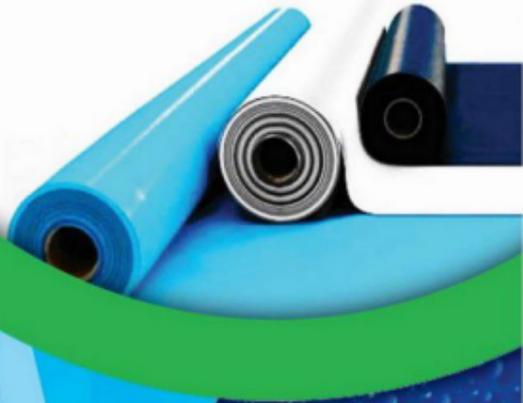




Yekta Varagh Polymer Yazd Co.



Introduction:

Yekta Varagh Polymer Company, the first manufacturer of PVC geomembrane with a width of 2 meters and conforming to the German ZTV standard in Iran, has started its activity in 2011 in Valiasr industrial region. Our Company according to the needs of civil engineering projects of the country and benefiting technology, experts and also the high quality of raw materials have produced and supplied the PVC flexible geomembrane. Company's products have been used successfully in many of the largest civil engineering and national projects. So, by increasing the annual capacity of standard PVC isolation flexible sheets to 1500,000 square meters, in addition to supplying all the needs of the country, we have taken a step towards export our products abroad.

The most important projects:

- ✓ Tehran Metro Lines 3, 4, 6, 7
- ✓ Qom Metro
- ✓ Shiraz Metro
- ✓ Isfahan Metro
- ✓ Tabriz Metro
- ✓ Mashhad Metro
- ✓ Sadr-Niyayesh Tunnel
- ✓ Hakim Tunnel
- ✓ Haraz Road Tunnels
- ✓ Tehran-Shomal Freeway Tunnels
- ✓ Arak- Khorramabad Freeway Tunnels
- ✓ Kermanshah-Khosravi Railway Tunnel
- ✓ Chabahar-Iranshahr Railway Tunnel
- ✓ Tonekabon Road Tunnel
- ✓ Shahid Rajaee Port and Assaluyeh Petrochemical reservoir
- ✓ The Central Bank Museum
- ✓ Buildings foundation lining in Tehran, Isfahan, Karaj
- ✓ Roof garden in Tehran, Shiraz, Mazandaran, Assaluyeh

Production specifications:

- ✓ Roll width: 2 and 1.55 meters
- ✓ Thickness: 1, 1.2, 1.5, 2, 3, 4, 5, 6 mm
- ✓ Roll length: Customer order

Company Products :

- ✓ PVC flexible geomembrane
- ✓ Monolayer Sheet
- ✓ Double layer Sheets (Signal layer)
- ✓ Multilayer Sheets
- ✓ Transparent Flexible PVC sheet
- ✓ PVC Geocomposite
- ✓ Roof Garden



YEKTAVARAGH YAZD CO.



Compatible With German Standard ZTV



Factory: Vali Asr Industrial Zone, Km15 Tehran Road Yazd-Iran

Tel: (+98 35)3527 94 84

Email: info@yektavaragh.com

Commercial Department: +98913 353 6977

WWW.YEKTAVARAGH.COM



Yekta Varagh Polymer Yazd Co.

Yekta varagh Polymer Yazd is the first producer in IRAN of PVC geomembranes with a width of 2 meters in accordance with the ZTV standard of Germany. To meet the needs of the country's development projects to a world-class product, in 2013, the advanced line of PVC soft-sheet multi-purpose isolation, along with its production technology in Yazd has been exploited.

The goal of producing such a product was to compensate for the shortage and the need for civil and national projects that have already provided hundreds of thousands of meters successfully and with the approval of employers and contractors.

PVC geomembrane, a subgroup of geosynthetics is used to insulate moisture and in fact is considered as the third generation isolation products.

This type of membrane, due to its unique properties such as high flexibility, cold and heat resistance (30°C to 120°C), high resistance to perforation, anti acid and alkali, fire resistance, elongation up to high tear in three directions and long-term durability is more widely used than other insulators.

