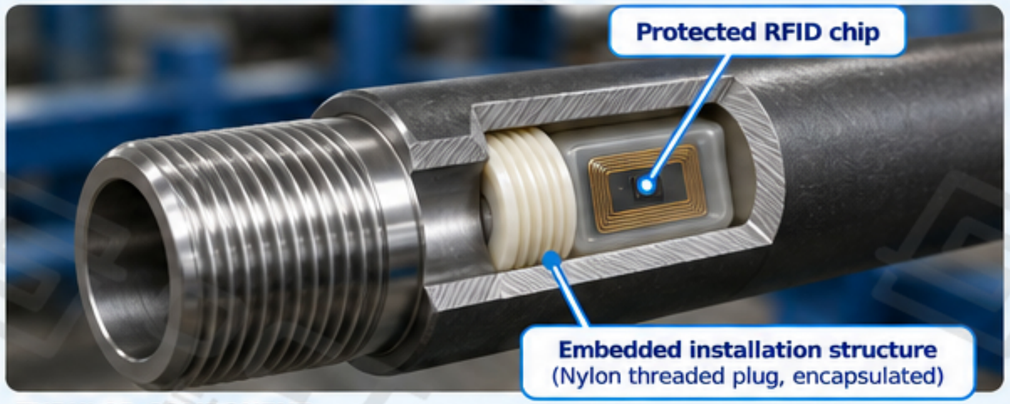
RFID-BASED OILFIELD EQUIPMENT IDENTIFICATION

LIFECYCLE MANAGEMENT GUIDE

01 RFID SYSTEM OVERVIEW

An RFID-based oilfield equipment management system connects selected physical components with their digital equipment records through registered identification chips. The system organizes equipment information across manufacturing, logistics, storage, field operation and end-of-life management, linking component identity with well assignments, operating history and maintenance records.

RFID IDENTIFICATION EXAMPLE



TUBULAR COMPONENT

Tag design and mounting arrangement are component-specific.

EQUIPMENT COVERED BY RFID IDENTIFICATION

EQUIPMENT CATEGORY	RFID IDENTIFICATION PURPOSE	MANAGEMENT FOCUS
Sucker Rods	Individual component identification	Specifications, length and usage history
Polished Rods	Equipment identification	Technical records and service history
Tubing	Component identification	Well assignment and quality tracking
Sucker Rod Pumps	Pump identification	Pump records and maintenance history
Polished Rod Sealing Devices	Component identification	Maintenance and packing replacement records

DIGITAL EQUIPMENT RECORD

RECORD ELEMENT	INFORMATION LINKED TO THE EQUIPMENT
Equipment identity	Registered chip association and individual equipment record
Technical information	Specifications and manufacturing information
Well assignment	Associated well and equipment allocation
Operating history	Installation and recorded usage history
Maintenance history	Service, inspection and replacement records

EQUIPMENT LIFECYCLE MANAGEMENT FLOW



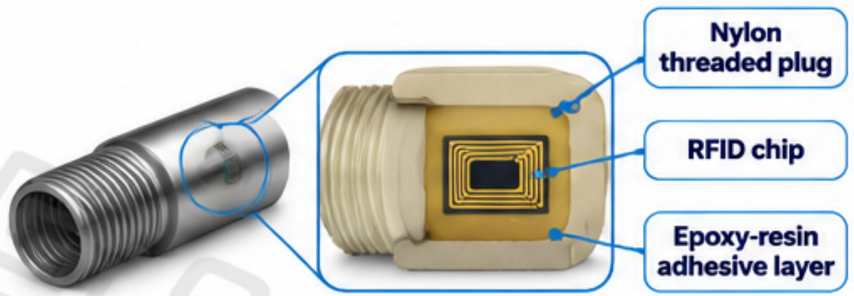
IDENTIFICATION AND TRACEABILITY: By linking a physical component to its digital equipment record, RFID supports the review of specifications, well assignments, operating history and maintenance information throughout the equipment lifecycle.

02 RFID CHIP INSTALLATION AND PROTECTION

RFID chips are integrated into protective structures on olifield production equipment. The installation arrangement varies according to the equipment type and its structural requirements. Protective components accommodate the identification chip and help maintain its installed position during equipment handling and field operation.

