.6			+
Length l [mm]	min.	2000	1999	2000	2000	+80 -20	+
	max.	2005	2004	2004			
Deviation from squareness of the ends [mm]	Spigot	5.1	6.0	4.9	≤ 16	--	+
	Socket	4.8	9.9	7.3			+
Deviation from straightness [mm/m]		1.5	1.6	1.1	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		976.4	976.4	976.3	976.0	± 0.5	+
Invert conformity [mm]	a_{sp-1}	88.0	88.2	87.6	Difference ≤ 8	--	+
	a_m	84.0	84.6	84.1			
Thickness of the wall s_1 [mm]	Spigot	66.3	66.7	66.5	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

* = manufacturer specifications

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W15 [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.008	≥ 90	115.4
2				115.3
3				136.3
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 96
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking:	EN 295-1, SASO/GSO
Manufacturer's identification:	SVCP
Date of manufacturing:	27.04.2017 - 27.04.2017 - 02.05.2017
Nominal size:	DN 800 ES
Class:	C - class 120 - 96 KN/M
Identification symbol of the third party certification body:	--

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **19 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	19	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	3468.6	3618.3	149.7	4.3	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 800 ES x 2000 - System C - 96 kN/m - Class 120** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018
 By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No.

220000631-17-U-18-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000

Date of visits/sampling

04 - 08.12.2017

Date of testing

04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 900 ES x 2000 - System C - 95 kN/m**

Description of the tests/underlying specifications

DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013

DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013

DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	908.0	907.0	908.0	≥ 878	--	+
	Socket	905.0	905.0	906.0			+
Length l [mm]	min.	2005	2004	2005	2000	+80 -20	+
	max.	2010	2007	2008			
Deviation from squareness of the ends [mm]	Spigot	4.0	3.9	5.0	≤ 18	--	+
	Socket	5.2	9.3	6.8			+
Deviation from straightness [mm/m]		0.5	0.8	0.6	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		1096.5	1096.4	1096.5	1096.0*	$\pm 0.5^*$	+
Invert conformity [mm]	a_{sp-1}	97.2	96.2	98.1	Difference ≤ 9	--	+
	a_m	91.4	89.6	93.2			
Thickness of the wall s_1 [mm]	Spigot	69.2	70.2	69.4	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

* = manufacturer specifications

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.002	≥ 90	103.5
2				103.7
3				121.5
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 86
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 01.09.2016 - 05.12.2016 - 04.12.2016
 Nominal size: DN 900 ES
 Class: C - Class 95 - 95 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **22 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	22	yes

2.6 Water tightness of the pipe joint under angular deflection according to DIN EN 295-1, clause 6.2.2

Test performed according to DIN EN 295-1, clause 6.2.2 and DIN EN 295-3, clause 21.2 on the connection of two pipes.

DIN EN 295-1, clause 6.2.2	Test pressure [bar]	Test time [min]	Requirement fulfilled
DN 100-200 : 80mm/m DN 225-500 : 30mm/m DN 600-800 : 20mm/m DN > 800 : 10mm/m	0.05 0.50	5	yes yes

2.7 Water tightness of the pipe joint under shear load according to DIN EN 295-1, clause 6.2.3

Test performed according to EN 295-3, clause 21.3 on the connection of two pipes.

DIN EN 295-1, clause 6.2.3	Shear load [kN]	Test pressure [bar]	Test time [min]	Requirement fulfilled
25 N/mm nominal size in cl. 160 31.25 N/mm nominal size in cl. 200 37.5 N/mm nominal size in cl. 240	22.5	0.05 0.50	15	yes yes

2.8 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	3753.4	3927.5	174.1	4.6	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 900 ES x 2000 - System C - 95 kN/m** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order




Dipl.-Ing. Tayyar Uysal
 Inspector

Test Report No. 220000631-17-U-19-e

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442

Kingdom of Saudi Arabia

Conclusion of the contract

08.12.2000
Date of visits/sampling
04 - 08.12.2017
Date of testing
04 - 08.12.2017

Order

Monitoring test 2017 according to control agreement No. 22000631 dated Dec 08, 2000 including audit/inspection of testing, controlling of records and sampling at the client's production sites Factory Plant 1 and Factory Plant 2, 2nd Industrial Area, Riyadh 11442, KSA.

Samples

Vitrified clay pipes jointed by system C according to EN 295-1.
Designation: **DN 1000 ES x 2000 - System C - 95 kN/m - Class 95**

Description of the tests/underlying specifications

- DIN EN 295-1 „Vitrified clay pipe systems for drains and sewers – Part 1: Requirements for pipes, fittings and joints“, May 2013
- DIN EN 295-2 „Vitrified clay pipe systems for drains and sewers – Part 2: Evaluation of conformity and sampling“, May 2013
- DIN EN 295-3 „Vitrified clay pipe systems for drains and sewers – Part 3: Test methods “, March 2012

The results of the tests refer exclusively to the samples named above.
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This report consists of 4 pages.

1 Sampling

The manufacture of the vitrified clay pipes takes place in both of the production plants either Factory Plant 1 or Factory Plant 2 in the 2nd Industrial Area, Riyadh, 11442, KSA. The sampling was conducted accordingly.

2 Results of the tests

2.1 Appearance of the pipes

The pipes were sounding clear and were free from such defects as would impair their function when in service. The pipes were glazed of dark brown colour.

2.2 Dimensions

Table 1: Dimensions

		Pipe 1	Pipe 2	Pipe 3	Target values in acc. with DIN EN 295-1	Permissible deviations in acc. with DIN EN 295-1	Requirement fulfilled ?
Minimum bore d_1 [mm]	Spigot	1010.0	1008.0	1010.0	≥ 975	--	+
	Socket	1004.0	1006.0	1005.0			+
Length l [mm]	min.	1998	1995	1997	2000	+80 -20	+
	max.	2002	2000	2002			
Deviation from squareness of the ends [mm]	Spigot	5.8	5.5	3.8	≤ 20	--	+
	Socket	4.5	5.1	4.3			+
Deviation from straightness [mm/m]		1.3	0.7	0.4	≤ 3	--	+
Socket fairing internal diameter d_4 [mm]		1203.4	1203.3	1203.4	1203.0*	$\pm 0.5^*$	+
Invert conformity [mm]	a_{sp-1}	99.7	99.2	99.8	Difference ≤ 10	--	+
	a_m	96.4	95.8	96.1			
Thickness of the wall s_1 [mm]	Spigot	76.6	76.5	76.6	--	--	--

+ = complies with requirement n = does NOT comply with requirement - = no input

* = manufacturer specifications

2.3 Watertightness and crushing strength in accordance with DIN EN 295-1, clauses 5.9 and 5.14

For testing the water tightness and in order to determine the water adding value, the vitrified clay pipes were filled with water in accordance with DIN EN 295-1, clause 5.14 and DIN EN 295-3, clause 12, and a water pressure of 0.5 bar was applied for the duration of 1 hour preconditioning time. After another 15 minutes time the water adding value was determined by (l / m²).

For determining the crushing strength of vitrified clay pipes according to DIN EN 295-1, clause 5.9, the pipes were preconditioned according to DIN EN 295-3, clause 7.1.1, method a) (complete immersion in a container filled with water at ambient temperature for a minimum duration time according to EN 295-3, table 1).

Table 2: Watertightness and crushing strength

Samples	Watertightness		Crushing strength	
	Visual inspection of leakage pipe surface	Water addition W ₁₅ [l/m ²]	Preconditioning [hours]	Force at break FN [kN/m]
1	no leakage/dry	0.000	≥ 90	114.7
2				114.9
3				141.6
Set values:	no leakage no wet areas	≤ 0.040	≥ 90	≥ 95
Requirements:	yes	yes	yes	yes

2.4 Marking (impressed)

EN-Marking: EN 295-1, SASO/GSO
 Manufacturer's identification: SVCP
 Date of manufacturing: 30.04.2017 - 29.04.2017 - 29.04.2017
 Nominal size: DN 1000 ES
 Class: C - class 95 - 100 KN/M *
 Identification symbol of the third party certification body: --

*= Pipe marking declares higher crushing strength than the class number to EN 295-1

2.5 Airtightness of the pipes including pipe joint according to DIN EN 295-1, clause 5.18

Test performed according to clause 5.18 of EN 295-1 and section 16 of EN 295-3 on a test setup consisting of 1 pipe by applying an air gauge pressure of 10 mbar for a period of **24 minutes time**. Requirement: The gauge pressure must not drop below 7.5 mbar.

