



Autoclave Reactor with Agitator

(CS + Titanium Grade 2 Cladded)

TABLE OF CONTENT

- INTRODUCTION P 02
- EQUIPMENT OVERVIEW P 03
- KEY TECHNICAL SPECIFICATIONS P 03
- DESIGN PHILOSOPHY P 04
- CLADDING PROCESS P 05
- WELDING PROCEDURE P 06
- QUALITY CONTROL & INSPECTION PROCEDURES P 07
- AGITATOR ASSEMBLY P 07
- TINITA ENGINEERING CAPABILITIES P 07

INTRODUCTION

The **Autoclave Reactor with Agitator** (CS + Titanium Grade 2 Cladded) was engineered to deliver superior corrosion resistance and structural integrity for a copper refinery project.

This equipment was fabricated to meet extreme process conditions involving high temperature, pressure, and corrosive media. Tinita Engineering Pvt. Ltd. a leading

specialist in reactive metal fabrication undertook the complete design, manufacturing, and testing of this unit under strict international codes.

The reactor combines the strength of carbon steel with the corrosion resistance of Titanium Gr.2 cladding, ensuring long-term service life and zero contamination of the process media.

SCOPE OF SUPPLY

- Design, fabrication, and inspection
- Titanium cladding and agitator integration
- Pressure and performance testing
- Final quality assurance & documentation





EQUIPMENT OVERVIEW

- **Equipment Name** : Autoclave Reactor with Agitator
- **Material of Construction (MOC)** : Carbon Steel + Titanium Grade 2 Cladded
- **Type** : Pressure Vessel / Reactor
- **Design Code** : ASME Sec. VIII Div. 1
- **Application** : Copper Refinery Project – Hydrometallurgical Processing
- **Manufacturer** : Tinita Engineering Private Limited

KEY TECHNICAL SPECIFICATIONS

Parameter	Specification
Internal Diameter	3000 mm
Length	4540 mm
Thickness	20 mm + 5 mm (Cladding)
Design Temperature	200°C
Material of Construction (MOC)	Carbon Steel + Titanium Gr.2 Cladded
Agitator Type	Mechanically Driven Top-Mounted Unit
Agitator MOC	Solid Titanium Grade 2
Manufacturing Standard	ASME Sec VIII Div 1, TEMA, PED

DESIGN PHILOSOPHY

Tinita's design team used ASME VIII Division 1 guidelines, applying both static and thermal stress analysis to ensure the vessel's integrity under fluctuating pressure and temperature cycles.

KEY DESIGN

CONSIDERATIONS INCLUDED:

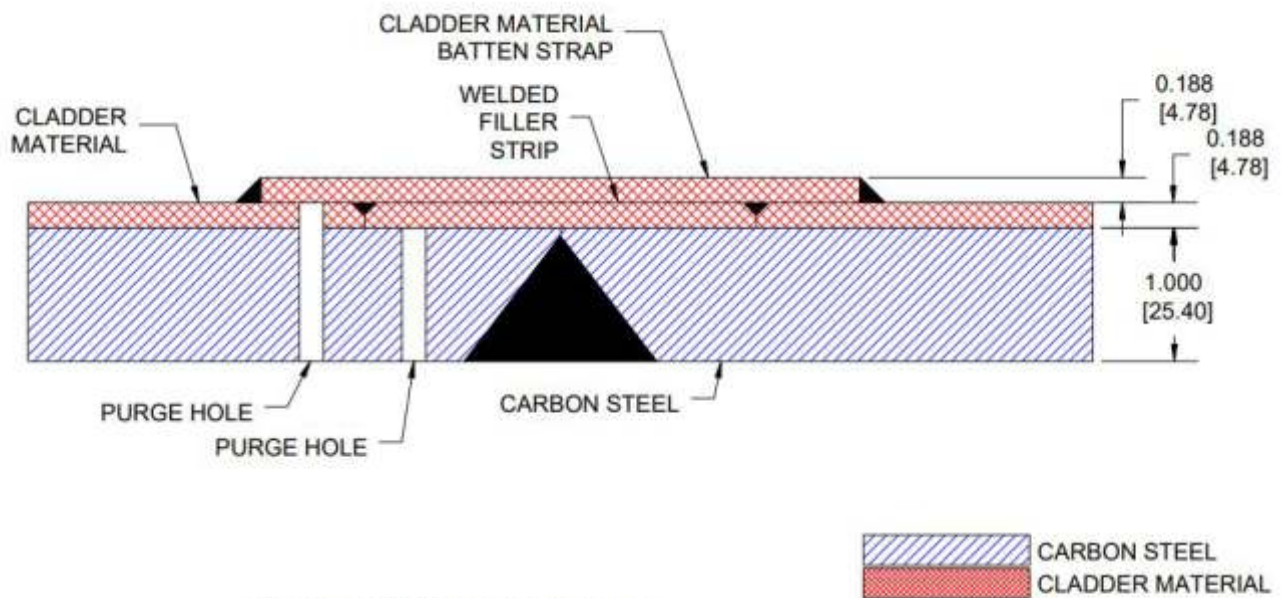
- Uniform cladding thickness for maximum bonding integrity as per ASTM B898
- Quality Level Class-1 (Latest Edition)
Controlled heat input during welding to preserve titanium's passive oxide layer.
- Agitator mounting designed to ensure vibration-free operation.
- Shell reinforcement for localized stress around nozzles and agitator shaft.

