

Annexure-VI

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		No. of Pages: 4

**PROCESS AND QC DOCUMENT FOR ACID PICKLING
OF TITANIUM & TITANIUM ALLOY COMPONENTS**

OCTOBER 2009

**MATERIALS AND MECHANICAL ENTITY
VIKRAM SARABHAI SPACE CENTRE
THIRUVANANTHAPURAM-22**

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		No. of Pages: 4

**PROCESS AND QC DOCUMENT FOR ACID PICKLING
OF TITANIUM & TITANIUM ALLOY COMPONENTS**

OCTOBER 2009

**MATERIALS AND MECHANICAL ENTITY
VIKRAM SARABHAI SPACE CENTRE
THIRUVANANTHAPURAM-22**

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		No. of Pages: 4

DOCUMENT CONTROL AND DATA SHEET

01	DOCUMENT NO	MME/ST/PQD/APTi/01/09
02	TITLE OF THE REPORT	PROCESS AND QC DOCUMENT FOR ACID PICKLING OF TITANIUM & TITANIUM ALLOY COMPONENTS
03	REVISION NUMBER	01
04	TYPE OF DOCUMENT	PROCESS & QC DOCUMENT
05	AUTHORS	
06	REVIEWED BY	
07	APPROVED BY	
08	DATE OF PUBLICATION	OCTOBER 2009
09	NUMBER OF PAGES	4
10	NUMBER OF FIGURES	0
11	NUMBER OF TABLES	0
12	NUMBER OF ANNEXURES	1
13	NUMBER OF REFERENCES	2
14	ORIGINATING GROUP	RPFF/MME
15	CONTROL STATUS	CONTROLLED
16	DISTRIBUTION STATUS	RESTRICTED
17	KEY WORDS	ACID PICKLING, DEGREASING, CLEANING, MASKING, TITANIUM, TITANIUM ALLOY
18	ABSTRACT	THIS DOCUMENT GIVES THE PROCEDURE AND QC CHECK POINTS FOR ACID PICKLING OF TITANIUM AND TITANIUM ALLOY COMPONENTS USED IN LAUNCH VEHICLES AND SATELLITES.
VSSC		Doc. No: MME/ST/PQD/APTi/01/09
		Status: CONTROLLED
		No. of Pages: 4

CONTENTS

Sl.No	Description	Page No
1.0	Introduction	1
2.0	Applicable Documents	1
3.0	Process Sequence	1
4.0	Protection and Storage	2
5.0	QC Check points	3
	Annexure-1- Flow Chart	4

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		Page No: 1/4

1.0 INTRODUCTION

This document covers the process and procedure for acid pickling of Titanium and Titanium alloy components used in Launch vehicles and satellites and its QC checkpoints. Acid pickling is carried out for the removal of soils, oxides, scales and foreign substances present as surface contaminants. It is done prior to EB Welding for achieving defect-free weld joints.

2.0 APPLICABLE DOCUMENTS

- 2.1 ASTM B 600-91: Standard Guide for Descaling and Cleaning Titanium and Titanium Alloy Surfaces.
- 2.2 LPSC Doc. No.CC/LV/IFAB/LBF/2001: Chemical Cleaning Process Document for PSLV and GSLV Tankages

3.0 PROCESS SEQUENCE

The process sequence comprises the following steps. All the steps are followed continuously till the end of the sequence.

3.1 Degreasing:

This step involves the removal of surface contaminants like oil, shop dust, marking ink etc. Clean the component by wiping the entire surface with cotton soaked with AR/GR Grade Isopropyl Alcohol/IPA (Propan-2-ol). Repeat the operation till the surface is free from all the contaminants.

3.2 Drying:

Dry the component with hot air drier for removal of excess solvent.

3.3 Masking:

Mask the entire component leaving the area to be pickled using maskant tape & polythene sheet.

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		Page No: 2/4

3.4 Acid Pickling:

Dip the component upto the required height from the lip in a PP tray containing the following solution

Nitric Acid	:	150gm/L
Hydro Fluoric Acid	:	15gm/L
Grade	:	GR/AR
Temperature	:	Ambient
Duration	:	10-30 seconds

This treatment removes oxide film.

3.5 Rinsing:

Rinse the component thoroughly with running water for a period of 10 to 15 minutes until the final collected rinse water sample is free from acid traces. Use pH indicator paper for checking absence of acidity.

3.6 De-Ionised Water Rinse:

After water rinse, rinse the component thoroughly with DI water.

3.7 De-Masking:

After DI water rinsing, remove the maskant tape and polythene cover.

3.8 Final Cleaning:

After de masking, the component is thoroughly rinsed with AR/GR grade Iso Propyl alcohol.

3.9 Drying:

Dry the component with a hot air drier thoroughly.

The flow chart of the process sequence to be followed for acid pickling is given in Annexure-I

4.0 PROTECTION AND STORAGE

4.1 The pickled surface should be protected with polythene cover.

4.2 Pickled surface should not be touched with bare hand but only with cotton or gloves.

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		Page No: 3/4

4.3 The acid pickled component should be welded immediately but not later than five days.

4.4 Store the component in a closed container with silica gel packs.

5.0 QC CHECK POINTS

5.1 Check and Record the identification number engraved on the component.

5.2 Check for its Stage Clearance and verify the Stage Clearance Certificate. Discrepancies if any, shall be brought to the notice of concerned inspection section.

5.3 Ensure the cleaning with cotton soaked with Isopropyl Alcohol/IPA (Propan-2-ol).

5.4 Ensure the exposed region and masked regions are as per the process drawing.

5.5 Ensure the composition of the etching solution and the duration of etching as per the following

Nitric Acid	:	150gm/L
Hydro Fluoric Acid	:	15gm/L
Grade	:	GR/AR
Temperature	:	Record the temp (Shall be between 25 to 40°C)
Duration	:	10 - 30 seconds.

5.6 After etching, the surface shall be of silver matt finish. Also it is to be ensured that the other surface area is not contaminated and the etched surfaces are protected with polythene cover.

5.7 Check the pH value of final rinsed water and report

5.8 An On-line Inspection Report will be made prior to clearing the job for further processing.

VSSC	Doc. No: MME/ST/PQD/APTi/01/09	Status: CONTROLLED
		Page No: 4/4

ANNEXURE-1

FLOW CHART