DIN EN 295-1, clause 5.18	Test pressure [mbar]	Permissible Δp [mbar]	Test time [min]	Requirement fulfilled ?
1 Pipe	10	2.5	24	yes

2.6 Water absorption (boiling test) in accordance with DIN EN 295-1, clause 5.1.3

The specimen was tested in accordance with DIN EN 295-3 section 28.2 by drying at a temperature of $(115 \pm 5) ^\circ\text{C}$ until in two consecutive weighings no further mass loss could be observed. Subsequently, the specimen was immersed in a container of cold water and brought to the boil. The water was maintained boiling for 1 hour time. After cooling, the specimen was taken out of the water and gently dried with a towel and reweighed.

Sample No.	Dry weight [g]	Weight after 1 hour boiling [g]	Water absorption [g]	Water absorption [%]	Set values DIN EN 295-1	Requirement fulfilled ?
1	4141.1	4331.2	190.1	4.6	$\leq 6 \%$	yes

3 Assessment

Concerning the tested characteristics, the tested vitrified clay pipes **DN 1000 ES x 2000 - System C - 95 kN/m - Class 95** meet the requirements of DIN EN 295-1. The results correspond to the results of the internal routine tests.

Dortmund, 12.03.2018

By order



Dipl.-Ing. Tayyar Uysal
 Inspector



Surveillance Report No. 220000631-17-(Sys C)-S-e

March 12, 2018

Client

Saudi Vitrified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date of inspection/sampling

05. – 07.12.2017

Receipt of samples

05.01.2018

Date of testing

until 29.02.2018

Order

Monitoring test according to control agreement No. 22 000631 including audit/inspection of testing, controlling of records and sampling at the client's production site.

Subject matter of tests/samples

Pipe joints for vitrified clay pipes and fittings according to EN 295-1:2013

Description:	Seals for socketted pipes made from polyurethane elastic sealing material and rigid fairing material
Jointing system:	System C
Nominal sizes:	DN 200 up to and including DN 1200
Elastic sealing material (PUR-E):	J77/VP902
Rigid fairing material (PUR-S):	033/033A or KS45/033A, resp.
Manufacturer/supplier :	Frechem GmbH & Co. KG, Germany

Description of sampling

Samples were taken from the stock or from running production at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the MPA NRW.

The results of the tests refer exclusively to the samples named above.

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This Surveillance Report consists of 3 pages and 5 enclosures.

Description of the tests/underlying specifications

DIN EN 295-1:2013-05 "Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings and joints"

related documents:

DIN CEN/TR 16626 DIN SPEC 19629:2014-04 "Vitrified clay pipe systems for drains and sewers - Guidance for voluntary third-party certification procedures"

DIN EN 295-2:2013-05 "Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"

DIN EN 295-3:2012-03 "Vitrified clay pipe systems for drains and sewers - Part 3: Test methods"

DIN EN 681-4:2006-11 "Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 4: Cast polyurethane sealing elements"

Regarding the monitoring tests on vitrified clay pipes see separate reports of MPA NRW No. 220000631-17-U-03 to -19

- Inspection of the production plant and auditing concerning the production according to the regulations including factory production control

Inspection of production and testing and check of the internal control records were performed along with the visits at the client's manufacturing works plant 1 and plant 2, 2nd Industrial Area, Riyadh, 11442, KSA by the agent of MPA NRW.

- Material tests and performance tests

Audit test on base of DIN CEN/TR 16626 DIN SPEC 19629:2014-04, table 1.

Test methods, kind, and quantity of conducted material tests and performance tests are selected according to the appropriate items as listed in EN 295-1, clause 6 and EN 295-2, clauses 5.3.10, 5.3.11, and 5.3.12, respectively. Additionally, material tests according to DIN EN 681-4 for cast polyurethane sealing elements are included. Detailed references to the test standards and requirement standards are given in the enclosures to this report.

The short term joint assembly tests and performance tests on the pipe joints were conducted at the works' laboratory and witnessed by the agent of the MPA NRW.

The material tests on the samples of the polyurethane sealing elements and of the rigid fairing material were conducted at the laboratory of MPA NRW.

Where necessary or specified by the test standards, storage and testing of the samples/specimens were carried out in a standard conditioning atmosphere to DIN EN ISO 291 - 23/50 class 2 unless otherwise expressly stated.

Results of the inspection and tests

- Production capability and performance of factory production control

The existing infrastructure and equipment comply with the requirements for the manufacture of the products in accordance with the regulations.

The factory production control includes production supervision and intermediate and final testing of the products. There are diverse laboratories for the different kinds of performance tests and material tests. The laboratory equipment comprises all necessary test devices with documents of calibration completely available. The performing of factory production control is sufficiently ensured.

Checking of the records resulted to no complaints.

- Material tests and performance tests

See enclosures 1 to 5.

Quality Management System


The conformity of the quality management system with the terms of ISO 9001:2008 was certified by document no. 04100 980025 of TÜV Nord Cert GmbH, Germany, dated 05.02.2016 - valid for the production plant Riyadh of the Saudi Vitrified Clay Pipe Co., Ltd.

Assessment

The results of the inspection and of all of the performed tests comply with the requirements of the underlying specifications.

Dortmund, March 12, 2018

By order


Volkmar Seidel
Inspector



The MPA Certificate of Conformity MPA NRW-00631-01 (Version 02) dated 19.04.2017 remains valid.

Dortmund, March 12, 2018

By Order


M. Sc. Stephan Ulbrich
Head of certification body



Results of the material tests

Properties of polyurethane (PUR) sealing and fairing materials

Supplier: Frechem GmbH & Co. KG, Germany
 Dispensing unit: Plant 1/Old factory, big carousel

Elastic sealing material (PUR-E) **J77/VP 902**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements according to DIN EN 681-4:2006-11
 and DIN EN 295-3:2013-03, clause 18

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Tensile strength	6	N/mm ²	4,1	6,0	5,7	≥ 2
Elongation at break	6	%	92	149	145	≥ 90
Hardness	5	Shore A	65	68	67	67 ± 5
Compression set						
24 h, 70°C	3	%	5,5	7,7	5,7	≤ 20
72 h, 23°C	3	%	1,5	3,7	2,6	≤ 5
Resistance to ageing						
Hardness after 7 d/70°C	5	Shore A	67	68	68	67 ± 5
Stress relaxation in compression						
7 d/23°C	1	%	4,3			≤ 14
100 d/23°C	-	%	(evaluation test only)			≤ 16
Behaviour at low temperature -10°C						
Hardness	5	Shore A	74	75	75	≤ 80

Rigid fairing material (PUR-S) **033/033A**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements
 according to EN 295-1:2013-05, clause 6.1.4, and EN 295-3:2012-03, clause 25.1,
 and additional test of chemical resistance

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Creep deformation at 1,25 N/mm ²						
ε ₀ (t=10 ⁰ min)	3	%	1,3	2,4	2,1	≤ 5
Δε _{4,0} (t=(10 ⁰ ...10 ⁴) min)		%	0,9	1,4	1,2	≤ 8
Chemical resistance						
Volume change after 7 d immersion						
Sulfuric acid pH 2	4	%	1,3	2,4	2,1	≤ 5
Sodium hydroxide solut. pH 12	4	%	2,6	3,3	3,2	≤ 5

Properties of polyurethane (PUR) sealing and fairing materials

Supplier: Frechem GmbH & Co. KG, Germany
 Dispensing unit: Plant 1/Old factory, small carousel

Elastic sealing material (PUR-E) **J77/VP 902**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements according to DIN EN 681-4:2006-11
 and DIN EN 295-3:2013-03, clause 18

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Tensile strength	6	N/mm ²	3,1	6,0	5,5	≥ 2
Elongation at break	6	%	62	158	144	≥ 90
Hardness	5	Shore A	67	69	68	67 ± 5
Compression set						
24 h, 70°C	3	%	8,9	11,3	10,1	≤ 20
70 h, 23°C	3	%	1,3	3,1	2,5	≤ 5
Resistance to ageing						
Hardness after 7 d/70°C	5	Shore A	67	68	68	67 ± 5
Stress relaxation in compression						
7 d/23°C	1	%	4,5			≤ 14
100 d/23°	-	%	(evaluation test only)			≤ 16
Behaviour at low temperature -10°C						
Hardness	5	Shore A	75	76	76	≤ 80

Rigid fairing material (PUR-S foam) **KS45/033A**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements
 according to EN 295-1:2013-05, clause 6.1.4, and EN 295-3:2012-03, clause 25.1,
 and additional test of chemical resistance