Geomembranes have been used in the following application : insulating tunnels, water and chemical tanks, pools, building materials, canals, roof garden and etc.

The PVC geomembrane is produced by two methods of calendaring and extruding processes, which in calendaring process maximum thickness is 700 microns and is used in production of tablecloths, clear tablecloths, the cover of chair and furniture.

In the extruder method, the thickness is 1 mm to the top, due to its single-layered nature and the type of raw material combination it can pass the rigid standards of insulators.

Internationally recognized standards for geomembrane PVC are ZTV Germany and ASTM America, fortunately the products of Yektavaragh Yazd meet all the requirements of these standards. The company uses foreign first grade raw materials in its production to cope with the domestic and international competition. In addition to preserving the quality, as a result of convergence with the current Iranian economy, the company has reduced the price of its products to the minimum.

Factory: Vali Asr Industrial Zone, Km15 Tehran Road Yazd-Iran

Tel: (+98 35)3527 94 84

Email: info@yektavaragh.com

Commercial Department: +98913 353 6977

WWW.YEKTAVARAGH.COM



Yekta Varagh Polymer Yazd Co.

German ZTV standard

Characteristics	Test method	Unit	Required	Result
General properties	DIN EN 1850-2		Free of bubbles, cracks, blowholes	Conform
Thickness	DIN EN 1849-2	mm	average value \geq nominal thickness	$2.0 \pm \%5$
Tensile strength	EN ISO 527	N/mm ²	≥ 12	MD:18.98 TD:17.27
Elongation at break	EN ISO 527	%	≥ 250	MD:265 TD:301
Static puncture strength	EN ISO 12 236	KN	Value to be determined	3.66
Melt flow index (MFI)	EN ISO 1133	gr/10 min	Value to be determined	21.2
Density	EN ISO 1183-1	g/cm ³	Tolerance $\leq \pm 0.01$	1.301 ± 0.002
Size alteration	EN ISO 1107-2	%	± 2.0	MD:- 0.92 TD:+ 0.25
DSC analysis	EN ISO 11 357	j	Calculate diagram	No change
Water permeability	DIN EN 14 150	m ³ /m ² /day	$< 10^{-6}$	Upstream: 2.018×10^{-8} Downstream: 2.023×10^{-8}
Behavior after long-term ageing 80° C/70 days	DIN EN 1296	%	≤ 20	Pass
Fire reaction	DIN EN ISO 11925-2 DIN EN 13501-1	-	Class E	Class E

The first manufacturer of PVC geomembrane with a width of 2 meters with German ZTV standard in Iran for tunneling applications

Factory: Vali Asr Industrial Zone, Km15 Tehran Road Yazd-Iran

Tel: (+98 35)3527 94 84

Email: info@yektavaragh.com

Commercial Department: +98913 353 6977

WWW.YEKTAVARAGH.COM



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Andisheh Bartar Miran
Institute

Test Report

Licenses:

-License of research from the Ministry of Industries and Business
- The authority license for research collaboration with the Ministry of Petroleum
-License of Iran Technical and Vocational Training Organization
- License for holding workshops for Institute of Standards and Industrial Research of Iran

Agreements:

-Iran Polymer and Petrochemical Institute
- Sazeh Gostar Saipa
- Razi Metallurgical Research Center
- Razi foundation
- Gostareh Plastic
- Aryanam

Applicant	Mr.EbrahimZadeh	Test code	95082301
company/producer	Yekta Varagh Polymer Yazd	Result Published on	26/11/2016
Sample Name and Type	PVC Geomembrane with nominal thickness 2 mm	Appendix/Supplement	-
Trade name	-	Date of sampling	-
Application number	-	Sample Received on	13/11/2016
Application date	13/11/2016	Sample Tested on	13/11/2016
Sample code	-	Production date	-
Address of applicant: Vali-Asr Industrial Zone, Km15 Tehran Road, Yazd, Iran		Production series	-
Tel: +983535279484 Fax: +983535279484		Place of sampling	-
		Type of standard	-
Standard Reference: ZTV	Cost of experiment:.....	conditioning:	Temperature: 23 ± 2°C Humidity: 50 ± 5 %