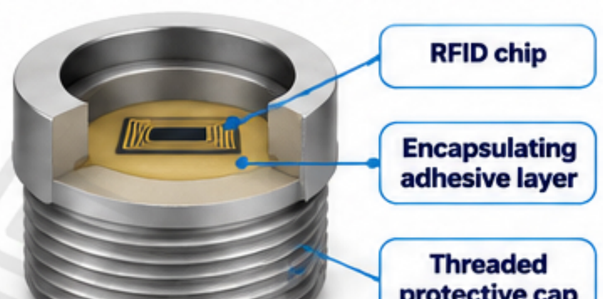
INSTALLATION STRUCTURES BY EQUIPMENT TYPE

SUCKER RODS & POLISHED RODS



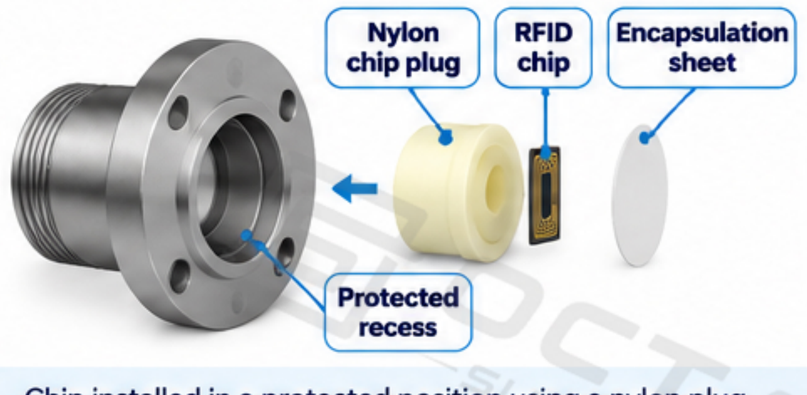
Chip housed inside a nylon threaded plug and protected by an epoxy-resin adhesive layer.

TUBING & SUCKER ROD PUMPS



Chip protected within an encapsulated assembly with a threaded protective cap.

POLISHED ROD SEALING DEVICES



Chip installed in a protected position using a nylon plug and encapsulation sheet.

INSTALLATION METHOD SUMMARY

Equipment	RFID Chip Installation Structure
Sucker Rods and Polished Rods	RFID chip inside a nylon threaded plug; protected by an epoxy-resin adhesive layer.
Tubing and Sucker Rod Pumps	RFID chip within a protected structure using an encapsulating adhesive layer and a threaded protective cap.
Polished Rod Sealing Devices	RFID chip in a protected position using a nylon plug and an encapsulation sheet.

INSTALLATION VERIFICATION

Verification Item	What to Confirm
Installation Structure	Correct protective structure for the equipment type.
Protective Assembly	Integrity of the adhesive layer, plug, cap, or encapsulation sheet.
Chip Registration	Correct association between the RFID chip and equipment number.
Equipment Record	Successful retrieval of the corresponding digital equipment information.

TECHNICAL NOTE: Verify the installation structure and chip-to-equipment registration before the component enters service. Chip frequency, read distance, temperature limits, pressure limits, and protection ratings are not specified here and must be confirmed from the applicable chip and equipment documentation.

03 EQUIPMENT IDENTIFICATION AND DIGITAL RECORDS

Each RFID chip is registered and associated with an individual equipment record in the management platform. Retrieving the registered chip identifier provides access to the equipment's identity, specifications, manufacturer information, and recorded usage data. This link dstinguísdes individual components, including items within the same equipment category.

RFID IDENTIFICATION AND DIGITAL RECORD



RFID Chip Identifier

Equipment Digital Record

Equipment Number	SR-000123
Equipment Name	Sucker Rod
Specification	Ø22 mm × 6 m
Manufacturer	—
Usage Data	Downhole history · Runs: 12

Registered chip identifier links the physical component to its digital record.

EQUIPMENT INFORMATION FIELDS

Information Field	Recorded Information	Management Purpose
Equipment Number	Individual equipment identification number	Distinguishes individual components
Equipment Name	Component or product name	Identifies equipment category
Specification	Equipment specification and model	Provides technical identification
Manufacturer	Manufacturing information	Maintains manufacturing traceability
Length	Recorded component length	Supports dimensional records and engineering calculations
Maximum Load	Maximum load information	Maintains equipment load-related data
Number of Runs	Recorded equipment usage count	Tracks equipment utilization history

EQUIPMENT RECORD ASSOCIATION

RFID Chip Identification
Registered chip identifier

Equipment Master Record
Equipment number · Specification · Manufacturer · Length · Maximum Load

Well and Usage Records
Well association · Downhole history Pull-out history · Number of Runs

Lifecycle Information
Manufacturing · Logistics · Storage · Field Use · End-of-Life

EQUIPMENT DATA MANAGEMENT

Equipment records should remain associated with the correct physical component throughout its service life. When equipment is assigned to a well, retrieved from service, inspected, stored, or retired, the corresponding records should be updated to maintain a traceable history.

The management platform provides a centralized reference for equipment identity, technical information, and iifecycle records, rather than treating each operating event as an isolated entry.