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Creep deformation at 1,25 N/mm ²						
ε ₀ (t=10 ⁰ min)	3	%	2,8	3,7	3,4	≤ 5
Δε _{4;0} (t=(10 ⁰ ... 10 ⁴) min)		%	4,8	6,1	5,5	≤ 8
Chemical resistance						
Volume change after 7 d immersion						
Sulfuric acid pH 2	4	%	0,1	0,7	0,4	≤ 5
Sodium hydroxide solut. pH 12	4	%	-1,3	-0,1	-0,9	≤ 5

Surveillance Report No. 220000631-17-(Sys C)-S-e dated March 12, 2018 Enclosure 3 of 5

Properties of polyurethane (PUR) sealing and fairing materials

Supplier: Frechem GmbH & Co. KG, Germany
 Dispensing unit: Plant 1/Old factory, fittings

Elastic sealing material (PUR-E) **J77/VP 902**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements according to DIN EN 681-4:2006-11
 and DIN EN 295-3:2013-03, clause 18

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Tensile strength	6	N/mm ²	4,7	6,2	5,4	≥ 2
Elongation at break	6	%	113	149	128	≥ 90
Hardness	5	Shore A	64	67	66	67 ± 5
Compression set 24 h, 70°C	3	%	11,1	12,1	11,4	≤ 20
70 h, 23°C	3	%	1,3	1,9	1,3	≤ 5
Resistance to ageing Hardness after 7 d/70°C	5	Shore A	66	67	66	67 ± 5
Stress relaxation in compression 7 d/23°C	1	%	4,8			≤ 14
100 d/23°	-	%	(evaluation test only)			≤ 16
Behaviour at low temperature -10°C Hardness	5	Shore A	71	74	73	≤ 80

Rigid fairing material (PUR-S) **033/033A**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements
 according to EN 295-1:2013-05, clause 6.1.4, and EN 295-3:2012-03, clause 25.1,
 and additional test of chemical resistance

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Creep deformation at 1,25 N/mm ² ε ₀ (t=10 ⁰ min)	3	%	1,4	3,2	2,0	≤ 5
Δε _{4,0} (t=(10 ⁰ ... 10 ⁴) min)		%	0,7	1,8	0,8	≤ 8
Chemical resistance Volume change after 7 d immersion						
Sulfuric acid pH 2	4	%	-3,7	-0,1	-3,0	≤ 5
Sodium hydroxide solut. pH 12	4	%	-6,1	+0,5	-4,2	≤ 5

Properties of polyurethane (PUR) sealing and fairing materials

Supplier: Frechem GmbH & Co. KG, Germany
 Dispensing unit: **Plant 2/New factory, big carousel**

Elastic sealing material (PUR-E) **J77/VP 902**
 Location/Date of sampling: **Riyadh/06.12.2017**

Test methods and requirements according to DIN EN 681-4:2006-11
 and DIN EN 295-3:2013-03, clause 18

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Tensile strength	6	N/mm ²	4,5	5,8	5,4	≥ 2
Elongation at break	6	%	119	157	140	≥ 90
Hardness	5	Shore A	66	69	68	67 ± 5
Compression set 24 h, 70°C	3	%	9,9	10,7	10,6	≤ 20
	3	%	1,4	1,4	1,4	≤ 5
Resistance to ageing Hardness after 7 d/70°C	5	Shore A	67	68	68	67 ± 5
Stress relaxation in compression 7 d/23°C	1	%	4,5			≤ 14
	-	%	(evaluation test only)			≤ 16
Behaviour at low temperature -10°C Hardness	5	Shore A	73	75	74	≤ 80

Rigid fairing material (PUR-S) **033/033A**
 Location/Date of sampling: **Riyadh/06.12.2017**

Test methods and requirements
 according to EN 295-1:2013-05, clause 6.1.4, and EN 295-3:2012-03, clause 25.1,
 and additional test of chemical resistance

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Creep deformation at 1,25 N/mm ² ε ₀ (t=10 ⁰ min)	3	%	2,8	3,5	3,2	≤ 5
		%	3,4	4,4	3,9	≤ 8
Chemical resistance Volume change after 7 d immersion Sulfuric acid pH 2	4	%	0,5	1,1	0,9	≤ 5
	4	%	-1,4	-0,1	-0,9	≤ 5

Properties of polyurethane (PUR) sealing and fairing materials

Supplier: Frechem GmbH & Co. KG, Germany
 Dispensing unit: Plant 2/New factory, small carousel

Elastic sealing material (PUR-E) **J77/VP 902**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements according to DIN EN 681-4:2006-11
 and DIN EN 295-3:2013-03, clause 18

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Tensile strength	6	N/mm ²	4,9	5,6	5,1	≥ 2
Elongation at break	6	%	125	152	140	≥ 90
Hardness	5	Shore A	68	70	68	67 ± 5
Compression set						
24 h, 70°C	3	%	9,7	12,0	10,8	≤ 20
70 h, 23°C	3	%	0,7	2,0	1,4	≤ 5
Resistance to ageing						
Hardness after 7 d/70°C	5	Shore A	67	68	67	67 ± 5
Stress relaxation in compression						
7 d/23°C	1	%	3,2			≤ 14
100 d/23°	-	%	(evaluation test only)			≤ 16
Behaviour at low temperature -10°C						
Hardness	5	Shore A	72	74	73	≤ 80

Rigid fairing material (PUR-S foam) **KS45/033A**
 Location/Date of sampling: Riyadh/06.12.2017

Test methods and requirements
 according to EN 295-1:2013-05, clause 6.1.4, and EN 295-3:2012-03, clause 25.1,
 and additional test of chemical resistance

Property	n No. of single values	Unit	Test results			Requirement
			Extreme values		Median	
Creep deformation at 1,25 N/mm ²						
ε ₀ (t=10 ⁰ min)	3	%	1,2	2,1	2,0	≤ 5
Δε _{4;0} (t=(10 ⁰ ... 10 ⁴) min)		%	1,0	1,6	1,2	≤ 8
Chemical resistance						
Volume change after 7 d immersion						
Sulfuric acid pH 2	4	%	-3,2	+0,1	-2,2	≤ 5
Sodium hydroxide solut. pH 12	4	%	-5,3	-2,,7	-4,4	≤ 5

Surveillance Report No. 220000631-17-(Sys F)-S-e

March 12, 2018

Client

Saudi Vitriified Clay Pipe Co., Ltd.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date of inspection/ sampling

05. – 07.12.2017

Receipt of samples

05.01.2018

Date of testing

until 08.03.2018

Order

Monitoring test according to control agreement No. 22 000631 including audit/inspection of testing, controlling of records and sampling at the client's production site.

Subject matter of tests/samples

Pipe joints for vitrified clay pipes and fittings according to EN 295-1:2013

Description: Pipe joints of socketted pipes with rubber sealing elements made from an elastomer of dense structure attached (glued) to the pipes

Jointing system: **System F**

Nominal sizes: **DN 100 and DN 150**

Samples (taken):

- 3 pieces of rubber sealing elements DN 100/FN 34 - System F made from an elastomer of dense structure, manufacturer Umm Al Quwain Rubber Industries Ltd (URIL), U.A.E.
- 3 pieces of rubber sealing elements DN 150/FN 34 - System F made from an elastomer of dense structure, manufacturer Umm Al Quwain Rubber Industries Ltd (URIL), U.A.E.

Description of sampling

Samples were taken from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the MPA NRW.

The results of the tests refer exclusively to the samples named above.

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This Surveillance Report consists of 3 pages and 2 enclosures.

Underlying specifications/description of the tests

DIN EN 295-1:2013-05 "Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings and joints"

related documents:

DIN CEN/TR 16626 DIN SPEC 19629:2014-04 "Vitrified clay pipe systems for drains and sewers - Guidance for voluntary third-party certification procedures"

DIN EN 295-2:2013-05 "Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"

DIN EN 295-3:2012-03 "Vitrified clay pipe systems for drains and sewers - Part 3: Test methods"

DIN EN 681-1:2006-11 "Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Part 1: Vulcanized rubber"

Regarding the monitoring tests on vitrified clay pipes see separate reports of MPA NRW No. 220000631-17-U-01 to -02

- Inspection of the production plant and auditing concerning the production according to the regulations including factory production control

Inspection of production and testing and check of the internal control records were performed along with the visits at the client's manufacturing works plant 1 and plant 2, 2nd Industrial Area, Riyadh, 11442, KSA by the agent of MPA NRW.