No.	Test Measurement	Standard	Performance Limit	Result	Defects		
					Slight	Major	Critical
1	General properties	ZTV (DIN EN 1850-2)	Free of bubbles, cracks, blowholes and inlays of foreign matter	Accept			
2	Thickness	ZTV (DIN EN 1849-2)	average value: ≥ nominal thickness minimum value: ≥ average value - 5 % maximum value: ≤ average value + 5 %	nominal thickness: 2.00 mm average value: 2.00 mm minimum value: 1.92 mm maximum value: 2.03 mm			
3	Density	ZTV (DIN EN ISO 1183-1)	Tolerance: ≤ ±0.01 g/cm ³	1.294±0.003 g/cm ³			
4	Tensile strength	ZTV (DIN EN ISO 527-1&-3)	≥12 N/mm ²	MD: 20.18 N/mm ² TD: 20.14 N/mm ²			
5	Elongation at break	ZTV (DIN EN ISO 527-1&-3)	≥250%	MD: 253 % TD: 299 %			
6	Push-through force	ZTV (DIN EN ISO 12236)	-	3.2 kN			
7	Push-through displacement	ZTV (DIN EN ISO 12236)	-	119.09 mm			
8	Size alteration	ZTV (DIN EN ISO 1107-2)	±2%	MD:-1.20% TD:+0.07%			
9	DSC analysis	ZTV (DIN EN ISO 11357-1&-3)	-	No changes were found in the chart.			
10	Behavior in low temperature (-20°C) (bending behavior)	ZTV (DIN EN 495-5)	No cracks	No cracks			
11	Fire reaction	ZTV (DIN EN 13501-1& BS EN ISO 11925-2)	Class E	Class E			
12	Behaviour after heat ageing	ZTV (EN 1296)	-	Subsequently announced			

This test report is acceptable by performance limit of ZTV standard.

Procedure condition: Tensile: Speed: 100 mm/min, Grp: 80mm, Gauge: 25mm- Static puncture strength: Speed: 50 mm/min- bending behavior: 1 hr @ (-20°C)- Density: 23°C - Oven Aging: temperature: 80°C, Time: 70d- Size alteration: 6hr @ 80°C- DSC :rate:10°C/min, Atmosphere: N₂, Fire reaction: speed: 150 mm/20s

Comments: 1- Sampling had done with applicant. 2- These results are valid just for this received sample. 3- Number of specimens for each test is accordance with standard. 4- The 3rd, 9th & 11th clauses have tested in the Razi Applied Science foundation. 5- In the Fire reaction test, burning type is self-extinguishing. 6- In this report just 1 to 12 clauses had done from ZTV standard. 7- Test's uncertainty consist of : Tensile: 3.69%, punched: 1.65%

Tested by: Reza Sobhani Technical Manager: Parham Noori Managing Director: Ahreza Mirbolook

Address: 2nd floor, No.1, 25th street, Lashgari Expy, Tehran, Iran. Po. Code: 1399837611 Tel & Fax: +982144539094-5, +982144565305

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Document code: F4030/07

Revision date: 94/06/15

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Institute

Test Report

Applicant	Mr.EbrahimZadeh	Test code	96012701	Licenses: -License of research from the Ministry of Industries and Business - The authority license for research collaboration with the Ministry of Petroleum -License of Iran Technical and Vocational Training Organization - License for holding workshops for Institute of Standards and Industrial Research of Iran Agreements: -Iran Polymer and Petrochemical Institute * - Sazeh Gostar Saipa - Razi Metallurgical Research Center - Razi foundation - Gostareh Plastic - Aryanam
company/producer	Yekta Varagh Polymer Yazd	Result Published on	25/07/2017	
Sample Name and Type	PVC Geomembrane with nominal thickness 2 mm	Appendix/Supplement	-	
Trade name	-	Date of sampling	-	
Application number	96-102	Sample Received on	15/04/2017	
Application date	13/04/2017	Sample Tested on	15/04/2017	
Sample code	-	Production date	-	
Address of applicant: Vali-Asr Industrial Zone, Km15 Tehran Road, Yazd, Iran		Production series	-	
Tel: +983535279484 Fax: +983535279484		Place of sampling	-	
		Type of standard	-	
Standard Reference: -	Cost of experiment:	conditioning:	Temperature: 23 ± 2°C Humidity: 50 ± 5 %	

