energy API

Registered Data Sheet Perforating System Evaluation, API RP 19B Section 1

API Perforator Design Registration

API Form 19B-Section 1 ☐ Conforms to All Requirements of Section 1 ☑ Special Test - See Remarks/Exceptions below

Service Company	BVT, JSC	Explosive weight	27,2 gm, RDX powder, Case Material Steel
Gun OD& Trade Name	4,016" (102 mm) PK0102-AT	Max Temp, °F	302 (150 °C) 2 hr 284 (140°C) 5hr 266 (130°C) 12 hr 248 (120°C) 30 hr 230 (110°C) 72 hr
Charge Name	ZPK102-AT-M-09	Maximum Pressure Rating	11603 (80 MPa) psi, Carrier Material Steel
Manufacturer Charge Part No.	ZPK102-AT-M-09 Date of Manufacture 12 May, 2011	Shot Density Tested	6,1 (20 shots/m) Shots/ft
Gun Type	Expendable Gun TCP/Wireline	Recommended Minimum ID for Running	4,921 (125 mm) in.
Phasing Tested	60 degrees, Firing Order: Top down X Bottom up	Available Firing Mode:	Selective X Simultaneous
Debris Description	N/A	Debris Weight	N/A gm/charge, Debris N/A In/charge
Remarks/Exceptions per Section 1.11	Casing used: 5,748" (146 mm)×0,374"(9,5 mm) GRADE D, GOST 632-80		
Casing Data	5,748" (146 mm) OD, Weight 21,37 (31,8 kg/m) lb/ft API Grade,	Date of Section 1 Test	14 June, 2011
Target Data	55,118" (1400 mm) OD, Amount of Cement 3669,1 (1664 kg) lb, Amount of Sand 7338,2 (3328 kg) lb,	Amount of Water	1907,3 (865 kg) lb.
Date of Compressive Strength Test	14 June, 2011 Briquette Compressive Strength 6251,01 psi,	Age of Target	33 days

Shot No.	No 1	No 2	No 3	No 4	No 5	No 6	No 7	No 8	No 9	No 10	No 11
Clearance, in (mm)	0,56 (14,2)	0,6 (15,3)	0,69 (17,6)	0,74 (18,8)	0,69 (17,6)	0,60 (15,3)	0,56 (14,2)	0,60 (15,3)	0,69 (17,6)	0,74 (18,8)	0,69 (17,6)
Casing Hole Diameter, Short Axis, in (mm)	0,75 (18,93)	0,75 (18,95)	0,7 (17,79)	0,64 (16,36)	0,67 (17,07)	0,63 (16,03)	0,75 (18,95)	0,69 (17,43)	0,73 (18,43)	0,71 (18,04)	0,70 (17,82)
Casing Hole Diameter, Long Axis, in (mm)	0,75 (19,09)	0,82 (20,75)	0,72 (18,36)	0,76 (19,19)	0,8 (20,26)	0,88 (22,22)	0,78 (19,72)	0,73 (18,56)	0,79 (19,96)	0,77 (19,43)	0,71 (18,03)
Average Casing Hole Diameter, in. (mm)	0,75 (19,01)	0,78 (19,85)	0,71 (18,08)	0,7 (17,78)	0,74 (18,67)	0,75 (19,13)	0,76 (19,34)	0,71 (18,0)	0,76 (19,2)	0,74 (18,74)	0,71 (17,93)
Total Depth, in (mm)	14,9 (379,5)	13,8 (349,5)	13,6 (344,5)	13,8 (349,5)	13,8 (349,5)	14,2 (359,5)	13,6 (344,5)	13,4 (339,5)	13,0 (329,5)	13,2 (334,5)	13,4 (339,5)
Burr Height, in (mm)	0,2 (5,18)	0,16 (4,02)	0,14 (3,66)	0,13 (3,32)	0,09 (2,33)	0,07 (1,67)	0,18 (4,52)	0,15 (3,87)	0,08 (1,97)	0,12 (3,07)	0,07 (1,7)

Shot No	No 12	No 13	No 14	No 15	No 16	No 17	No 18	No 19	No 20	No 21	No 22	Average
Clearance, in (mm)	0,60 (15,3)	0,56 (14,2)	0,6 (15,3)	0,69 (17,6)	0,74 (18,8)	0,69 (17,6)	0,60 (15,3)	0,56 (14,2)	0,6 (15,3)			xxxxxxxxxxxx
Casing Hole Diameter, Short Axis, in (mm)	0,65 (16,49)	0,68 (17,24)	0,82 (20,8)	0,73 (18,52)	0,71 (18,05)	0,66 (16,7)	0,74 (18,83)	0,72 (18,27)	0,73 (18,6)			0,71 (17,97)
Casing Hole Diameter, Long Axis, in (mm)	0,76 (19,22)	0,7 (17,63)	0,85 (21,63)	0,77 (19,67)	0,81 (20,67)	0,89 (22,64)	0,78 (19,68)	0,84 (21,42)	0,77 (19,56)			0,78 (19,89)
Average Casing Hole Diameter, in (mm)	0,70 (17,86)	0,69 (17,44)	0,84 (21,22)	0,75 (19,1)	0,76 (19,36)	0,77 (19,67)	0,76 (19,26)	0,78 (19,85)	0,75 (19,08)			0,75 (18,93)
Total Depth, in (mm)	13,4 (339,5)	13,4 (339,5)	13,8 (349,5)	13,8 (349,5)	13,6 (344,5)	13,6 (344,5)	14,6 (369,5)	13,8 (349,5)	15,0 (379,5)			13,8 (349,3)
Burr Height in (mm)	0,176 (4,47)	0,1 (2,42)	0,13 (3,33)	0,18 (4,48)	0,17 (4,36)	0,08 (2,09)	0,19 (4,82)	0,11 (2,71)	0,16 (3,94)			0,13 (3,4)

Remarks The gun can be used in gas wells. Penetration normalized to 5000 psi by method of SPE 27424 (approx. 3,8% / 1000psi) = 14,4" (365,9mm)

Manufacturer's Certification

Type of Certification: X Self Third Party

I certify that these tests were made according to the procedures as outlined in API 19B: Recommended Practice for Evaluation of Well Perforators, Second Edition, September 2006. All of the equipment used in these tests, such as the guns, jet charges detonator cord, etc., was standard equipment with our company for the use in the gun being tested and was not changed in any manner for the test. Furthermore, the equipment was chosen at random from stock and therefore will be substantially the same as the equipment that would be furnished to perforate a well for any operator. API neither endorses these tests nor recommends the use of the perforator system described.

API Witness A. Tovmachenko 17 June, 2011 (Date)

X	CERTIFIED BY	A. Yakuba	Technical Director	17 June, 2011	BVT, JSC	224 Leninskaya St., Samara, 443001, Russian Federation
	RECERTIFIED	(Company Official)	(Title)	(Date)	(Company)	(Address)

Name of test as it should appear on website: ZPK102-AT- 09

Name of test as it appears on application and application date: ZPK102-AT-M-09