SOFTWARE UTILIZED:

- PV Elite v27 – pressure vessel mechanical design.
- PRG Nozzle PRO.



CLAD WELD JOINT CONFIGURATION — DUAL CONTAINMENT DESIGN



EXPLOSION CLAD WELD
JOINT CONFIGURATION
(DUAL CONTAINMENT DESIGN)

- This is the most robust joint configuration for high-pressure, corrosive environments.
- It includes two purge holes for gas flow and monitoring, ensuring both sides of the weld are inert during TIG welding.
- A welded filler strip and batten strap provide double containment to prevent any process leakage into the carbon steel.
- Commonly used in critical autoclaves and reactors where failure tolerance is near zero

QUALITY CONTROL & INSPECTION PROCEDURES

Tinita's QA/QC team implemented a multi-stage inspection plan in compliance with ASME, PED, and client-specific standards

IN-PROCESS INSPECTIONS:

- Material verification with MTCs and PMI.
- Dimensional checks after each fabrication stage.
- Welding parameter validation and pre/post-cleaning supervision.

FINAL TESTING:

- Hydrostatic pressure testing.
- Magnetic Particle Test (MPT)
- Radiographic testing of circumferential and longitudinal welds.
- PMI and surface finish verification

AGITATOR ASSEMBLY

Type: Mechanically driven, top-mounted agitator.

Drive: Motor coupled with gearbox for controlled rotation.

Seal Arrangement: Double mechanical seal suitable for corrosive media.

Blades: Titanium Grade 2, corrosion-resistant and polished for smooth operation

TINITA ENGINEERING CAPABILITIES

Tinita Engineering Pvt. Ltd. has continuously advanced its manufacturing infrastructure and design competence to meet the evolving demands of high-pressure, high-temperature process industries. Our present capabilities enable the fabrication of large-scale Titanium, Zirconium, and Nickel Alloy Reactors/Mixers designed for critical chemical, hydrometallurgical, and pharmaceutical applications.

TECHNICAL HIGHLIGHTS:

- **Maximum Thickness:**
Up to 80 mm THK
- **Height/Length Capability:**
Up to 8.5 meters
- **Diameter:** Up to 5 meters
- **Pressure Handling:** Up to 100 bar
- **Single Equipment Weight:**
Up to 100 metric tons



Tinita
ENGINEERING PRIVATE LIMITED

At Tinita Engineering Pvt. Ltd. we are committed to excellence in design, manufacturing, and innovation. If you would like to know more about our Titanium Gr.2 Cladded Reactors or discuss your specific process requirements, our experts would be glad to assist.

**Reach out to us—we'll help you
find the right solution for your industrial needs.**



+91-22-50441001



tinita@tinita.in



www.tinitamfg.com