No.	Test Measurement	Standard	Performance Limit	Result	Defects		
					Slight	Major	Critical
1	Tensile strength (Before oxidation)	ZTV (DIN EN ISO 527-1&-3)	-	MD: 20.00 N/mm ²			
				TD: 18.46 N/mm ²			
2	Elongation at break (Before oxidation)	ZTV (DIN EN ISO 527-1&-3)	-	MD: 222 %			
				TD: 313 %			
3	Tensile strength (After oxidation)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 14575)	-	MD: 22.86 N/mm ²			
				TD: 20.66 N/mm ²			
4	Elongation at break (After oxidation)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 14575)	-	MD: 214 %			
				TD: 287 %			
5	Change of Tensile strength (before and after oxidation)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 14575)	-	MD: 14.3 %			
				TD: 11.92 %			
6	Change of Elongation at Break (before and after oxidation)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 14575)	-	MD: 3.60 %			
				TD: 8.31 %			

Procedure condition:

Tensile: Speed: 100 mm/min, Grip: 80mm, Gauge:25mm

Oxidation resistance for a service life of 25 years: Oven: temperature: 85 °C, Time: 90d

Comments:

- 1- Sampling was done with applicant.
- 2- These results are valid just for this received sample.
- 3- Number of specimens for each test is accordance with standard.
- 4- Test's uncertainty consist of: Tensile: 2.40%



Tested by: Alireza Mirbolook

Technical Manager: Ebrahim Noori

Managing Director: Alireza Mirbolook
شماره ثبت: ۳۳۵۹۷



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Institute

Test Report

Applicant	Mr.EbrahimZadeh	Test code	95082301
company/producer	Yekta Varagh Polymer Yazd	Result Published on	29/01/2017
Sample Name and Type	PVC Geomembrane with nominal thickness 2 mm	Appendix/Supplement	-
Trade name	-	Date of sampling	-
Application number	-	Sample Received on	13/11/2016
Application date	13/11/2016	Sample Tested on	13/11/2016
Sample code	-	Production date	-
Address of applicant: Vali-Asr Industrial Zone, Km15 Tehran Road, Yazd, Iran		Production series	-
Tel: +983535279484 Fax: +983535279484		Place of sampling	-
		Type of standard	-
Standard Reference: -	Cost of experiment:	conditioning:	Temperature: 23 ± 2°C Humidity: 50 ± 5 %

Licenses:

-License of research from the Ministry of Industries and Business
- The authority license for research collaboration with the Ministry of Petroleum
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Agreements:

-Iran Polymer and Petrochemical Institute
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- Razi Metallurgical Research Center
- Razi foundation
- Gostaresh Plastic
- Aryanam

No	Test Measurement	Standard	Performance Limit	Result	Defects		
					Slight	Major	Critical
1	Tensile strength (Before Oven Aging)	ZTV (DIN EN ISO 527-1&-3)	≥ 12 N/mm ²	MD: 20.18 N/mm ²			
				TD: 20.14 N/mm ²			
2	Elongation at break (Before Oven Aging)	ZTV (DIN EN ISO 527-1&-3)	≥ 250 %	MD: 253 %			
				TD: 299 %			
3	Tensile strength (After Oven Aging)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 1296)	-	MD: 21.30 N/mm ²			
				TD: 20.71 N/mm ²			
4	Elongation at break (After Oven Aging)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 1296)	-	MD: 281 %			
				TD: 310 %			
5	Change of Tensile strength (Before and after Oven Aging)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 1296)	≤ 20%	MD: 5.55 %			
				TD: 2.83 %			
6	Change of Elongation at Break (Before and after Oven Aging)	ZTV (DIN EN ISO 527-1&-3 & DIN EN 1296)	≤ 20%	MD: 11.07 %			
				TD: 3.68 %			

This test report is acceptable by performance limit of ZTV standard.

