RECOMMENDED SAFETY PROCEDURES

The mining industry continues to demand even higher levels of safety and productivity. In order to meet these requirements, we work continuously to develop even safer products, and to produce comprehensive manuals enabling for safer and effective use of our products.

You must wear appropriate personal protective equipment (PPE) at all times. This is what we strongly recommend, to help avoid injury:
- Safety helmet
- Hearing protection
- Safety glasses
- Protective high visibility clothing
- Respiratory protection
- Safety boots
- Any site-specific PPE as required

DRESS RIGHT FROM HEAD TO TOE

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BE AWARE OF ALL SAFETY PROCEDURES

We ask that you start by obeying all instructions given. Never work under an unsupported roof or close to potential pinch point locations. Beware of the potential hazards of a loose roof and ribs, and scale down roof and ribs prior to bolting. It is important to bolt early in the mining process – as soon as is safely and practically possible.
Safe work procedures should incorporate inspection before the machine operates, and also through regular monitoring based upon mining conditions, safety and hazard management systems. Workers should be provided with safety information, instruction and training on transportation, installation, operational care and disposal of drilling tools.

MAKE A RISK ANALYSIS BEFORE YOU START

Pay attention to safety when planning all of your work. Before you start, always take your time to go through all operations. Identify any potential risks and take appropriate measures to avoid them. If necessary, seek expert advice on how to help minimize risks. Finally, make sure that you have the right resources to perform all tasks in the safest manner possible.

Please check www.safeworkaustralia.gov.au for more information.
IADC Codes - Rotary Rock Bits

International Association of Drilling Contractors

IADC Codes make it easier for drillers to describe what kind of rock bit they are looking for to the supplier. Bit Brokers International follows the IADC bit classification system in which the first three digits classify the bit according to the formation it is designed to drill and the bearing/seal design used.

Example 5-4-5-R:

First Digit:
a. 1, 2, and 3 designate STEEL TOOTH BITS with 1 for soft, 2 for medium and 3 for hard formations.
b. 4, 5, 6, 7 and 8 designate TUNGSTEN CARBIDE INSERT BITS for varying formation hardness with 4 being the softest and 8 the hardest.

Second Digit:
1, 2, 3 and 4 are further breakdown of formation with 1 being the softest and 4 the hardest.

Third Digit:
This digit will classify the bit according to bearing/seal type - see information on different bearing types - and special gauge wear protection as follows:
1. Standard open bearing roller bit/2. Standard open bearing roller bit, air-cooled
3. Standard open bearing roller bit with gauge protection which is defined as carbide inserts in the heel of the cone
4. Sealed roller bearing bit/5. Sealed roller bearing bit with gauge protection
6. Journal sealed bearing bit/7. Journal sealed bearing bit with gauge protection

Fourth Digit:
The following letter codes are used in the fourth digit position to indicate additional features:

Bearing Types:
There are primarily four (4) types of bearing designs used in tricone drilling bits:

1.) STANDARD OPEN BEARING ROLLER BIT: On these bits the cones will spin freely. This type of bit has a front row of ball bearings and a back row of roller bearings.

2.) STANDARD OPEN BEARING ROLLER BIT FOR AIR DRILLING: Cones are similar to #1, but have air injection directly to the cones to cool the bearings. Air flows into the cone through the passage ways inside the pin. (Not for mud applications)

3.) SEALED BEARING ROLLERS BITS These bits have an O-Ring seal with a grease reservoir for bearing cooling. The seals acts as a barrier against mud and cuttings to protect the bearings

4.) JOURNAL BEARING ROLLER BITS These bits are strictly oil/grease cooled with nose bearings, O-Ring seal and a race for maximum performance.

Please check http://www.iadc.org/drillbits/ for more information.
251mm (9 7/8”) IADC435

Bit Description

<table>
<thead>
<tr>
<th>Bit Size</th>
<th>ADC Code</th>
<th>Pin Connection</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>251mm/9-7/8”</td>
<td>435</td>
<td>6-5/8” API REG</td>
<td>65Kg</td>
</tr>
</tbody>
</table>

IADC: 435 - TCI sealed roller bearing bit with gauge protection for soft formations with low compressive strength and high drillability.

**Compressive Strength:**

65-85 MPA  
9,000-12,000 PSI

**Ground Description:**

Long intervals of very soft poorly compacted shales, dolomites, sandstones, clays, salts and limestones.

**Product Specification**

<table>
<thead>
<tr>
<th>Bearing Type</th>
<th>Operating Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller-Ball-Roller-Thrust Button/Sealed Bearing</td>
<td>Weight on Bit: 9,880-39,500</td>
</tr>
<tr>
<td><strong>Circulation Type</strong></td>
<td>Rotating speed: 80 - 110RPM</td>
</tr>
<tr>
<td>Jet Air</td>
<td>Air Back Pressure: 0.2 - 0.4</td>
</tr>
<tr>
<td><strong>Gage Level Protection</strong></td>
<td>Gage Row: Chisel</td>
</tr>
<tr>
<td>Inner and Nose Rows: Ogive</td>
<td>Hardmetal and wear resistant carbide on shirrtail lip and lug</td>
</tr>
</tbody>
</table>

**GUIDE FOR BEST BIT PERFORMANCE**

- When a new bit is installed, drill bit at reduced weight for a short break-in period. Use the 1/3 – 2/3 rule: 1/3rd of normal weight and RPM for 1/3 first hole, 2/3rd of normal weight and RPM for next 1/3rd of hole. Use normal drilling parameters to finish the hole.
- Provide adequate air to the bit to ensure trouble free bearing performance and reduced abrasion wear on cones and shirrtails.
- Turn the air on before lowering the bit to collar the hole. Keep the air on until the bit is finished drilling and is out of the hole. Always rotate the bit when moving in or out of the hole.
- Always rotate when coming out of the hole.
- Blasthole bits drill most economically when sufficient weight is applied to cause spalling of the formation. Selecting correct rotary speed is usually a matter of trial-and-error, depending upon the formation being drilled or use the factory recommended weight and rotation speeds.
- Never use the hydraulic down pressure on the bit to aid in leveling the machine.
- When adding extra drill steel in wet holes, always make three or four cleaning passes to get the bottom of the hole as clean as possible.
- After the bit is discarded it is necessary to make a comparative analysis of each bit type dulling and causes.