




RPN KNOW-HOW FOR INDIA PROCUREMENT PACKAGES



WBS	Subassembly	Ref.	Component or operation	 MEMBERS
WBS 1,5	VACUUM VESSEL	<u>1,5,1-B</u>	Shielding	40-30, BOCCARD, BONITEMPO, BUREAU VERITAS, CIMAT, COMEX NUCLEAIRE, FOC TRANSMISSIONS, GARLOCK, GMP, GROUPE BONNANS, REEL, ROBATEL, SDMS, SETIS, VELAN
WBS 2,4	CRYOSTAT	<u>2,4,1-A</u>	Cryostat Factory	40-30, AMESYS, BOCCARD, BUREAU VERITAS, CIMAT, COMEX NUCLEAIRE, GMP, REEL, SDMS, SITES
		<u>2,4,1-B</u>	Cryostat Assembly	
WBS 2,6	WATER COOLING	<u>2,6,2-A</u>	Heat Rejection & Comp CW: Mat. & Transportation	AMESYS, BOCCARD, BONITEMPO, BUREAU VERITAS, CIMAT, EKIU, COMEX NUCLEAIRE, FIATEQ, REEL, ROBATEL, SETIS, SITES
WBS 3,4	CRYOPLANT & CRYODISTRIBUTION	<u>3,4,2</u>	Cryolines	BOCCARD, BONITEMPO, CIMAT, COMEX NUCLEAIRE, FOC TRANSMISSIONS, REEL, ROBATEL, SDMS, SETIS, SOM NUCLEAIRE, VELAN
		<u>3,4,3</u>	Cryodistribution Components	
WBS 5,1	ION CYCLOTRON HEATING & CURRENT DRIVE	<u>5,1,3</u>	Radio Frequency Power Sources	40-30, BOCCARD, BUREAU VERITAS, COMEX NUCLEAIRE, FIATEQ, GMP, REEL, ROBATEL, SDMS, SETIS
		<u>5,1,4</u>	Power Supply	
WBS 5,2	ELECTRON CYCLOTRON HEATING & CURRENT DRIVE	<u>5,2,3</u>	Radio Frequency Power Sources	40-30, AMESYS, BOCCARD, BUREAU VERITAS, EKIU, COMEX NUCLEAIRE, FIATEQ, GMP, REEL, ROBATEL, SDMS, SETIS
		<u>5,2,4</u>	Power Supply	
WBS 5,3	NEUTRAL BEAM HEATING & CURRENT DRIVE	<u>5,3,6</u>	Power Supply for Heating Neutral Beam	40-30, AMESYS, ASTRIANE, BOCCARD, BONITEMPO, CIMAT, EKIU, COMEX NUCLEAIRE, FIATEQ, FOC TRANSMISSIONS, REEL, ROBATEL, SDMS, SETIS, VELAN
		<u>5,3,7</u>	Diagnostic Neutral Beam	
WBS 5,5	DIAGNOSTICS	<u>5,5-A</u>	Magnetic measurements	40-30, AMESYS, BUREAU VERITAS, COMEX NUCLEAIRE, EKIU, FIATEQ, FOC TRANSMISSIONS, SDMS, SETARAM, SITES, SOM NUCLEAIRE
		<u>5,5-B</u>	Neutron measurements	
		<u>5,5-C</u>	Optical systems	
		<u>5,5-D</u>	Bolometry	
		<u>5,5-E</u>	Spectroscopic systems	
		<u>5,5-F</u>	Microwave systems	
		<u>5,5-G</u>	Systems for machine operation	
		<u>5,5-N</u>	Diagnostics engineering	



➔ **WBS 1,5 – VACUUM VESSEL**

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
<p>40-30 (4, 12) BOCCARD (1, 9, 10) BONITEMPO (8, 10) BUREAU VERITAS (4, 9, 12) CIMAT (6, 7, 10, 11, 12) COMEX NUCLEAIRE (1, 3, 4, 7, 9, 10, 12) EKIUUM (9) FIATEQ (9) GARLOCK (12) GMP (2, 6) REEL (2, 6, 7, 9, 10, 12) ROBATEL (1, 3, 6, 9, 10) SDMS (3, 10, 12) SETIS (2, 5, 9) SITES (4, 5, 9, 11) SOM NUCLEAIRE (9)</p>	<ol style="list-style-type: none"> 1. Thick plate boilermaking and stainless steel piping 2. Large dimensions parts machining 3. Stainless steel (Large Thickness) welding 4. Non destructive testing 5. Three dimensional testing 6. Metallic structure manufacturing (tool, gantry crane) 7. Handling, packaging 8. Cutting, stamping 9. Engineering, R&D 10. Thin plate boilermaking 11. Assembly process and laser cutting 12. Leak Tightness Testing

➔ **WBS 2,4 - CRYOSTAT**

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
<p>40-30 (2) AMESYS (3, 4) BOCCARD (1, 2) BUREAU VERITAS (1, 2) CIMAT (3, 4) COMEX NUCLEAIRE (1, 2, 3, 4) GMP (4) REEL (1, 2, 3, 4) SDMS (1, 2) SITES (4)</p>	<ol style="list-style-type: none"> 1. Automatic stainless steel welding 2. NDE testing of welds 3. Handling 4. Mechanical assembly