Procedure condition:

Tensile: Speed: 100 mm/min, Grip: 80mm, Gauge: 25mm
Oven Aging: temperature: 80°C, Time: 70d

Comments:

- 1- Sampling was done with applicant.
- 2- These results are valid just for this received sample.
- 3- Number of specimens for each test is accordance with standard.
- 4- Test's uncertainty consist of: Tensile: 3.69%



Tested by: Reza Sobhani

Technical Manager: Parham Noori

Managing Director: Alireza Mirbolook

شماره ثبت: ۲۳۵۹۷

Andisheh Bartar Miran
Institute

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Document code: F4030/07

Revision date: 94/06/15

Test Report

Applicant	Mr.EbrahimZadeh	Test code	95082301
company/producer	Yekta Varagh Polymer Yazd	Result Published on	26/11/2016
Sample Name and Type	PVC Geomembrane with nominal thickness 2 mm	Appendix/Supplement	-
Trade name	-	Date of sampling	-
Application number	-	Sample Received on	13/11/2016
Application date	13/11/2016	Sample Tested on	13/11/2016
Sample code	-	Production date	-
Address of applicant: Vali-Asr Industrial Zone, Km15 Tehran Road, Yazd, Iran Tel:+983535279484 Fax:+983535279484		Production series	-
		Place of sampling	-
		Type of standard	-
Standard Reference: ASTM D7176	Cost of experiment:	conditioning:	Temperature: 23 ± 2°C Humidity: 50 ± 5 %

Licenses:

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- The authority license for research collaboration with the Ministry of Petroleum
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- Razi Metallurgical Research Center
- Razi foundation
- Gostaresh Plastic
- Aryanam

No.	Test Measurement	Standard	Performance Limit	Result	Defects		
					Slight	Major	Critical
1	Tensile strength at break	ASTM D7176 (ASTM D882)	≥ 24 kN/m	MD: 39.86 kN/m			
				TD: 38.04 kN/m			
2	Elongation at break (Without Extensometer)	ASTM D7176 (ASTM D882)	≥ 450%	MD: 533 %			
				TD: 615 %			
3	Tear Resistance	ASTM D7176 (ASTM D1004)	≥ 67N	MD: 156.20 N			
				TD: 160.33 N			
4	Soil Burial	ASTM D7176 (ASTM G160)		Subsequently announced.			

Procedure condition:

Tensile: Speed: 500 mm/min, Grip: 50 mm

Tear: Speed: 51 mm/min, Grip: 25.4 mm

Comments:

- 1- Sampling was done with applicant.
- 2- These results are valid just for this received sample.
- 3- Number of specimens for each test is accordance with standard.
- 4- Test's uncertainty consist of :Tensile: 3.96%, Tear: 1.43%
- 5- As per customer's request, Elongation at break is reported without Extensometer.
- 6- As per customer's request, 1 to 4 clauses only have been tested from ASTM D7176.
- 7- As per customer's request, performance limit is reported accordance 1.5mm thickness in ASTM D7176.
- 8- Sample for 4th clause had put 30 days in soil.



Tested by: Alireza Afshar

Technical Manager: Ebrahim Noori

Managing Director: Alireza Mirbolook

Address: 2nd floor, No.1, 25th street, Lashgari Expy, Tehran, Iran. Po. Code: 1399837611 Tel & Fax: +982144539094 5, +982144565305

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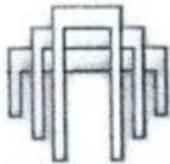
• **ЦНИПРОМЗДАНИЙ** •

ЦЕНТРАЛЬНЫЙ НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ И ПРОЕКТНО-ЭКСПЕРИМЕНТАЛЬНЫЙ
ИНСТИТУТ ПРОМЫШЛЕННЫХ ЗДАНИЙ И СООРУЖЕНИЙ — ЦНИПРОМЗДАНИЙ

127238, МОСКВА, ДМИТРОВСКОЕ ШОССЕ, Д. 46, КОРП. 2. ТЕЛ: (495) 482 4506; ФАКС (495) 482 4306. E-MAIL: CNIPZ@CNIPZ.RU, WEB: WWW.CNIPZ.RU

ТЕХНИЧЕСКОЕ ЗАКЛЮЧЕНИЕ
о применимости гидроизоляционных материалов
производства Исламской Республики Иран в проекте «Бушер-2»
по результатам испытаний

Москва - 2018 г.



