

# Stimulation-Optimized Shaped Charges

S2906, S3106, and S3406

**APPLICATIONS**

- Hydraulic fracturing
- Conventional and unconventional reservoirs

**BENEFITS**

- Uniform entrance holes that enable even distribution of pumping pressure
- Reduced stimulation pressure via consistent entrance holes
- Promotion of uniform fractures for optimized productivity and minimal tortuosity

**FEATURES**

- Hole size consistent for all gun string configurations
- Compatible with industry-standard gun systems using the bent tab loading system
- Available with both RDX and HMX explosives

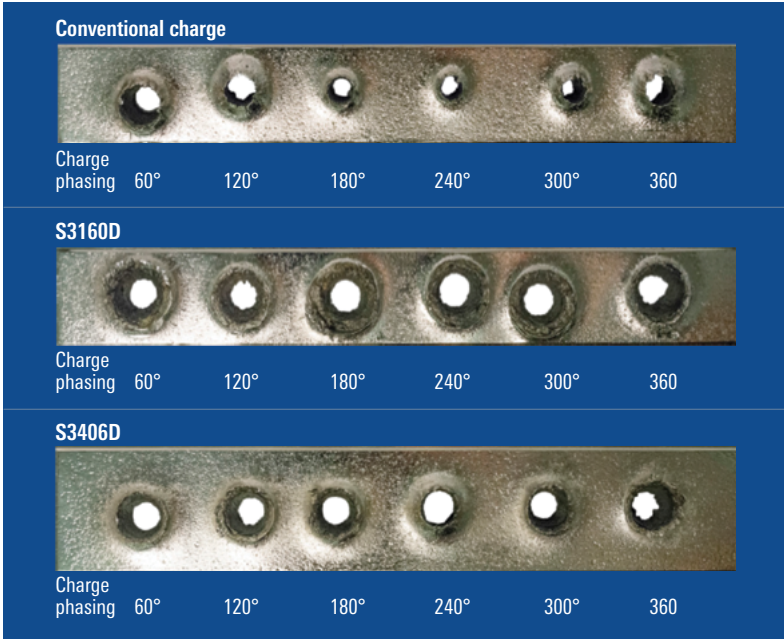


S3106 charge.

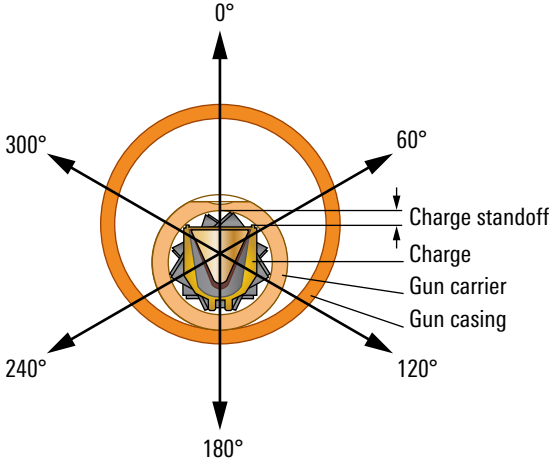
Because conventional deep penetrating shaped charges are optimized for natural completions with a focus on maximizing the depth of penetration, they are not designed to produce uniformly shaped and sized entrance holes around the wellbore, which is a critical requirement for improving fracture distribution between individual perforations.

A family of stimulation-optimized shaped charges (S-charges) has been developed to provide consistently large perforation entrance holes across the wellbore azimuth and across a range of gun standoffs. This uniformity is achieved without a loss of penetration depth.

Consistent entrance holes increase the area open to flow (AOF) for each perforation, which decreases the pressure drop across the perforation and lowers treating pressures, reducing the likelihood of early screenout. Fracturing operational risk is reduced while efficiency is increased.



Comparison of the uniform, consistent entrance holes delivered by S-charges with those of conventional shaped charges.



Gun standoff around the wellbore.

