

SMITH BITS

A Schlumberger Company



Impax

Diamond-enhanced insert (DEI) hammer bits

Superior reliability, durability, and performance

Impax* hammers feature a hardened-steel guide sleeve instead of the conventional plastic blow tube, optimizing energy transfer from the piston to the bit. Replacing the blow tube also significantly improves deep-hole drilling reliability by minimizing failures due to shock, vibration, abrasive wear, and high-temperature erosion caused by misting.

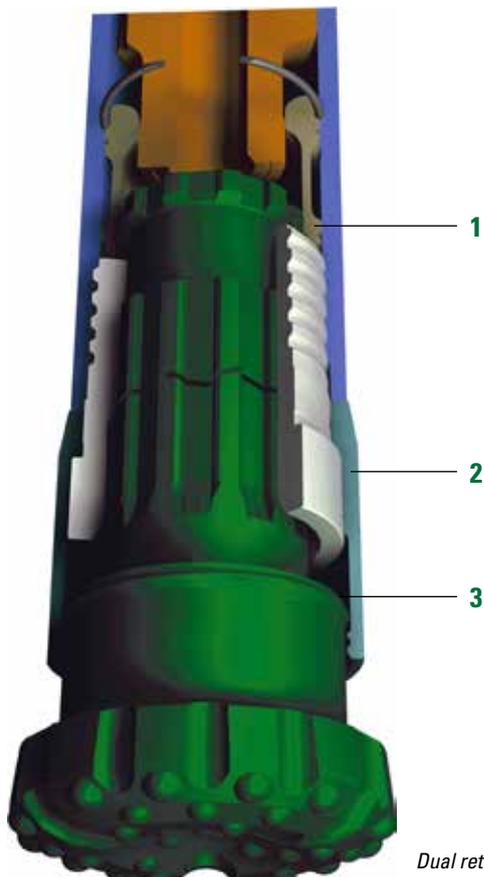
The Impax hammer's lower chamber has been designed to handle 10% to 20% more water than conventional hammer bits, thereby improving performance. High backpressure and large circulation volumes resulting from water produced by misting and influx are major causes of hammer failures. When water incursion forces other hammer bits to be tripped out of the well, the Impax hammer's capabilities enable it to continue performing reliably, even in deep wells.

Secure bit retention downhole

When encountering hard rock formations that require the use of a percussion hammer, Impax bits offer a highly reliable retention system that virtually eliminates the loss of the bit head in the hole and saves the cost of fishing or sidetracking.

1. The system's primary retention mechanism is a set of split retaining rings at the top of the bit. *(below)*
2. The bit retainer is a sleeve trapped between the shoulders of the driver sub and the hammer case. It catches the bit head in the event that a shank (fracture in the spline area) prevents the primary retention rings from functioning. *(below)*
3. The secondary catch mechanism is a rope thread machined on the retainer ID and the bit OD. During the trip out of the hole, right-hand rotation of the drillstring virtually eliminates any chance of the bit head separating from the retainer. *(below)*

For conventional hammer bits, split rings are the only means of attachment to the drillstring and the possibility of losing the bit head downhole is so great that the bits have built-in fishing threads to facilitate retrieval.



Dual retention system

Applications

Air drilling in:

- hard to soft formations
- vertical or deviated wells
- deep wells

Benefits

- High ROP and lower cost because of rapid hammer action and durable cutting structures
- Cost and time savings as a result of no drilling mud
- Lower NPT and reduced tripping due to greater reliability
- Increased life of subsequent bit and faster casing because of good hole quality

Features

- Hardened-steel guide sleeve for optimal energy transfer and ruggedness
- Larger chamber to handle greater water incursion
- Unique, dual bit-retention system for reduced risk
- Carbide and diamond-enhanced inserts for durability and abrasion resistance
- Choice of profiles to suit the application
- Full range of options for cutting structure layouts

Increased footage at lower cost

Impax hammer bits have tough and durable DEIs that increase the footage drilled and lower the cost per foot. These bits eliminate the need for reaming, extending the life of the subsequent bit and providing a quality borehole for running casing. In addition, three exhaust ports improve bit face cleaning for longer life and better ROP. The bit can be supplied with a concave bottom, which optimizes directional control.

DIGR diamond in gauge row hammer bits

DIGR* hammer bits are the cost-effective choice for drilling applications that do not require DEIs on all cutting structures. These bits offer a full range of options for cutting structure layout but use DEIs only in the gauge row, providing excellent ROP and durability in less demanding formations. DIGR bits use the same retention system as Impax bits.