А К Ц И О Н Е Р Н О Е О Б Щ Е С Т В О

ЦНИИПРОМЗДАНИЙ

ЦЕНТРАЛЬНЫЙ НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ И ПРОЕКТНО-ЭКСПЕРИМЕНТАЛЬНЫЙ
ИНСТИТУТ ПРОМЫШЛЕННЫХ ЗДАНИЙ И СООРУЖЕНИЙ — ЦНИИПРОМЗДАНИЙ

127238, МОСКВА, ДМИТРОВСКОЕ ШОССЕ, Д. 46, КОРП. 2. ТЕЛ. (495) 482 4500. ФАКС (495) 482 4306. E-MAIL: CNIPZ@CNIPZ.RU, WEB: WWW.CNIPZ.RU

ТЕХНИЧЕСКОЕ ЗАКЛЮЧЕНИЕ
о применимости гидроизоляционных материалов
производства Исламской Республики Иран в проекте «Бушер-2»
по результатам испытаний

Генеральный директор,
докт. техн. наук, проф.,
заслуженный строитель России



В.В. Гранев

Начальник отдела покрытий и
кровель, канд. техн. наук

А.В. Пешкова

Зам. начальника отдела,
канд. техн. наук,
почетный строитель России

А.М. Воронин

Москва - 2018 г.

4(18) Подземная гидроизоляция из полимерной мембраны (ПВХ-мембраны) KIA PARS, LAYE, YEKTAVAR AGH YAZD Co

4(18).1 Физико-механические показатели материала

Наименование показателя, ед. измерения	Технические требования	Результаты испытаний	Метод испытания
4(18).1.1 Теплостойкость (изменение линейных размеров), мм	нагрев при 60°C в течение 5 час.	на поверхности отсутствуют вздутия, размеры не изменились	ГОСТ EN 1110-2011
4(18).1.2 Относительное удлинение ϵ , %	≥ 300	333; 304,8; 320,5; 327,2 $\epsilon_{\text{ср.}} = 321,4$	ГОСТ Р 56704-2015
4(18).1.3 Прочность при разрыве, МПа	≥ 8	17,12; 13,49; 17,70; 17,00 $\sigma_{\text{ср.}} = 16,3$	ГОСТ Р 56704-2015
4(18).1.4 Водонепроницаемость	давление - 0,2 МПа в течение 24 час.	выдержал	ГОСТ EN 1928-2011

4(18).2 Срок службы (условная долговечность - Д) при воздействии на подземную гидроизоляцию химических реагентов

Методика испытаний не отличается от той, которая приведена в пункте 1(4).2.

4(18).2.1 Результаты испытаний приведены на рисунке 4, из которого следует, что ПВХ-мембрана изменила относительное удлинение при воздействии химических сред в пределах допустимых требований.

