

**Annexure – 1**

No. : AWEIL/UPEIDA/22 Dated-12.10.2022

**List of Testing Facilities of AWEIL Units**

<b>Sl. No.</b>	<b>Location</b>	<b>Name of Division /R&amp;D centre (In UP Only)</b>	<b>Description of Test Facilities</b>	<b>Range</b>	<b>Certification /Accreditation</b>	<b>Remarks</b>
1.	Small Arms Factory ,Kalpi road , Kanpur, UP, Pin Code-208009	Kanpur	Chrome Plating	-	-	Material to be tested: Hexavalent, Trivalent, Total Sulphate, Total Oxide, Iron Oxide.  Spec. -Analysis of Chrome Plating Solution
2.	Small Arms Factory ,Kalpi road , Kanpur, UP, Pin Code-208009	Kanpur	Testing Apparatus for determination of Ingredients	-	-	Material to be tested : Phosphating solution.  Spec.- Determination of Ingredients
3.	Small Arms Factory ,Kalpi road , Kanpur, UP, Pin Code-208009	Kanpur	Crack Detection	-	-	Material to be tested: Weldings  Magnetic particle inspection
4.	Small Arms Factory ,Kalpi road , Kanpur, UP, Pin Code-208009	Kanpur	Spring Load Testing Facility	-	-	Material to be tested: Spring  Spec. Magnetic particle inspection
5.	Small Arms Factory ,Kalpi road , Kanpur, UP, Pin Code-208009	Kanpur	Firing Proof range for Small Arms	Following caliber small arms can be tested :	-	-

				7.62x 51mm 9x39mm 5.56x30mm 5.56x45mm		
6.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	Hardness Testing Machine	Test Facility HRA,HRB, HRC,Load facility Vickers, Brinell	Nil	
7.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	Profile Projector	Upto 100X	Nil	
8.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	2D Height Gauge	0-600 mm	Nil	
9.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	Non-Contact Measuring Microscope	Grain size, Grain structure as per ISO	Nil	
10.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	Universal Testing Machine	100 KN	Nil	
11.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa , Amethi	Impact Testing Machine	300 J	Nil	
12.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Optical Emission Spectrometer	Base – Cu,Al,Fe,Ni,Zn	Nil	
13.	Ordnance Factory Project Korwa , Amethi ,	Korwa, Amethi	Hot & Cold Chamber	-70 degC to 80 degC	Nil	

	Pin Code-227412					
14.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Spray Salt Machine	---	Nil	
15.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Electro Magnetic Crack detector	To find surface cracks depth upto 3 mm	Nil	
16.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Ballistic measuring system	Rate of fire upto 20000 rpm	Nil	
17.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Firing Range	4 mm to 20mm calibre, rate of fire upto 2000 rpm , X&Y coordinate accuracy	Nil	
18.	Field Gun Factory,Kalpi road , Kanpur, UP, Pin Code-208009	FGK	Optical Emission Spectrometer	Iron Base Alloy	NABL	Chemical Analysis (as per IS 8811:1988, IS 9879)
19.	Field Gun Factory,Kalpi road , Kanpur, UP, Pin Code-208009	FGK	Fracture Toughness Testing Machine	0-500 KN	NABL	Fracture Toughness Test (as per ASTM E 399)
20.	Field Gun Factory,Kalpi road , Kanpur, UP, Pin Code-208009	FGK	Impact Testing Machine IZOD	0-15 KPM	NABL	Impact (Izod-V) (as per IS IS: 1598)
21.	Field Gun Factory,Kalpi road , Kanpur, UP, Pin Code-208009	FGK	Impact Testing Machine CHARPY	0-30 KGFM	NABL	Impact Charpy (as per IS IS: 1499)
22.	Field Gun	FGK	Hardness Testing	BRINELL,	NABL	Hardness Brinel, VICKERS