IDENTIFICATION PRINCIPLE: The RFID chip is not a database containing every equipment parameter; it provides the identification link used to retrieve the corresponding digital equipment record.

04 EQUIPMENT LIFECYCLE AND QUALITY TRACKING

The RFID management system links equipment identity with downhole, pull-out, inspection, quality, and maintenance records. These records provide a traceable history for reviewing equipment deployment, condition, and service decisions.

DOWNHOLE AND PULL-OUT HISTORY

Equipment Identification
Retrieve registered equipment record

→

Downhole Record
Record equipment entering the well

→

Operating Period
Maintain usage and service information

→

Pull-Out Record
Record equipment removed from the well

→

Inspection and Condition Review
Evaluate condition and maintenance needs

→

Return to Service or End-of-Life
Update equipment lifecycle record

For sucker rods, polished rods, and tubing, review deployment and retrieval history alongside equipment specifications and available well-condition information.

SUCKER ROD AND TUBING QUALITY TRACKING

Associated operating records support incident review, inspection planning, and assessment of equipment before return to service.

Equipment Condition	Management Purpose
Leakage	Records equipment-related leakage issues
Corrosion	Tracks corrosion-related equipment conditions
Eccentric Wear	Records wear associated with eccentric contact
Service-Life Changes	Supports equipment usage and maintenance review

SUCKER ROD PUMP SETTING DEPTH MANAGEMENT

Recorded length data can be used with the applicable engineering inputs for automatic pump setting depth calculation. Confirm the calculation method and input values for the actual pump configuration.

Calculation Input	Data Source
Sucker Rod Length	Length information recorded in sucker rod chip records
Rod Elongation Factor	Factor for the corresponding sucker rod type
Tie Rod Length	Recorded tie rod length
Pump Barrel Length	Pump barrel dimensional information

POLISHED ROD SEALING DEVICE MAINTENANCE WARNING



Equipment Record → **Packing Replacement-Time Calculation** → **Maintenance Reminder / Early Warning**

The platform uses equipment records and well operating conditions to support packing replacement planning and early maintenance warnings, helping reduce unexpected sealing problems.

LIFECYCLE MANAGEMENT VALUE: RFID-linked records support traceability from well entry and pull-out through condition review, quality tracking, pump setting-depth calculations, and polished-rod sealing-device maintenance.

05 IMPLEMENTATION AND TECHNICAL VERIFICATION

An RFID-based equipment management system should be configured around the actual equipment inventory, identification requirements, well management structure, and lifecycle record requirements. The implementation process includes chip installation, equipment record association, and verification of information retrieval and management functions.

RFID SYSTEM IMPLEMENTATION WORKFLOW

01



Equipment Scope Definition

Identify the equipment categories requiring RFID identification.

02



Chip Installation

Confirm the protective installation structure for each equipment type.

03



Chip Registration

Register chip identifiers and associate them with equipment numbers.

04



Equipment Data Entry

Establish equipment specifications and technical records.

05



Well Record Association

Connect equipment records with downhole and pull-out history.

06



System Verification

Verify identification, information retrieval, and record management.

PRE-DEPLOYMENT TECHNICAL VERIFICATION

Verification Item	Information to Confirm
Equipment Identification	Each chip is associated with the correct equipment number.
Chip Installation	Protective structure matches the equipment type.
Equipment Specifications	Equipment name, model, manufacturer, length, and maximum load are recorded.
Well Association	Equipment records are correctly linked to individual wells.
Usage History	Downhole and pull-out records can be maintained.
Quality Tracking	Leakage, corrosion, eccentric wear, and service-life information can be recorded.
Maintenance Warning	Packing replacement and service-life warning rules are properly configured.
Record Management	Manufacturing, logistics, storage, field-use, and end-of-life records can be reviewed.

TECHNICAL DOCUMENTS AND PROJECT INPUTS

Document / Input	Purpose
Equipment List	Defines the equipment categories and identification scope.
Equipment Technical Specifications	Provides component models, dimensions, and load information.
RFID Chip Datasheets	Confirms chip characteristics and operating limits
Installation Drawings	Verifies chip installation and protective structures.
Equipment Registration List	Establishes chip-to-equipment identification records.
Well Equipment Records	Provides equipment-to-well association information.
Inspection and Maintenance Criteria	Establishes equipment condition assessment and maintenance requirements.



FINAL TECHNICAL NOTE

Reliable RFID equipment management requires accurate chip installation, correct equipment registration, complete technical records, and consistent updates to well and operating history. RFID identification provides access to equipment records, but it does not independently determine the physical condition or remaining service life of a component. Equipment inspection, maintenance, and return-to-service decisions must still follow the applicable technical requirements and inspection criteria.