- Material tests and performance tests

Audit test on base of DIN CEN/TR 16626 DIN SPEC 19629:2014-04, table 1.

Test methods, kind, and quantity of conducted material tests and performance tests are selected according to the appropriate items as listed in EN 295-1, clause 6 and EN 295-2, clause 5.3.10, respectively. Additionally, material tests according to DIN EN 681-1/WC for rubber sealing elements are included. Detailed references to the test standards and requirement standards are given in the enclosures to this report.

The short term joint assembly tests and performance tests on the pipe joints were conducted at the works' laboratory and witnessed by the agent of the MPA NRW.

The material tests on the samples of the rubber sealing elements were conducted at the laboratory of MPA NRW.

Where necessary or specified by the test standards, storage and testing of the samples/specimens were carried out in a standard conditioning atmosphere to DIN EN ISO 291 - 23/50 class 2 unless otherwise expressly stated.

Results of the inspection and tests

- Production capability and performance of factory production control

The existing infrastructure and equipment comply with the requirements for the manufacture of the products in accordance with the regulations.

The factory production control includes production supervision and intermediate and final testing of the products. There are diverse laboratories for the different kinds of performance tests and material tests. The laboratory equipment comprises all necessary test devices with documents of calibration completely available. The performing of factory production control is sufficiently ensured.

Checking of the records resulted to no complaints.

- Material tests and performance tests

See enclosures 1 and 2.

Quality Management System

The conformity of the quality management system with the terms of ISO 9001:2008 was certified by document no. 04100 980025 of TÜV Nord Cert GmbH, Germany, dated 05.02.2016 - valid for the production plant Riyadh of the Saudi Vitrified Clay Pipe Co., Ltd.

Assessment

The results of the inspection and of the performed tests comply with the requirements of the underlying specifications with the exception of the hardness IRHD as delivered for lip seals DN 100/FN 34.

Dortmund, March 12, 2018

By order



Volkmar Seidel
Inspector



The MPA Certificate of Conformity MPA NRW-00631-01 (Version 02) dated 19.04.2017 remains valid.

Dortmund, March 12, 2018

By Order



M. Sc. Stephan Ulbrich
Head of certification body



Results of the material tests

Material properties of sealing elements

Nomination:	Rubber sealing element ('L'-Clay-Pipe-Ring)
Nominal size:	DN 100/FN 34 - F - EN 295-1
No. of samples:	3
Receipt of samples:	05.01.2018
Material:	Elastomer of dense structure, moulded
Material type:	NR
Hardness class:	50 IRHD
Nominal hardness:	50 IRHD
Manufacturer:	Umm Al Quwain Rubber Industries Ltd (URIL), U.A.E.
Marking:	100 MM URIL 21/22/23 BS EN 681-1 MADE IN UAE 17.

Tests and requirements to DIN EN 681-1:2006-11, Table 2, Type WC

Property	n quantity of single values	Unit	Results			Requirement
			Extreme values		Median	
Dimensions			conform			see control agreement
Imperfections and defects			none			none
Hardness	5	IHRD	41	43	42	50 ± 5
Tensile strength	5	N/mm ²	18,1	22,5	19,8	≥ 9
Elongation at break	5	%	579	634	608	≥ 375
Compression set						
72 h, 23°C	3	%	8,2	8,8	8,3	≤ 12
24 h, 70°C	3	%	13,5	15,5	13,9	≤ 20
70 h, -10°C	3	%	30,1	38,0	30,8	≤ 40
Accelerated Ageing in air 7 d/70°C			related to median			extr.
Change of						
- Hardness	5	IRHD	+2			-5...+8
- Tensile strength	5	%	-12,6			-20
- Elongation at break	5	%(rel.)	-10,5			-30...+10
Volume change after pure water immersion 7 d/70°C	3	%	+3,6	+3,8	+3,6	extr. -1...+8
Stress relaxation in compression*) 7 d/23°C	1	%	7,2			≤ 14
Ozone resistance 50 pphm	3	-	no cracks			no cracks
Marking			see above			see control agreement

*) Coefficient of correlation: 1,00

Material properties of sealing elements

Nomination: **Rubber sealing element ('L'-Clay-Pipe-Ring)**
 Nominal size: **DN 150/FN 34 - F - EN 295-1**
 No. of samples: **3**
 Receipt of samples: **05.01.2018**
 Material: **Elastomer of dense structure, moulded**
 Material type: **NR**
 Hardness class: **50 IRHD**
 Nominal hardness: **50 IRHD**
 Manufacturer: **Umm Al Quwain Rubber Industries Ltd (URIL), U.A.E.**
 Marking: **150 MM URIL 21/22/23 BS EN 681-1 MADE IN UAE 17.**

Tests and requirements to **DIN EN 681-1:2006-11, Table 2, Type WC**

Property	n quantity of single values	Unit	Results			Requirement
			Extreme values		Median	
Dimensions			conform			see control agreement
Imperfections and defects			none			none
Hardness	5	IHRD	49	51	50	50 ± 5
Tensile strength	5	N/mm ²	24,4	28,5	26,4	≥ 9
Elongation at break	5	%	557	600	578	≥ 375
Compression set						
72 h, 23°C	3	%	5,6	5,9	5,9	≤ 12
24 h, 70°C	3	%	10,6	11,5	10,9	≤ 20
70 h, -10°C	3	%	21,7	23,1	23,0	≤ 40
Accelerated Ageing in air 7 d/70°C			related to median			extr.
Change of						
- Hardness	5	IRHD	+1			-5...+8
- Tensile strength	5	%	-2,7			-20
- Elongation at break	5	%(rel.)	-3,8			-30...+10
Volume change after pure water immersion 7 d/70°C	3	%	+1,4	+2,6	+2,5	extr. -1...+8
Stress relaxation in compression*)						
7 d/23°C	1	%	5,8			≤ 14
Ozone resistance 50 pphm	3	-	no cracks			no cracks
Marking			see above			see control agreement

*) Coefficient of correlation: 1,00

شركة السحيمي - فيفرو المحدودة

FUGRO-SUHAIMI LTD.

geotechnical, materials and NDT engineers



P. O. Box 51179

Riyadh 11543

Saudi Arabia

Phone: 01 464 0960

Fax: 01 463 2306

C. R. 2050004110 / 003

E-mail: fsriyadh@fugro-suhaimi.com

Job No. SA13-4043

14 February 2018

ص. ب. ٥١١٧٩

الرياض

المملكة العربية السعودية

تلفون: ٠١ ٤٦٤ ٠٩٦٠

فاكس: ٠١ ٤٦٣ ٢٣٠٦

س. ت. ٢٠٥٠٠٠٤١١٠/٠٠٣

البريد الإلكتروني: fsriyadh@fugro-suhaimi.com

TO WHOMSOEVER IT MAY CONCERN

Sub: Independent Testing Laboratory Report on Clay Pipes of Saudi Vitrified Clay Pipe Co., Riyadh, Saudi Arabia.

Fugro-Suhaimi Ltd. (FSL) is pleased to submit this report on laboratory tests witnessed by our representative on clay pipes at Saudi Vitrified Clay Pipe Co. facilities in Riyadh during 11 to 13 February 2018.

The specimens tested were of 100SS, 150SS, 200SS, 200ES, 250SS, and 250ES 300SS, 300ES, 350ES, 400SS, 400ES, 450ES, 500SS, 500ES, 600ES, 700ES, 800ES, 900ES, 1000ES. The laboratory tests were witnessed by our representatives and were conducted in general accordance with the procedures outlined in EN 295-3:2013, QCS 2014, GSO EN 295-3:2008 & ASTM C 700 specifications. The pipes tested were sound and meets the minimum requirements. The test results are satisfactory and appended herewith.

Based on the test results, the specimens tested comply with the EN 295-3:2013, QCS 2014 and GSO EN 295-3:2008 specifications minimum requirements for items tested, and all (SS) pipes comply with ASTM C 700 Extra Strength requirements. We, therefore recommend acceptance of the pipes from the same batch/lot.

We also observed that the pipes inspected and ready for shipment were properly packed in pallets, such that individual pipe was not touching each other as soft wood cushions were placed between them.

We have the pleasure in preparing this report and hope this report is to your satisfaction. If you have any questions or we can be of further assistance, please do not hesitate to contact us.

Regards,

FUGRO-SUHAIMI LTD.