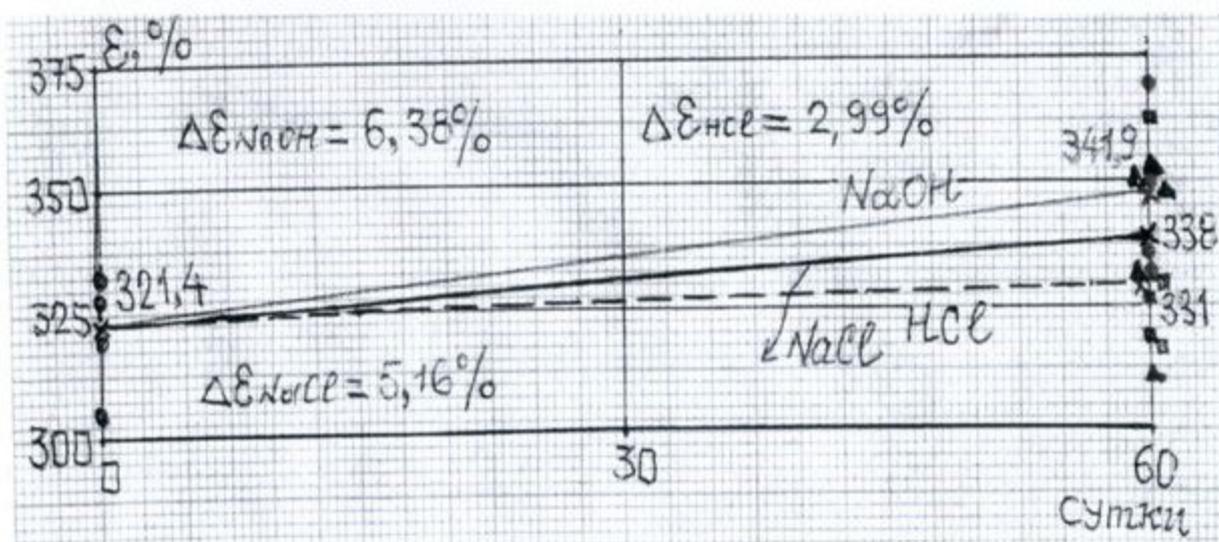


Рисунок 4 - Изменение деформативности ПВХ-мембраны при воздействии химических реагентов

4(18).2.2 Условная долговечность ПВХ-мембраны в подземной гидроизоляции равна:

$$D_{\text{NaOH}} = 60 + 60 \times (25 - 6,38) : 25 = 105 \text{ лет};$$

$$D_{\text{NaCl}} = 60 + 60 \times (25 - 5,16) : 25 = 100 \text{ лет};$$

$$D_{\text{HCl}} = 60 + 60 \times (25 - 2,99) : 25 = 113 \text{ лет}.$$

4(18).3 Выводы:

4(18).3.1 Испытанная ПВХ-мембрана по полученным физико-механическим показателям соответствует Рабочей документации АЭС «Бушер-2» «Гидроизоляция подземных частей зданий и сооружений. Технические требования. ВU 2.0120.0.0.AS.EC0002. Ревизия СО1»

4(18).3.2 Условная долговечность ПВХ-мембраны по показателю эластичности (деформативности) равна около 100 годам.

4(18).3.3 Испытанная полимерная ПВХ-мембрана может быть применена для гидроизоляции конструкций АЭС «Бушер-2».

Перечень стандартов и методик

- 1 ГОСТ EN 1110-2011 Материалы кровельные и гидроизоляционные гибкие битумосодержащие. Методы определения теплостойкости
- 2 ГОСТ EN 1928-2011 Материалы кровельные и гидроизоляционные гибкие битумосодержащие и полимерные (термопластичные или эластомерные). Методы определения водонепроницаемости
- 3 ГОСТ 2678-94* Материалы рулонные кровельные и гидроизоляционные. Методы испытаний
- 4 ГОСТ 12020-72 Пластмассы. Методы определения стойкости к действию химических сред
- 5 ГОСТ 12730.5-84* Бетоны. Методы определения водонепроницаемости
- 6 ГОСТ 14791-79 Мастика герметизирующая нетвердеющая строительная. Технические условия
- 7 ГОСТ 25945-98 Материалы и изделия полимерные строительные герметизирующие нетвердеющие. Методы испытаний
- 8 ГОСТ 26589-94 Мастики кровельные и гидроизоляционные. Методы испытаний
- 9 ГОСТ 28574-2014 Защита от коррозии в строительстве. Конструкции бетонные и железобетонные. Методы испытаний адгезии защитных покрытий
- 10 ГОСТ 30778-2001 Прокладки уплотняющие из эластомерных материалов для оконных и дверных блоков. Технические условия
- 11 ГОСТ 31899-2-2011 Материалы кровельные и гидроизоляционные гибкие полимерные (термопластичные или эластомерные). Методы определения деформативно-прочностных свойств
- 12 ГОСТ Р 54257-2010 Надежность строительных конструкций и оснований. Основные положения и требования
- 13 ГОСТ Р 56704-2015 Мембрана полимерная гидроизоляционная из поливинилхлорида. Технические условия
- 14 АО «ЦНИИПромзданий» «Гидроизоляция подземных частей зданий и сооружений. Метод определения условной долговечности при воздействии химических сред»
- 15 ВСН 58-88(р) Положение о проведении реконструкции, ремонта и технического обслуживания зданий, объектов коммунального и социально-культурного назначения. Нормы проектирования. Госкомархитектуры при Госстрое СССР, М., 1990 г.