Bit profiles

F feature—Flat

- Feature Flat bottom with a single gauge-angle bit head profile
- Advantage Allows use of heavier-set cutting structures on the bit face
- Benefit Excellent drilling performance in hard formation intervals

M feature—Modified

- Feature Nonstandard bit head profile
- Advantage Incorporates unique geometry for specific operating parameters
- Benefit Enhanced performance for special drilling applications

V feature—Concave

- Feature Concave bottom with a dual gauge-angle bit head profile
- Advantage Provides additional drilling stability and directional control
- Benefit Excellent drilling performance in medium-soft to medium formation intervals where hole deviation is a primary concern

X feature—Convex

- Feature Flat face with a convex, dual gauge-angle bit head profile
- Advantage Allows use of heavy-set cutting structures on the face and gauge
- Benefit Excellent drilling performance in medium to medium-hard formation intervals

Gauge reinforcement

PD feature—Optional gauge protection

- Feature All-diamond gauge reinforcement
- Advantage Significantly extends the life of the bit gauge
- Benefit Increased life of subsequent bit and a quality hole for running casing through elimination of the need for reaming.

Gauge inserts

G feature—Diamond in gauge row (DIGR)

- Feature Diamond-enhanced gauge inserts (with carbide face inserts)
- Advantage Provide exceptional gauge durability and abrasion resistance
- Benefit Excellent bit gauge life when drilling long, medium-soft formation intervals

Face inserts

C feature—Carbide insert

- Feature All carbide cutting structure
- Advantage Provides excellent durability and abrasion resistance
- Benefit Superior and cost-effective drilling performance in soft to medium-soft formations

D feature—Diamond-enhanced insert (DEI)

- Feature All DEI cutting structure
- Advantage Provides exceptional durability and abrasion resistance
- Benefit Excellent drilling performance in longer intervals through hard formations

6 feature— $\frac{6}{8}$ -in [18 mm]-diameter DEI

- Feature $\frac{6}{8}$ -in-diameter DEIs in gauge cutting structure
- Advantage Allows use of heavy-set diamond gauge cutting structures
- Benefit Increased life of subsequent bit and a quality hole for running casing

7 feature— $\frac{7}{8}$ -in [22 mm]-diameter DEI

- Feature $\frac{7}{8}$ -in-diameter DEIs in gauge cutting structure
- Advantage Allows use of diamond gauge cutting structures with improved impact damage resistance
- Benefit Increased life of subsequent bit and a quality hole for running casing



Bit head retention

N feature—Nonretainable

- Feature No retaining feature on the bit head (standard fishing threads)
- Advantage Provides compatibility with third-party hammers that have no bit-retention features
- Benefit Flexible use of bit in various BHAs such as those used for water wells and construction

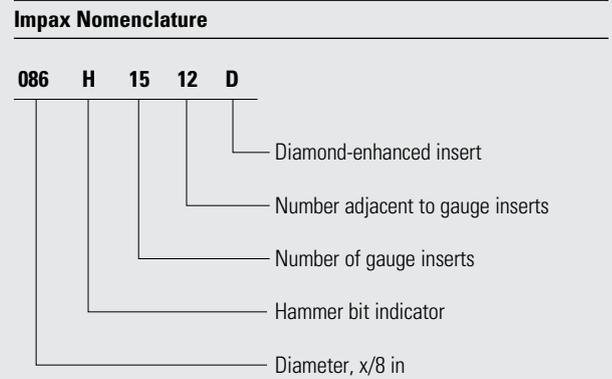
R feature—Retainable

- Feature Patented bit head retention system
- Advantage Prevents loss of bit head in the hole
- Benefit Reduced risk, and hence cost, of sidetracking or fishing

Impax Nomenclature and Features

Impax Nomenclature and Features		
Size, 1/8 in	Type	Available Features
61	H0806	X,6,R,D,PD
62	H1006	X,6,R,D,G
63	H1006	X,6,R,D,G
64	H1006	X,6,R,D,G
66	H1006	X,6,R,D,G
77	H1209	V,7,R,D,PD
83	H1209	V,7,R,D,PD
84	H1209	V,7,R,D,PD
86	H1206	V,7,R,D,PD
86	H1209	V,7,R,D,PD
87	H1209	V,7,R,D,G,PD
87	H1512	V,6,R,D,G,PD
94	H1509	V,7,R,D,PD
95	H1509	V,7,R,C,D,PD
96	H1509	V,7,R,C,D,PD
97	H1509	V,7,R,C,D,PD
105	H1509	V,7,R,D,PD
110	H1209	V,7,R,D,PD
122	H1209	V,7,R,D,G,PD
123	H1209	V,7,R,D,G,PD
146	H1812	V,7,R,D,G,PD
174	H1809	V,7,R,D,G,PD

Impax Features	
C	Carbide Insert
D	Diamond Enhanced Insert (DEI)
F	Flat Profile
G	Diamond in Gauge Row
M	Modified Profile
N	Nonretainable
PD	Optional Gauge Protection
R	Retainable
V	Concave Profile
X	Convex Profile
6	3/8-in [18-mm] Diameter DEI
7	7/8-in [22-mm] Diameter DEI



8 3/4-in H1512D Impax bit