Anil K. Mathew

Lab Manager - Riyadh Branch



Dammam: Tel.: 03 8574200 Fax: 03 8572035 - Jubail: Tel.: 03 3412700 Fax: 03 3412691
Jeddah: Tel.: 02 6724907 Fax: 02 6724907 - Yanbu: Tel.: 04 396 2173 Fax: 04 3210963
Abqaiq: Tel.: 03-5660363 Fax: 03-5660363 - NDT Jeddah: Tel.: 02 6781495 Fax: 02 6781495



الدمام: تلفون: ٠٣ ٨٥٧٤٢٠٠ - فاكس: ٠٣ ٨٥٧٢٠٣٥ - الجبيل: تلفون: ٠٣ ٣٤١٢٧٠٠ - فاكس: ٠٣ ٣٤١٢٦٩١
جدة: تلفون: ٠٢ ٦٧٢٤٩٠٧ - فاكس: ٠٢ ٦٧٢٤٩٠٧ - ينبع: تلفون: ٠٤ ٣٩٦٢١٧٣ - فاكس: ٠٤ ٣٢١٠٩٦٣
ابقيق: تلفون: ٠٣ ٥٦٦٠٣٦٣ - فاكس: ٠٣ ٥٦٦٠٣٦٣ - ان دي تي جدة: تلفون: ٠٢ ٦٧٨١٤٩٥ - فاكس: ٠٢ ٦٧٨١٤٩٥

شركة ذات مسئولية محدودة أسستها شركة السحيمي ومكلااند العالمية المحدودة في عام ١٩٧٦ رأس المال ٢.٠٠٠.٠٠٠ ريال مدفوع بالكامل. المركز الرئيسي الدمام

Auditing Test Report

Date: 14/02/2018

Lab No: 40164-4

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

13/02/2018

Auditing Purpose:

Testing of Pipe's Joints material for Vitrified Clay Pipes & Fittings " System C" according to EN 295-1:2013

Description: Seals for socketted pipes made from polyurethane elastic sealing material and rigid fairing material

Jointing System:

System C

Nominal Size:

DN 200 up to DN 1200

Samples (taken):

three specimens of polyurethane sealing and fairing materials from dispensing units in use

Description of Sampling

Samples were taken from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

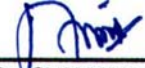
EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"
EN 681-4:2006	"Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Part 4: Cast polyurethane sealing elements"



Results of Joint Material tests

Joint Material	Tests	Unit	Requirements (EN 681-4:2006)	Readings			Result
				1	2	3	
Polyurethane Sealing (Spigot Material)	Dimensions			Confrom according to ISO 3302			Pass
	Visual Imperfections			None			Pass
	Hardness	IRHD	67 ± 5	70.5	69.0	67.0	Pass
	Compression Set : 24 hrs at 70 C°	%	≤ 20	8.9	8.5	7.5	Pass
Rigid Fairing materials (Socket material)	Creep Deformation , at 1.25 N/mm, initial (t=10 ⁰ min.)	%	≤ 5	1.5	2.2	2.7	Pass
	Creep Deformation , at 1.25 N/mm, (t=10 ⁰ ...10 ⁴ min.)	%	≤ 8	3.4	3.5	3.4	Pass
	Indentation (after 24 h)	mm	≤ 0.5	0.3	0.4	0.4	Pass

* These type tests are not required as a factory production control system, as per EN 295-2:2013, clause 5.3.11


FUGRO - SUHAIMI LTD
ANIL K MATHEW



AL HOTY - STANGER**TEST REPORT**

Date: February 11, 2018

Ref.No: 15/2448

SAUDI VITRIFIED CLAY PIPE CO.

Report No: PM18T025

RIYADH - KSA

Page: 1 of 1

Sample Description : SOFT POLYURETHANE RUBBER (RED SAMPLE)
Company : SAUDI VITRIFIED CLAY PIPE CO.
Testing date : 05/02/2018
Sample Delivered by : Client
Required Test : Tensile Strength – ISO 37/ EN 681-4

TEST RESULT

Test Property	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Average
Tensile Strength, MPa	2.61	2.23	2.04	2.11	2.77	2.352

Test Conditions:-

S. No	Test Parameters	Values
01	Type of Test Specimen	Type 1
02	Thickness of specimen, mm	8.8
03	Rate of Extension, mm/min	500
04	Room Atmospheric conditions	Test temperature= 22.10°C, Humidity=46%
05	Requirement, Min, MPa	2

Note:

AHSL certifies that the above test was carried out in accordance with Specific standard.

Tested by

Hasan Shawkat
 Polymer Engineer
 AHSL Polymer Department



Verified by:

SAYYED ASJAD HUSSAIN
 Dept. Head - Specialist division
 AHSL Polymer Department

Test Method Variation: None

This report relates only to the sample tested and shall only be reproduced in full with the written approval of AHSL testing laboratory

AL HOTY STANGER LTD.CO.**INDEPENDENT LABORATORIES & MATERIALS TESTING**

P.O.Box 3072 - Al-Khobar 31952, - TEL: (013) 889 1000 / 808 4317 / 808 7517 / 808 5217 Fax : (013) 898-1466

Jubail P.O. Box 467 - Tel: (013) 341-6791 Fax : (013) 341-0642 - Hofuf P.O. Box 2752 - Tel: (013) 586-3210 Fax : (013) 587-1420 - Riyadh P.O. Box 7359 - Tel: (011) 478-4292 Fax : (011) 479-2058
Jeddah P.O. Box 8129 - Tel: (012) 660-1924 Fax : (012) 665-6742 - Yanbu - P.O. Box 30312 - Tel: (014) 322-5495 Fax : (014) 391-7471

AL HOTY - STANGER**TEST REPORT****SAUDI VITRIFIED CLAY PIPE CO.****RIYADH - KSA**

Date: February 11, 2018

Ref.No: 15/2448

Report No: PM18T025

Page: 1 of 1

Sample Description : SOFT POLYURETHANE RUBBER (RED SAMPLE)
Company : SAUDI VITRIFIED CLAY PIPE CO.
Testing date : 05/02/2018
Sample Delivered by : Client
Required Test : Elongation – ISO 37/ EN 681-4

TEST RESULT

Test Property	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Average
Elongation at break, %	91.67	92.83	95.10	93.75	95.97	93.86

Test Conditions:-

S. No	Test Parameters	Values
01	Type of Test Specimen	Type 1
02	Thickness of specimen, mm	8.8
03	Rate of Extension, mm/min	500
04	Room Atmospheric conditions	Test temperature= 21.10°C, Humidity=46%
05	Requirement, Min, %	90

Note:

AHSL certifies that the above test was carried out in accordance with Specific standard.

Tested by

Hasan Shawkat
 Polymer Engineer
 AHSL Polymer Department



Verified by:

SAYYED ASJAD HUSSAIN
 Dept. Head - Specialist division
 AHSL Polymer Department

Test Method Variation: None

This report relates only to the sample tested and shall only be reproduced in full with the written approval of AHS testing laboratory

AL HOTY STANGER LTD.CO.
INDEPENDENT LABORATORIES & MATERIALS TESTING

P.O.Box 3072 - Al-Khobar 31952, - TEL: (013) 889 1000 / 808 4317 / 808 7517 / 808 7518 / 808 5217 Fax : (013) 898-1466
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 Jeddah P.O. Box 8129 - Tel: (012) 660-1924 Fax : (012) 665-6742 - Yanbu - P.O. Box 30312 - Tel: (014) 322-5495 Fax : (014) 391-7471

AL HOTY - STANGER**TEST REPORT**

Date: February 11, 2018

Ref.No: 15/2448

SAUDI VITRIFIED CLAY PIPE CO.

Report No: PM18T025

RIYADH - KSA

Page: 1 of 1

Sample Description : SOFT POLYURETHANE RUBBER (RED SAMPLE)
Company : SAUDI VITRIFIED CLAY PIPE CO.
Testing date : 05/02/2018
Sample Delivered by : Client
Required Test : Stress Relaxation – ISO 3384/ EN 681-4

TEST RESULT

S. No	Test Property	Reading 1	Reading 2	Reading 3	Average
01	Stress Relaxation, %	12.0	12.8	13.25	12.68

Test Conditions:-

S. No	Test Parameters	Values
01	Method of preparation of test piece	Cut
02	Test piece dimensions – diameter, thickness, mm	13mm, 6.3mm
03	Test method used	Method A
04	Conditioning prior to testing	Thermal conditioning, 70°C for 3 hours Mechanical conditioning – 10% compression, 5 cycles
05	Conditioning prior to testing	
06	Test duration and temperature	7 days at 23°C
07	Compression	10%
08	Laboratory Conditions	Temperature=21.2°C, Humidity=46%
09	Requirement, Maximum, %	
		14

Note:

AHSL certifies that the above test was carried out in accordance with Specific standard.