	Factory, Kalpi road , Kanpur, UP, Pin Code-208009		Machine	VICKERS		
23.	Field Gun Factory, Kalpi road , Kanpur, UP, Pin Code-208009	FGK	Universal Testing Machine	0-600 KN	NABL	Ultimate Tensile Strength (as per IS-1608)
24.	Field Gun Factory, Kalpi road , Kanpur, UP, Pin Code-208009	FGK	3D CO-ORDINATE MEASURING MACHINE	2500*1500*1300 MM	ISO 103602-2:2001	
25.	Ordnance Factory Kanpur , Kalpi road , Kanpur, UP, Pin Code-208009	OFC	SPECTRO GDS 500A (LECO MAKE)		NABL	For testing of chemical composition of ferrous (low alloy steel, stainless steel etc.) and non ferrous (Cu base and Al base) material.
26.	Ordnance Factory Kanpur , Kalpi road , Kanpur, UP, Pin Code-208009	OFC	PAINT TESTING	AS PER IS 168: 1993/IS 138 :1992	---	1. Viscosity of paints using ford cup 2. Flash point 3. Water content using Dean Stark Apparatus 4. Flexibility & Adhesion 5. Fineness of grind 6. Resistance to Lubricant & Petroleum Hydrocarbon 7. Gloss Value 8. Corrosion resistance test 9. Impact resistance test
27.	Ordnance Factory Kanpur , Kalpi road , Kanpur, UP, Pin Code-208009	OFC	SALT SPRAY TESTING	AS PER JSS 0465-01-1988	---	For resistance to corrosion of phosphated/ painted / varnished stores like 105 mm IFG HE/IIIg Shells/120mm TK HESH/

						Mortar Bomb/ 155mm ERFB etc.
28.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	MICRONISED GRAPHITE OIL & LIQUID PARAFFIN TESTING	---	---	1. Specific gravity 2. Viscosity 3. Ash Content 4. Flash Point
29.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	DIESEL, LDO & KEROSENE OIL TESTING	---	---	1. Specific gravity 2. Water Content
30.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	PORTABLE & ETP WATER TESTING	---	---	pH, TDS, TSS Fluoride, Hardness, Calcium Hardness, Alkalinity, Nitrate, Sulphate, Chloride, Hexavalent Chromium, Arsenic through test kits.
31.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	MISCELLANEOUS TESTING	---	---	1. Moisture content in white cotton yarn. 2. GSM of A4 / A3 size paper. 3. Coating thickness measurement of coated surface like painted shells and other stores.
32.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	OLYMPUS MICROSCOPE	(OLYMPUS/200 MODEL NO. BS- 51-M ) WITH IMAGE ANALYZER	NABL	For Metallographic testing (Microstructure, NMIR, Case depth & Grain size) of ferrous and non ferrous (Al base) material. Compliant to Industry 4.0
33.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP,	OFC	Stereo Zoom Microscope	---	---	(Radical Make) For Macrostructure testing and Material Investigation.

	Pin Code-208009					
34.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Hot Mounting Press Machine	---	---	For mounting of small and thin samples for metallurgical investigation.
35.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	UTM (MAKE INSTRON, UK)	500 KN	NABL	For testing of Tensile strength, proof stress, reduction of area, elongation of ferrous and non ferrous (Al base) material.
36.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	HARDNESS TESTING MACHINE (MAKE Mitutoyo, Japan)	---	NABL in HV5,HV10 & HV30	For hardness testing at various load i.e. 1, 2 ,5, 10, 20, 30 Kg. Compliance to Industry 4.0.
37.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	CHARPY TESTING MACHINE (MAKE AVERY, ENGLAND - 300 JOULES)	---	NABL	For testing of Charpy.
38.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	IZOD TESTING MACHINE (MAKE AVERY, ENGLAND - 170 JOULES)	---	NABL	For testing of Izod.
39.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	COLD ENVIRONMENTAL TEST CHAMBER (MAKE ENVIROTECH, HYDERABAD : 0 To - 60C) -	---	NABL	For sub zerocharpy test.
40.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automatic/Digital Computerized spring testing machine Model No. AEC1112- AC10KN	Capacity: 10KN Resolution : 0.1 kgf	---	Used for Tension and Compression test.

41.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	PPE kit test facilities	Resistance of Protective Clothing materials to penetration by Blood and Body fluids from class 1 to class 6 as per ASTM 1670-17A AND ISO 16603-2004	NABL	Equipment used for testing : OFC SUSHRUT - I/01
42.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Ultrasonic flaw detector (Olympus)	---	---	For detection of crack in all barrels like T-72, T-90 etc.
43.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Portable Ultrasonic flaw detector (USM GO)-	---	---	For detection of crack in all barrels like T-72, T-90 etc.
44.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	• Magnetic Particle Inspection (Hollow mag UCH 1080) -	---	---	For detection of crack in all barrels and casing.
45.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Radiography Testing	Real time Digital X-ray Machine Along With X-ray Generator And Flat Panel Detector (Lead Shielded Cabinet) (Model No. MQXC 301 as per Atomic Energy	License from BARC safety council valid till 30 Nov'2024.	Used for testing of following components: Throat Insert & Guide Stud For PINAKA Assembly Ordnance Components. Fully Digital, Automatic (as well as Manual) and Industry 4.0 compliant. Minimum Radiation (tends to zero) in working area. User friendly interface

