Product Information Bulletin

P-Series Triplex Mud Pumps

Discharge Spacer Socket-Head Cap Screws

REFERENCE	REFERENCE DESCRIPTION Triplex Mud Pump
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1 PURPOSE

The purpose of this information bulletin is to notify of the occurrence, findings, and options to improve safety after the first incidence of a reported failure. A set of socket-head cap screws failed to retain discharge pressure on a “P” series mud pump. Subsequent investigation indicated that the primary cause of failure was a corrosive environment. The option to change the current cap screws to an alternate grade which may, under particular circumstances, have a longer life is listed at the end of this publication in Table 1.

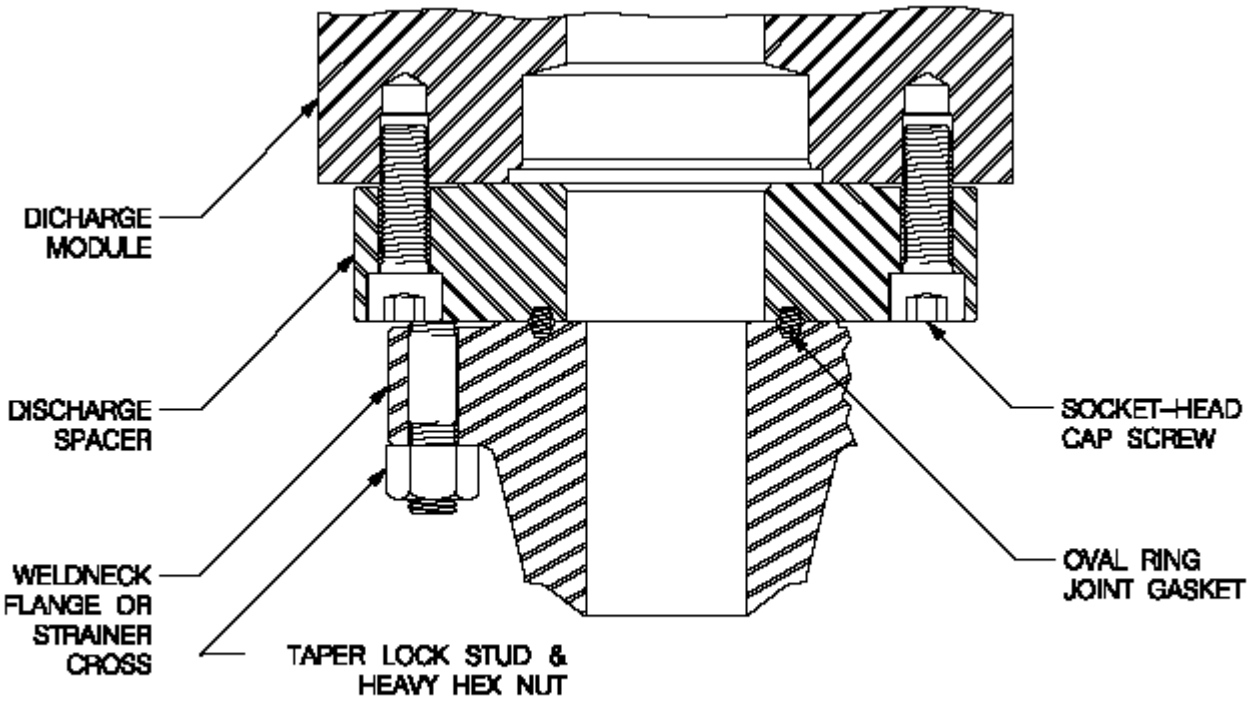

FIGURE 1: TYPICAL SECTION THRU DISCHARGE OUTLET

The discharge outlet assembly for “P” Series MUD Pumps (Figure 1) attaches the weldneck flange to the discharge spacer, with the spacer fixed to the discharge module by a circle of socket-head cap screws. The number of cap screws varies depending on the series model. All socket-head cap screws used previously in this application are made from the same material and meet the same specification. These cap screws meet the “Standard Specification for Allow Steel Socket-Head Cap Screws” as documented by the American Society for Testing and Materials (ASTM), designated as A-574.

1.1 Socket-Head Cap Screws:

Socket-head cap screws made to meet the A-574 specification have high-strength, high-load, and high-hardness properties and characteristics. Over the lifetime of the discharge outlet assembly design, these cap screws have been shown to be the best suited for this application with many years of successful service.

In the only reported instance, six of eight socket-head cap screws failed to retain the discharge spacer to the discharge module on the pulsation dampener side. The model “12-P-160” pump was one of three MUD Pumps in operation during drilling with pressurized suction lines, discharge lines, and pulsation dampeners.

In the course of a detailed investigation, the following summarized the findings with respect to the screws:

- Crack propagation for four of the six cap screws started at the root of the last non-engaged thread; while, two of the six had started between the cap screw head and engaged threads.

- Magnetic particle inspection (MPI) for both failed and intact cap screws did not show any indications of cracks within the threads.

- Metallurgical spectroscopy results indicated that corrosion was the primary cause of the weakening of the cap screws. The combination of corrosive contaminants contained in drilling mud, brines with chlorides, presence of galvanic cells, and the salt water environment, all within a contained area that allowed excessive heat to build up around the pumps, contributed to the overall weakening of these cap screws.

- The mechanical properties of strength and hardness, along with the chemical composition, all met the specification for ASTM A-574.

- No evidence of over-torque was found in any cap screw.

1.2 Identification of Replacement Cap Screws

With the unusual combination of factors and certain environmental conditions found in this one incidence, the discharge spacer socket-head cap screws can be affected by stress corrosion cracking. Any measure taken to eliminate some or all of the corrosion factors reduces the risk of possible failure.

In light of the recent findings, an alternate socket-head cap screw (meeting specification ASTM A-193, Grade B7) is now available. The alternate cap screw is less susceptible to weakening in an excessively corrosive environment. If an existing MUD pump is operating in an environment or condition as described above, it is recommended that these socket-head cap screws be checked and/or replaced using the appropriate replacement part number (Table 1) for the pump model.

Identification of Replacement Cap Screws

Model	Description	Existing Part Number	Replacement Part Number
7-P-50	Taper Lock Stud, 1-1/4” x 6-1/4”	2402560	Not Applicable
8-P-80	Socket-Head Cap Screw, 1-1/4” x 3-1/4”	7006607	7006607-25
9-P-100	Socket-Head Cap Screw, 1-1/4” x 3”	7006606	7006606-25
10-P-130	Socket-Head Cap Screw, 1-1/4” x 2-3/4”	7006605	7006605-25
12-P-160	Socket-Head Cap Screw, 1-1/2” x 3”	7006685	7006685-25
14-P-220	Socket-Head Cap Screw, 1-1/4” x 3-3/4”	7006609	7006609-25