# Stimulation-Optimized Shaped Charges

## S-Charge Specifications

Charge <sup>†</sup>	Part Number	Explosive Load, g	Gun Size, in	Target Casing Specification	Entrance Hole, in	Penetration, in	Test Standard	Entrance Hole Variation, %
S2906, RDX	102902593	15.4	2 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.47	14.4	QC <sup>‡</sup>	
S2906D, RDX	101454945	15.4	2 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.33	24.1	API RP 19B	
S2906D, HMX	101455550	16.3	2 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.35	30.7	API RP 19B	9.8
<a href="#">S3106, RDX</a>	101287482	19.4	3 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.49	19.9	API RP 19B	4.4
<a href="#">S3106D, RDX</a>	100920037	19.4	3 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.40	35.4	API RP 19B	2.8
S3106D, HMX	101287579	19.3	3 $\frac{1}{8}$	4 $\frac{1}{2}$ -in 11.6-lbm/ft L-80	0.45	36.1	QC	7.8
<a href="#">S3106D, RDX</a>	100920037	19.4	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.35	35.4	QC	5.7
S3106D, HMX	101287579	19.3	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.35	36.1	QC	6.0
S3106LE, RDX	103187958	18.4	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.30	30.5	QC	4.6
S3406, RDX	101287566	22.7	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.44	19.2	QC	
<a href="#">S3406D, RDX</a>	101267229	21.6	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.40	35.6	QC	5.5
S3406, RDX	101287566	22.7	3 $\frac{1}{8}$	5-in 15.0-lbm/ft L-80	0.52	19.2	QC	
<a href="#">S3406D, RDX</a>	101267229	21.6	3 $\frac{1}{8}$	5-in 15.0-lbm/ft L-80	0.42	35.6	API RP 19B	6.2
S3406D, HMX	101483306	21.9	3 $\frac{1}{8}$	5-in 15.0-lbm/ft L-80	0.50	35.3	QC	2.9
<a href="#">S3106D, RDX</a>	100920037	19.4	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.35	35.4	QC	2.7
S3406, RDX	101287566	22.7	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.45	19.2	QC	
<a href="#">S3406D, RDX</a>	101267229	21.6	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.40	35.6	QC	3.5
S3406D, HMX	101483306	21.9	3 $\frac{1}{8}$	5 $\frac{1}{2}$ -in 23.0-lbm/ft P-110	0.46	35.3	QC	3.4

Note: S-charges are compatible with industry-standard gun systems and a wide range of shots per foot (spf) and phasing (°) configurations, including 6, 60, 4, 90; and 5, 0. S3106 and S3406 charges are compatible with both 3 $\frac{1}{8}$ -in and 3 $\frac{3}{8}$ -in gun systems.

<sup>†</sup> D=deep penetrating

<sup>‡</sup> Non-API extrapolation with industry-standard casing size

## S-Charge Packaging

	S2906, RDX	S2906D, RDX	S2906D, HMX	S3106, RDX	S3106D, RDX	S3106D, HMX	S3106LE, RDX	S3406, RDX	S3406D, RDX	S3406D, HMX
Part number	102902593	101454945	101455550	101287482	101287482	101287579	103187958	101287566	101267229	101483306
Gross weight, lbm [kg]	37.0 [16.8]	37.9 [17.2]	39.9 [18.1]	62.9 [28.6]	65.4 [29.7]	64.9 [29.5]	65.5 [29.7]	62.4 [28.4]	62.4 [28.4]	65.4 [29.7]
Net weight, lbm [kg]	29.9 [13.6]	29.9 [13.6]	31.9 [14.5]	54.9 [24.9]	58.4 [26.5]	57.9 [26.3]	58.64 [26.6]	54.9 [24.9]	54.9 [24.9]	57.9 [26.5]
Quantity per box	100	100	100	100	100	100	100	100	100	100
Shelf life, years	10	10	10	10	10	10	10	10	10	10
UN number	440	440	440	440	440	440	440	440	440	440
Hazard class	1.4D	1.4D	1.4D	1.4D	1.4D	1.4D	1.4D	1.4D	1.4D	1.4D
Box size, in	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8	20 × 13 × 8

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