				(Radiation Protection) Rules 2004 Make: Med Equip Services, Hyderabad		and easy detection of flaws
46.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Coordinate Measurement Machine	---	---	
47.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Industry 4.0 compliant automatic 2D Height Gauges	---	---	
48.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automatic Video Boroscope for internal inspection of barrels	---	---	
49.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automatic digital wall thickness variation measurement machine	---	---	
50.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automatic Robotic arm for dimensional measurement - Romer	---	---	
51.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automatic Dynamic Balancing machine for high calibre shells	---	---	
52.	Ordnance Factory Kanpur Kalpi road , Kanpur, UP Pin Code-208009	OFC	Surface roughness tester	---	---	
53.	Ordnance Factory Kanpur ,Kalpi road ,	OFC	Magnetic Particle Indentation for crack	---	---	



	Kanpur, UP Pin Code-208009		detection			
54.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Industry 4.0compliant digital measuring instruments at shop floor for process control and quality checks	---	---	
55.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Strohlein Apparatus	As per IS-228 part-1 & part-9	NABL	For %C & %S in Ferrous material.
56.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Electrolytic Analyzer	As per IS 4027 part-1	NABL	For %Cu %Pb in Bronze.

## Annexure-2

No. : AWEIL/UPEIDA/22 Dated-12.10.2022

### List of Process Shop Facilities of AWEIL Units

Sl.	Location	Name of Division (In UP Only)	Description of Process Facilities	Range	Certification/ Accreditation	Remarks
1.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Precision Machining of Barrels up to 10m Length	---	---	---
2.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Auto-frettage Technology	---	---	---
3.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Shrinkage Technology	---	---	---
4.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Trepanning with Laser Alignment	i) Swing over cross slide- 800 mm(min.) ii) Sweing over bed- 1000mm (Min.) iii) Max. Turning length-10000 mm (min.) iv) Max. Work piece weight	---	---

				<p>between centers without steady rest- about 8000 kg.</p> <p>v) Spindle speed range- up to 350 rpm(min.)</p> <p>vi) Power of main AC Motor- min. 75 KW (100% Duty Cycle)</p> <p>vii) Torque at spindle-14730 Nm Minimum.</p>		
5.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Milling Technology for 10m length Barrels	---	---	---
6.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Rifling Technology for Barrels	---	---	---
7.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Robotic Nub Welding	<p>Material Handling Robots :- Six axis foundry grade robots payload capacity should be at least 6 Kg to handle the nubs.</p> <p>Welding Robot :- No. of axes will be 6 with articulated arm. The Robot</p>	---	---

				shall carry torches for MIG welding, Pay load- Weight of torches as per firms design but less than 6 kg, Positional accuracy +/- 0.1mm.		
8.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automated Shell Forging	---	---	---
9.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	High precision mass manufacturing	---	---	---
10.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automated Nosing /Swaging	Swaging Force- 1200 KN Frequency of stroke/min. - 1700 (approx.) Stroke adjustment range of dies.- 0.2 to 5mm Main Drive Motor : 55 KW (min) Motor Power for Die rotation -22 KW(min.) Feeder speed- 4m/min. (max.) Actual speed should be programmable for	---	---

				rapid-in-feed speed (Speed profile).		
11.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Automated Heat Treatment and Painting	Hardening and tempering, Capacity- 1 Ton/hr	---	---
12.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Precision Machining of Fins	Millturn 2000mm with counter spindle	---	---
13.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	GR Thermosetting Plastic Moulding	---	---	---
14.	Ordnance Factory Kanpur ,Kalpi road , Kanpur, UP, Pin Code-208009	OFC	Robotic Ultrasonic Testing	Automatic Ultrasonic Testing of profiles cylinder Tubes and Cubical blocks.	---	---
15.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Chrome Plating Plant with ETP	NA	Nil	
16.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Phosphating Plant with ETP	NA	Nil	
17.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Powder Coating/Surface Coating plant	NA	Nil	
18.	Ordnance Factory Project Korwa , Amethi ,	Korwa, Amethi	Sealed Quench automatic Belt Type furnace (Hardening,	1000degC	Nil	

	Pin Code-227412		Tempering & Carburising)			
19.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Pit type furnace(Hardening, Tempering & Carburising)	1000degC	Nil	
20.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Shot Blasting Machine (Surface finishing shot as media)	NA	Nil	
21.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Abrasive Blasting machine( Surface finishing Abrasive as media)	NA	Nil	
22.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Induction Hardening machine (Case hardening of smaller components of INSAS, TAR - STUD)	NA	Nil	
23.	Ordnance Factory Project Korwa , Amethi , Pin Code-227412	Korwa, Amethi	Induction Brazing Machine (Brazing of components of INSAS and PAG)	NA	Nil	