Tested by

Hasan Shawkat
Polymer Engineer
AHSL Polymer Department



Verified by:

SAYYED ASJAD HUSSAIN
Dept. Head - Specialist division
AHSL Polymer Department

This report relates only to the sample tested and shall only be reproduced in full with the written approval of AHS testing laboratory

Test Method Variation: None

AL HOTY STANGER LTD.CO.**INDEPENDENT LABORATORIES & MATERIALS TESTING**

P.O.Box 3072 - Al-Khobar 31952, - TEL: (013) 809 1000 / 808 4317 / 808 7517 / 808 7518 / 808 5217 Fax : (013) 898-1466
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 Jeddah P.O. Box 8129 - Tel: (012) 660-1924 Fax : (012) 665-6742 - Yanbu - P.O. Box 30312 - Tel: (014) 322-5495 Fax : (014) 391-7471

Sample Description : SOFT POLYURETHANE RUBBER (RED SAMPLE)
Company : SAUDI VITRIFIED CLAY PIPE CO.
Testing date : 05/02/2018
Sample Delivered by : Client
Required Test : Accelerated Aging – Change in Hardness (ISO 48)/ EN 681-4

TEST RESULT

S. No	Initial Hardness (H_i)	Change in Hardness (H_o)
01	65	67
02	64	68
03	63	67
04	64	67
05	64	66
Average	64	67

$$\Delta H = H_i - H_o$$


Test Conditions:-

S. No	Test Parameters	Values
01	Heat Aging Test duration	7 days @ 70°C
02	Thickness of sample	8.8
03	Method of preparation	Cut out
04	Test Method	Method N
05	Requirement	+/-5
06	Change in Hardness (ΔH)	3

Note:


AHSL certifies that the above test was carried out in accordance with Specific standard.

Tested by


Hasan Shawkat
 Polymer Engineer
 AHSL Polymer Department



Verified by:


SAYYED ASJAD HUSSAIN
 Dept. Head - Specialist division
 AHSL Polymer Department

Test Method Variation: None

This report relates only to the sample tested and shall only be reproduced in full with the written approval of AHS testing laboratory

AL HOTY STANGER LTD.CO.

INDEPENDENT LABORATORIES & MATERIALS TESTING

Auditing Test Report

Date: 12/02/2018

Lab No. :40162-2

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system F according to EN 295-1:2013

Size Description:

Nominal Size: DN 100 * 1000 mm
Jointing System: System F
Class: 34 KN/m

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type	Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	37	39	35	≥ 34	✓	
	Internal Barrel Diameter "D1"	mm	102	105	101	≥ 96	✓	
	Length	mm	1005	1004	1009	1000 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.001	0.015	0.01	≤ 0.04	✓	
	Deviation from Straightness	mm	3.6	4.2	4.1	< 5.0	✓	
	Squareness of Ends	Socket	mm	3.3	3.2	3.1	< 6.0	✓
		Spigot	mm	4.2	3.5	4.1		
	Airtightness	mm	5	7	4	Drops ≤ 25	✓	
	Water Absorption	%	1.8	1.5	1.8	≤ 6 %	✓	
	Bending Moment Resistance	KNm	2.8	3.5	3.6	≥ 1.7	✓	
Joint Assembly	Joint Interchangeability	mm	132.2	131.5	132	131 ± 1.5	✓	
	Watertightness under Angular Deflection	-	<u>No leak</u> , Deflection applied is 80 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	<u>No leak</u> , Shear force applied is 2.5 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	2.2	2.5	2.1	≤ 4	✓	

FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Date: 12/02/2018

Lab No. : 40163-3

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system F according to EN 295-1:2013

Size Description:

Nominal Size: DN 150 * 1500 mm
Jointing System: System F
Class: 34 KN/m

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

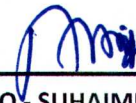
Underlying specification /description of the tests

EN 295-1:2013 "Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008 "Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013 "Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012 "Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	49	52	48	≥ 40	✓	
Internal Barrel Diameter "D1"		mm	149	152	151	≥ 146	✓	
Length		mm	1510	1505	1505	1500 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.012	0.01	0.02	≤ 0.04	✓	
Deviation from Straightness		mm	3.2	3.1	3.4	< 4.5	✓	
Squareness of Ends		Socket	mm	3.1	1.5	2.7	< 6.0	✓
		Spigot	mm	2.2	2.4	2.8		
Airtightness		mm	10	11	7	Drops ≤ 25	✓	
Water Absorption		%	2.5	2.5	1.9	≤ 6 %	✓	
Bending Moment Resistance		KNm	6.4	6.1	6.8	≥ 4	✓	
Joint Assembly	Joint Interchangeability		mm	187	186.8	187.2	186 ± 2.0	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 80 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 3.75 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2.2	2	2.5	≤ 4	✓



FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Lab No. : 40162-4

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 12/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 200 SS * 1750 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	62	65	66	≥ 45	✓	
	Internal Barrel Diameter "D1"	mm	199	205	201	≥ 195	✓	
	Length	mm	1760	1756	1750	1750 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.033	0.02	0.02	≤ 0.04	✓	
	Deviation from Straightness	mm	3.5	3.6	3.2	< 4.0	✓	
	Squareness of Ends	Socket	mm	2.1	2.7	2.4	< 6.0	✓
		Spigot	mm	2.0	1.5	1.4		
	Airtightness	mm	5	8	9	Drops ≤ 25	✓	
	Water Absorption	%	3.6	3.2	3.4	≤ 6 %	✓	
	Bending Moment Resistance	KNm	9.4	9.8	9.4	≥ 6.2	✓	
Joint Assembly	Joint Interchangeability	mm	259.9	260.5	260.4	260 ± 0.5	✓	
	Watertightness under Angular Deflection	-	No leak, Deflection applied is 80 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	No leak, Shear force applied is 5.0 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	2.5	2.8	2.3	≤ 4	✓	

FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Lab No. : 40162-6

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 12/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 200 SS * 2000 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	65	66	71	≥ 45	✓	
Internal Barrel Diameter "D1"		mm	209	201	210	≥ 195	✓	
Length		mm	2009	2004	2005	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.02	0.002	≤ 0.04	✓	
Deviation from Straightness		mm	3.5	3.2	2.9	< 4.0	✓	
Squareness of Ends		Socket	mm	1.8	1.2	1.8	< 6.0	✓
		Spigot	mm	1.8	1.7	1.2		
Airtightness		mm	8	4	10	Drops ≤ 25	✓	
Water Absorption		%	3.8	3.4	3.9	≤ 6 %	✓	
Bending Moment Resistance		KNm	11.5	10.7	10.4	≥ 6.2	✓	
Joint Assembly	Joint Interchangeability		mm	260.3	260.5	260.4	260 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 80 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 5.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2	2.5	2.3	≤ 4	✓

FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Date: 12/02/2018

Lab No. : 40162-7

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 200 ES * 2000 mm
Jointing System: System C
Class: 240

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	71	69	75	≥ 60	✓	
	Internal Barrel Diameter "D1"	mm	199.8	202.5	201.1	≥ 195	✓	
	Length	mm	2001	2005	2005	2000 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.01	0.015	0.01	≤ 0.04	✓	
	Deviation from Straightness	mm	2.1	3.2	3.5	< 4.0	✓	
	Squareness of Ends	Socket	mm	2.1	2.8	2.1	< 6.0	✓
		Spigot	mm	1.7	3.4	3.4		
	Airtightness	mm	10	4	7	Drops ≤ 25	✓	
	Water Absorption	%	3.4	2.1	2.5	≤ 6 %	✓	
	Bending Moment Resistance	KNm	11.8	12.4	12.7	≥ 8.6	✓	
Joint Assembly	Joint Interchangeability	mm	274.9	274.8	275	275 ± 0.5	✓	
	Watertightness under Angular Deflection	-	No leak, Deflection applied is 80 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	No leak, Shear force applied is 5.0 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	1.8	2.1	2.4	≤ 4	✓	



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ANIL K MATHEW



Auditing Test Report

Lab No. : 40162-8

Client

Saudi Vitrified Clay Pipe Co.

