TERVES
ENGINEERED RESPONSE

EXOSEAL™

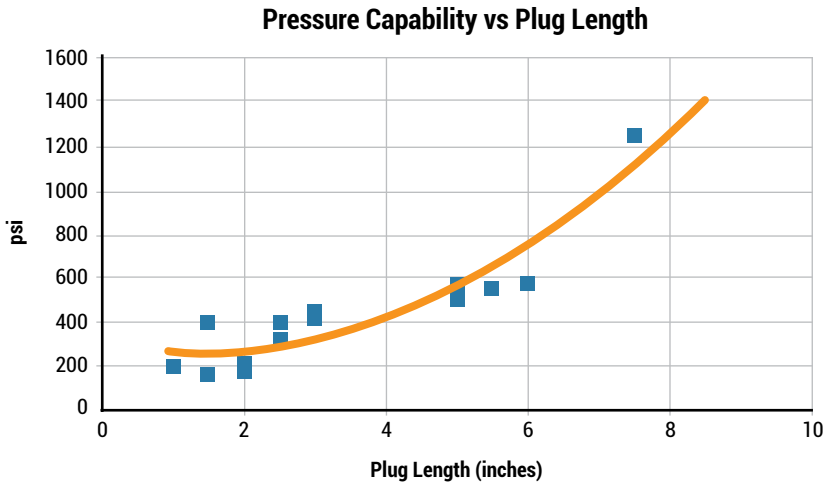
PRODUCT DESCRIPTION: STRUCTURAL EXPANDABLE

ExoSeal™ is an expandable structural polymer with high (GPa) modulus that expands in response to wellbore fluids. Exoseal is available in granular form to provide a high strength, expansive and sealing function to many applications and can be tailored in size, total expansion, rate of expansion and density to meet specific downhole applications:

- Use as an additive to cement to prevent fracturing and channeling by placing the cement into compression
- Pretreat a thin annulus prior to cementing to minimize fluid loss and ensure adequate TOC
- Add to fluid to reduce lost circulation or seal a leaking packer

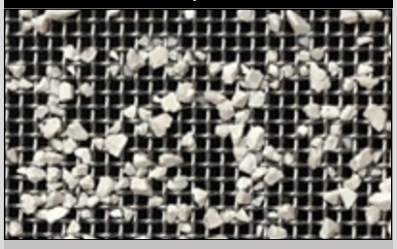
The product can be formulated to provide an expansion of 10 – 50 vol% with a significant force (4-15 kpsi). Material design can also incorporate temperature and fluid types to provide proper response time.

Material	Den g/cc
Pre-expanded Density	1.57
Post-expanded Density	1.49
% Expansion	**18.74**



Sealing capability in a loosely filled ¾" tube after expansion as a function of plug length

Pre-Expansion



Same sample of 20/40 mesh cut of ExoSeal on a 40 mesh screen
(After 4 hrs at 90°C in 1% KCl)

Post-Expansion

Exoseal fracturing a sample vial after exposure to water

DISCLAIMER: The information provided in this document is intended to assist manufacturers and specifiers in the selection and use of Terves' products. All data noted should be understood to be average and expected performance, and is provided to serve as a general guideline only. This information **does not represent and is not to serve as minimum specification standards.** For further information contact Terves directly. All Terves commercially available products have patents or patents pending in the United States and in a variety of countries. For the latest patent information on this specific product contact Terves directly.

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TERVALLOY SELECTION GUIDE

TervAlloy™ 3241 is a high strength dissolvable magnesium designed for oil and gas applications. Below are some comparative charts outlining mechanical properties and dissolution rates for our TervAlloy product line:

TervAlloy Comparative Dissolution Rates (mg/cm²hr)

Salinity (%KCl)	Temp (°C)	TervAlloy 3241 (TAx 100E)	TervAlloy 3042 (TAx 50E)	TervAlloy 1530 (TAx FW)	TervAlloy 1132 (TAx FW+)	TervAlloy 3133 (TAx HD)	TervAlloy 1343 (TAx HT)	TervAlloy 1331
0.1	30	-	-	17	4	-	17	11
	45	5	-	34	6	3	21	22
	60	9	-	52	11	9	38	38
	75	12	1	84	15	12	43	64
	90	17	3	118	37	16	51	116
1	30	3	-	24	13	2	26	16
	45	10	-	48	25	8	33	35
	60	18	2	70	48	14	58	59
	75	25	3	132	74	19	67	109
	90	33	8	187	75	25	69	137
3	30	4	-	24	16	2	29	16
	45	13	-	51	29	9	36	35
	60	22	3	91	56	17	61	66
	75	34	5	148	90	24	69	119
	90	46	9	233	117	33	93	152

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