→ WBS 2,6 - WATER COOLING

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
<p>AMESYS (3, 4) BOCCARD (7, 15) BONITEMPO (2) BUREAU VERITAS (9, 17) CIMAT (2, 7, 11) EKIUM (3, 4, 5,12) COMEX NUCLEAIRE (2, 3, 4, 5, 9, 10, 11, 12, 17) FIATEQ (3, 4, 5, 6, 9, 12, 17) REEL (2, 11) ROBATEL (2) SETIS (2, 14) SITES (12, 13, 14, 17)</p>	<ol style="list-style-type: none"> 1. Pumps manufacturing <li style="color: red;">2. Boilermaking, metallic structure <li style="color: red;">3. Regulation and security control <li style="color: red;">4. Automation - Control <li style="color: red;">5. Electric construction <li style="color: red;">6. Electromechanical engineering <li style="color: red;">7. Piping 8. Assembly of HP et BP stainless piping with thermal isolation <li style="color: red;">9. Engineering <li style="color: red;">10. Thermo-mechanical <li style="color: red;">11. Handling <li style="color: red;">12. Instrumentation <li style="color: red;">13. Manufacturing of cooling towers, tanks <li style="color: red;">14. Civil engineering <li style="color: red;">15. Water treatment 16. Nitrogen system + primary vacuum system <li style="color: red;">17. Design study of components

→ WBS 3,4 – CRYOPLANT & CRYODISTRIBUTION

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
<p>BOCCARD (5, 7) BONITEMPO (7) BUREAU VERITAS (6) CIMAT (5, 6, 7) COMEX NUCLEAIRE (1, 2, 3, 4, 5, 6, 7) FOC TRANSMISSIONS (2) REEL (6, 7) ROBATEL (6, 7) SDMS (1, 2, 3, 5, 6, 7) SETIS (7) SOM NUCLEAIRE (2, 3) VELAN (1)</p>	<ol style="list-style-type: none"> <li style="color: red;">1. Cryogenics <li style="color: red;">2. Mechanics <li style="color: red;">3. Thermal <li style="color: red;">4. Compression - decompression of helium gas <li style="color: red;">5. Stainless steel tubing <li style="color: red;">6. Helium leak tight TIG welding <li style="color: red;">7. Boilermaking



→ WBS 5,1 - ION CYCLOTRON HEATING & CURRENT DRIVE

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
40-30 (8) BOCCARD (2, 6) BUREAU VERITAS (4) COMEX NUCLEAIRE (2, 3, 4) FIATEQ (8) GMP (2) REEL (2, 3, 4) ROBATEL (2, 4) SDMS (1, 2, 3, 4) SETIS (2, 3)	<ol style="list-style-type: none"> 1. Technology of high-frequency components : wires, connection capacity, antenna 2. Machining and Welding – nuclear quality 3. High-precision mechanical assembly 4. Vacuum leak tight TIG welding 5. Insulating electrical deposition and vacuum- anti corrosion 6. Piping supporting systems 7. HF electromagnetic generators manufacturing 8. Electrical engineering

→ WBS 5,2 - ELECTRON CYCLOTRON HEATING & CURRENT DRIVE

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
40-30 (9) AMESYS (8, 9) BOCCARD (2, 4, 5) BUREAU VERITAS (3) EKIUUM (8, 9) COMEX NUCLEAIRE (2, 3) FIATEQ (9) GARLOCK (4) GMP (2) REEL (2, 3) ROBATEL (2) SDMS (1, 2, 3, 6, 7) SETIS (2, 5)	<ol style="list-style-type: none"> 1. Technology of high-frequency components : corrugated stainless steel piping 2. Machining and Welding – nuclear quality 3. Vacuum Leak tight TIG welding for pressurized water, copper mirrors and SS screens 4. Vacuum Leak tight , metal gaskets, water cooling 5. Piping supporting systems 6. Aluminum corrugated waves guides 7. Associated cryogenic systems 8. Associated electrical systems 9. Electrical engineering



→ WBS 5,3 - NEUTRAL BEAM HEATING & CURRENT DRIVE

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
40-30 (3, 11) AMESYS (3, 5) ASTRIANE (1, 2, 3, 6) BOCCARD (1) BONITEMPO (6) CIMAT (2, 6) COMEX NUCLEAIRE (1, 2, 3, 4, 5, 6, 7, 11) EKIUUM (5) FIATEQ (3, 5) FOC TRANSMISSIONS (2, 6) GARLOCK (11) REEL (6) ROBATEL (6) SDMS (1, 6, 7, 11) SETIS (6) VELAN (11)	<ol style="list-style-type: none"> 1. Mechanics, cryogenics, vacuum 2. Handling 3. Electrical engineering 4. Water cooling 5. Monitoring, automation – control, barometric, instrumentation 6. Mechanics, boilermaking 7. Vacuum, gas vacuum injection 8. Winding 9. Mass isolation 10. High voltage (1MV) electrotechnical components wiring, isolating control 11. Cryogenics, connection of cryo wires, vacuum waterproof

→ WBS 5,5 - DIAGNOSTICS

RPN MEMBERS	KNOW-HOW ■ <i>Know-how included by RPN</i> ■ <i>Non-included know-how</i>
40-30 (5) AMESYS (1, 2, 5, 8, 11) BUREAU VERITAS (11) EKIUUM (6, 11) COMEX NUCLEAIRE (8, 9, 10, 11, 12, 13) FIATEQ (1, 2, 5, 6, 11) FOC TRANSMISSIONS (12) SDMS (6, 12, 13) SETARAM (1, 2, 13) SITES (1, 3, 10, 11) SOM NUCLEAIRE (11, 12, 13)	<ol style="list-style-type: none"> 1. Design, Sensor manufacturing, connectors, electronics 2. Design, Instruments manufacturing for neutron measures 3. Optics 4. Laser cutting 5. Electronics 6. Design, Instruments manufacturing for measuring radiation (bolometric cameras) 7. Spectroscopic 8. Imagery signal processing 9. Micro-wave technology, radar specialist 10. Optics and infrared radiation 11. Engineering 12. Mechanics 13. Thermal 14. Connectors 15. Wiring