P.O. Box 6415

Riyadh 11442

Kingdom of Saudi Arabia

Date: 12/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: **DN 250 * 2000 mm**
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type	Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	58	57	61	≥ 50	✓	
	Internal Barrel Diameter "D1"	mm	255	250	255	≥ 244	✓	
	Length	mm	2010	2004	2005	2000 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.02	0.03	0.002	≤ 0.04	✓	
	Deviation from Straightness	mm	3.1	2.5	3.1	< 4.0	✓	
	Squareness of Ends	Socket	mm	2.8	3.2	2.5	< 6.0	✓
		Spigot	mm	1.9	2.4	1.5		
	Airtightness	mm	13	14	11	Drops ≤ 25	✓	
	Water Absorption	%	3.1	3.5	2.5	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability	mm	317.4	317.1	317.2	317 ± 0.5	✓	
	Watertightness under Angular Deflection	-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	No leak, Shear force applied is 6.25 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	3.7	3.4	3.2	≤ 4	✓	

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ANEL K MATHEW



Auditing Test Report

Lab No. : 40162-1

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 12/02/2018

Job No: SA13-4043

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: **DN 250 * 2000 mm**
Jointing System: System C
Class: 240

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	81	75	71	≥ 60	✓	
	Internal Barrel Diameter "D1"	mm	253	251	255	≥ 244	✓	
	Length	mm	2005	2004	2008	2000 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.025	0.02	0.001	≤ 0.04	✓	
	Deviation from Straightness	mm	1.8	1.9	2.5	< 4.0	✓	
	Squareness of Ends	Socket	mm	3.1	3.4	3.2	< 6.0	✓
		Spigot	mm	2.5	2.1	2		
	Airtightness	mm	7	8	11	Drops ≤ 25	✓	
	Water Absorption	%	2.5	3.4	3.8	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability	mm	341.4	341.2	341.1	341 ± 0.5	✓	
	Watertightness under Angular Deflection	-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	No leak, Shear force applied is 6.25 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	2.5	2.8	3.3	≤ 4	✓	

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Auditing Test Report

Date: 12/02/2018

Lab No. : 40162-9

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: **DN 300 * 2000 mm**
Jointing System: **System C**
Class: **160**

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	65	62	68	≥ 55	✓	
Internal Barrel Diameter "D1"		mm	302	305	301	≥ 293	✓	
Length		mm	2010	2008	2004	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.015	0.02	0.01	≤ 0.04	✓	
Deviation from Straightness		mm	1.5	1.2	1.4	< 4.0	✓	
Squareness of Ends		Socket	mm	2.1	2.2	2.2	< 6.0	✓
		Spigot	mm	2.1	2.8	1.4		
Airtightness		mm	8	13	11	Drops ≤ 25	✓	
Water Absorption		%	3.5	3.7	3.4	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	371.1	371.4	370.9	371 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 7.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	1.5	1.7	1.4	≤ 4	✓


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ANIL K MATHEW



Auditing Test Report

Date: 12/02/2018

Lab No. : 40162-10

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 300 * 2000 mm
Jointing System: System C
Class: 240

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	81	77	78	≥ 72	✓	
Internal Barrel Diameter "D1"		mm	299	305	302	≥ 293	✓	
Length		mm	2005	2010	2009	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.03	0.01	≤ 0.04	✓	
Deviation from Straightness		mm	2.2	2.2	1.8	< 4.0	✓	
Squareness of Ends		Socket	mm	2.8	2.3	2.7	< 6.0	✓
		Spigot	mm	2.2	2.8	2.1		
Airtightness		mm	11	15	12	Drops ≤ 25	✓	
Water Absorption		%	3.5	3.2	3.1	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	398.6	398.8	398.7	398.5 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 7.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2.8	2.4	2.5	≤ 4	✓

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ANIL K MATHEW



Auditing Test Report

Date: 12/02/2018

Lab No. : 40162-12

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

11/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 350 * 2000 mm
Jointing System: System C
Class: 200

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	92	85	87	≥ 70	✓	
Internal Barrel Diameter "D1"		mm	354	355	350	≥ 341	✓	
Length		mm	2005	2010	2009	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.015	0.03	0.015	≤ 0.04	✓	
Deviation from Straightness		mm	2.5	2.3	1.8	< 3.0	✓	
Squareness of Ends		Socket	mm	3.5	3.5	4.0	< 7.0	✓
		Spigot	mm	3.9	4.2	3.7		
Airtightness		mm	8	11	15	Drops ≤ 25	✓	
Water Absorption		%	3.5	4.1	4.2	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	459.3	459.3	459.4	459.0 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 8.75 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	3.5	3.1	2.9	≤ 4	✓

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ANIL K MATHEW



Auditing Test Report

Lab No. : 40163-1

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 400 * 2000 mm
Jointing System: System C
Class: 120

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	69	68	72	≥ 64	✓	
Internal Barrel Diameter "D1"		mm	405	403	407	≥ 390	✓	
Length		mm	2009	2015	2010	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.015	0.015	0.02	≤ 0.04	✓	
Deviation from Straightness		mm	2.5	1.2	1.5	< 3.0	✓	
Squareness of Ends		Socket	mm	4.4	4.5	4.6	< 8.0	✓
		Spigot	mm	3.2	4.2	3.4		
Airtightness		mm	12	15	13	Drops ≤ 25	✓	
Water Absorption		%	2.5	2.1	2.4	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	483.5	483.2	483.6	483.5 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 10.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2.5	2.8	1.87	≤ 4	✓

FUGRO - SUHAIMI LTD

ANIL K MATHEW



Auditing Test Report

Lab No. : 40163-2

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 400 * 2000 mm
Jointing System: System C
Class: 200

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	105	102	99	≥ 96	✓	
Internal Barrel Diameter "D1"		mm	400	407	405	≥ 390	✓	
Length		mm	2008	2007	2001	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.015	0.02	0.03	≤ 0.04	✓	
Deviation from Straightness		mm	1.5	1.8	1.2	< 3.0	✓	
Squareness of Ends		Socket	mm	3.5	3.1	3.4	< 8.0	✓
		Spigot	mm	2.4	2.7	2.8		
Airtightness		mm	13	15	12	Drops ≤ 25	✓	
Water Absorption		%	3.7	3.4	3.8	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	515.8	515.6	515.7	515.5 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 10.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2.9	2.7	2.5	≤ 4	✓

FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Lab No. : 40163-3

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: **DN 400 * 2500 mm**
Jointing System: System C
Class: 200

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

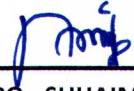
Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	105	107	101	≥ 96	✓	
Internal Barrel Diameter "D1"		mm	402	401	403.5	≥ 390	✓	
Length		mm	2505	2501	2500	2500 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.001	0.03	≤ 0.04	✓	
Deviation from Straightness		mm	1.5	1.3	0.9	< 3.0	✓	
Squareness of Ends		Socket	mm	4.2	4.1	3.4	< 8.0	✓
		Spigot	mm	4.8	3.8	3.5		
Airtightness		mm	17	14	12	Drops ≤ 25	✓	
Water Absorption		%	4.1	3.8	3.8	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	515.7	515.6	515.8	515.5 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 10.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	3.5	3.4	3.1	≤ 4	✓


FUGRO - SUHAIMI LTD

ANIL K MATHEW



Auditing Test Report

Lab No. : 40163-4

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 450 * 2000 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	92	98	94	≥ 80	✓	
Internal Barrel Diameter "D1"		mm	455	457	450	≥ 439	✓	
Length		mm	2005	2002	2009	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.03	0.015	≤ 0.04	✓	
Deviation from Straightness		mm	0.5	0.7	1.2	< 3.0	✓	
Squareness of Ends		Socket	mm	2.4	2.7	3.5	< 9.0	✓
		Spigot	mm	3.5	4.1	4.1		
Airtightness		mm	18	12	15	Drops ≤ 25	✓	
Water Absorption		%	3.5	3.1	2.4	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	579.4	579.3	579.1	579 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 11.25 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	2.1	2.7	2.5	≤ 4.5	✓

FUGRO - SUHAIMI LTD

ANEL K MATHEW



Auditing Test Report

Date: 13/02/2018

Lab No. : 40163-5

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 500 * 2000 mm
Jointing System: System C
Class: 120

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	85	91	84	≥ 65	✓	
Internal Barrel Diameter "D1"		mm	502	505	500	≥ 487	✓	
Length		mm	2005	2004	2008	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.035	0.03	≤ 0.04	✓	
Deviation from Straightness		mm	1.8	1.5	1.8	< 3.0	✓	
Squareness of Ends		Socket	mm	3.8	3.5	3.5	< 10.0	✓
		Spigot	mm	4.2	4.2	3.7		
Airtightness		mm	14	11	9	Drops ≤ 25	✓	
Water Absorption		%	4.5	5.2	4.2	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	605.2	605.3	605.4	605 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 12.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	3.7	4.1	3.5	≤ 5.0	✓

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Auditing Test Report

Lab No. : 40163-7

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 500 * 2500 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	96	91	88	≥ 80	✓	
Internal Barrel Diameter "D1"		mm	504	505	503	≥ 487	✓	
Length		mm	2505	2500	2504	2500 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.015	0.015	≤ 0.04	✓	
Deviation from Straightness		mm	0.6	0.2	0.4	< 3.0	✓	
Squareness of Ends		Socket	mm	6.8	6.1	5.6	< 10.0	✓
		Spigot	mm	5.8	6.4	6.1		
Airtightness		mm	17	14	15	Drops ≤ 25	✓	
Water Absorption		%	4.1	4.5	4.2	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	637.2	637.3	637.4	637 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 12.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	3.1	3.2	3.8	≤ 5.0	✓

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Auditing Test Report

Lab No. : 40163-6

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 500 * 2000 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result	
Pipes	Marking (visual Inspection)	-	✓	✓	✓	✓	✓	
	Crushing Strength	KN/m	98	88	95	≥ 80	✓	
	Internal Barrel Diameter "D1"	mm	501	505	504	≥ 487	✓	
	Length	mm	2011	2009	2010	2000 ^{+4%} _{-1%}	✓	
	Water Tightness	L/m ²	0.025	0.035	0.02	≤ 0.04	✓	
	Deviation from Straightness	mm	2.7	2.5	2.1	< 3.0	✓	
	Squareness of Ends	Socket	mm	5.1	5.4	5.5	< 10.0	✓
		Spigot	mm	5.8	5.2	5.6		
	Airtightness	mm	15	14	11	Drops ≤ 25	✓	
	Water Absorption	%	4.9	5.2	5.1	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability	mm	637.5	637.3	637.4	637 ± 0.5	✓	
	Watertightness under Angular Deflection	-	No leak, Deflection applied is 30 mm/m for 5 min.			No visible leakage	✓	
	Watertightness under Shear	-	No leak, Shear force applied is 12.5 KN for 15 min.			No visible leakage	✓	
	Continuity of Invert	mm	3.5	3.4	2.9	≤ 5.0	✓	

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Auditing Test Report

Lab No. : 40163-9

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 600 * 2000 mm
Jointing System: System C
Class: 160

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

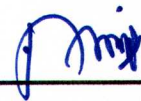
Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	102	119	112	≥ 96	✓	
Internal Barrel Diameter "D1"		mm	600	602	605	≥ 585	✓	
Length		mm	2009	2000	2005	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.01	0.02	0.03	≤ 0.04	✓	
Deviation from Straightness		mm	0.8	0.4	0.6	< 3.0	✓	
Squareness of Ends		Socket	mm	9.8	9.1	8.2	< 12.0	✓
		Spigot	mm	6.7	7.5	6.2		
Airtightness		mm	12	13	15	Drops ≤ 25	✓	
Water Absorption		%	4.2	4.1	4.8	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	758.3	757.9	758.1	758 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 20 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 15.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	4.1	4	3.9	≤ 6.0	✓



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Auditing Test Report

Lab No. : 40163-10

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Date: 13/02/2018

Job No. SA13-4043

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: **DN 700 * 2000 mm**
Jointing System: **System C**
Class: **120**

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	105	108	111	≥ 90	✓	
Internal Barrel Diameter "D1"		mm	708	705	700	≥ 682	✓	
Length		mm	2010	2005	2001	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.01	0.015	0.015	≤ 0.04	✓	
Deviation from Straightness		mm	0.4	0.8	0.7	< 3.0	✓	
Squareness of Ends		Socket	mm	7.5	7.8	7.4	< 14.0	✓
		Spigot	mm	6.4	6.1	7.5		
Airtightness		mm	19	21	21	Drops ≤ 25	✓	
Water Absorption		%	4.6	4.2	5.1	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	871.1	871	871.3	871 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 20 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 17.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	4.7	4.8	4.5	≤ 7.0	✓

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Auditing Test Report

Date: 13/02/2018

Lab No. : 40163-11

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 800 * 2000 mm
Jointing System: System C
Class: 120

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	105	101	105	≥ 96	✓	
Internal Barrel Diameter "D1"		mm	809	810	805	≥ 780	✓	
Length		mm	2007	2005	2004	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.01	0.03	0.02	≤ 0.04	✓	
Deviation from Straightness		mm	0.4	0.5	0.3	< 3.0	✓	
Squareness of Ends		Socket	mm	9.5	12	8.0	< 16.0	✓
		Spigot	mm	8.4	7.4	8.5		
Airtightness		mm	22	23	21	Drops ≤ 25	✓	
Water Absorption		%	5.3	5.1	5.4	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	976.3	975.9	975.8	976 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 20 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 20.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	6.2	6.7	6.4	≤ 8.0	✓


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ANIL K MATHEW



Auditing Test Report

Date: 13/02/2018

Lab No. : 40163-12

Client

Saudi Vitrified Clay Pipe Co.
P.O. Box 6415
Riyadh 11442
Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 900 * 2000 mm
Jointing System: System C
Class: 95 KN/m

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	110	115	105	≥ 95	✓	
Internal Barrel Diameter "D1"		mm	901	905	905	≥ 878	✓	
Length		mm	2015	2011	2010	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.02	0.033	0.011	≤ 0.04	✓	
Deviation from Straightness		mm	0.5	0.9	0.3	< 3.0	✓	
Squareness of Ends		Socket	mm	9.2	9.1	9.8	< 18.0	✓
		Spigot	mm	8.4	11	11.5		
Airtightness		mm	18	17	22	Drops ≤ 25	✓	
Water Absorption		%	5.8	4.7	5.1	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	1096.1	1096.3	1096.4	1096 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 10 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 22.5 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	6.5	6.4	5.7	≤ 9.0	✓



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Auditing Test Report

Lab No. :40163-13

Date: 13/02/2018

Job No. SA13-4043

Client

Saudi Vitrified Clay Pipe Co.

P.O. Box 6415

Riyadh 11442

Kingdom of Saudi Arabia

Sampling Date:

23/01/2018

Testing Date:

12/02/2018

Auditing Purpose:

Testing of Vitrified Clay Pipes jointed by system C according to EN 295-1:2013

Size Description:

Nominal Size: DN 1000 * 2000 mm
Jointing System: System C
Class: 95 KN/m

Description of Sampling

Samples were collected randomly from the stock at the client's manufacturing works in Riyadh (Kingdom of Saudi Arabia) by the agent of the Suhaimi - Fugro

Underlying specification /description of the tests

EN 295-1:2013	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
GSO EN 295-1:2008	"Vitrified clay pipe systems for drains and sewers - Part 1: Requirements for pipes, fittings & joints"
EN 295-2:2013	"Vitrified clay pipe systems for drains and sewers - Part 2: Evaluation of conformity and sampling"
EN 295-3:2012	"Vitrified clay pipe systems for drains and sewers - Part 3: Test Methods"



Test Results

	Test Type		Unit	Sample 1	Sample 2	Sample 3	Req.	Result
	Pipes	Marking (visual Inspection)		-	✓	✓	✓	✓
Crushing Strength		KN/m	115	117	109	≥ 100	✓	
Internal Barrel Diameter "D1"		mm	1009	1004	1000	≥ 975	✓	
Length		mm	2006	2005	2009	2000 ^{+4%} _{-1%}	✓	
Water Tightness		L/m ²	0.015	0.035	0.025	≤ 0.04	✓	
Deviation from Straightness		mm	0.5	0.2	0.8	< 3.0	✓	
Squareness of Ends		Socket	mm	9.4	9.8	8.5	< 20	✓
		Spigot	mm	9.4	8.5	8.2		
Airtightness		mm	24	22	23	Drops ≤ 25	✓	
Water Absorption		%	5.7	5.8	5.9	≤ 6 %	✓	
Joint Assembly	Joint Interchangeability		mm	1203.3	1203.4	1202.9	1203 ± 0.5	✓
	Watertightness under Angular Deflection		-	No leak, Deflection applied is 10 mm/m for 5 min.			No visible leakage	✓
	Watertightness under Shear		-	No leak, Shear force applied is 25.0 KN for 15 min.			No visible leakage	✓
	Continuity of Invert		mm	6.8	6.4	5.8	≤ 10.0	✓


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