

BHEL SAMVAAD 3.0

- सहयोग से सफलता



Indigenization of items & Development of local suppliers

9th Nov 2023

Bharat Mandapam, New Delhi

**Session 5 – (a) Insulated Rivetless & Anti Friction Bearings
(b) Electric Insulation Materials**

Evolution of Public Procurement Policy – Make in India

PPP-MII Order,
2017

2017

Public Procurement (Preference to Make in India), Order 2017 Dtd 15.06.2017 - to promote manufacturing and production of goods & services in India

Works included

2018

PPP-MII Order partially modified on 28.05.2018 to include works (including turnkey works)

Partial
modification

2019

PPP-MII Order partially modified on 29.05.2019 (only local suppliers eligible if sufficient local capacity is available)

Restriction on GTE

2020

PPP-MII Order partially modified on 04.06.2020 (Class I/ Class II local suppliers, no global tender above Rs. 5 Lakh and below Rs. 200 Cr. etc., unless approved by CA)

Notification on
Countries sharing
land border

2020

DoE Order dated 23.07.2020 (Bidders from countries sharing land borders to be registered with DPIIT)

Notification on
Countries sharing
land border

2023

DoE Order dated 23.02.2023 (Includes even TOT from Bidders from countries sharing land borders to be registered with DPIIT)

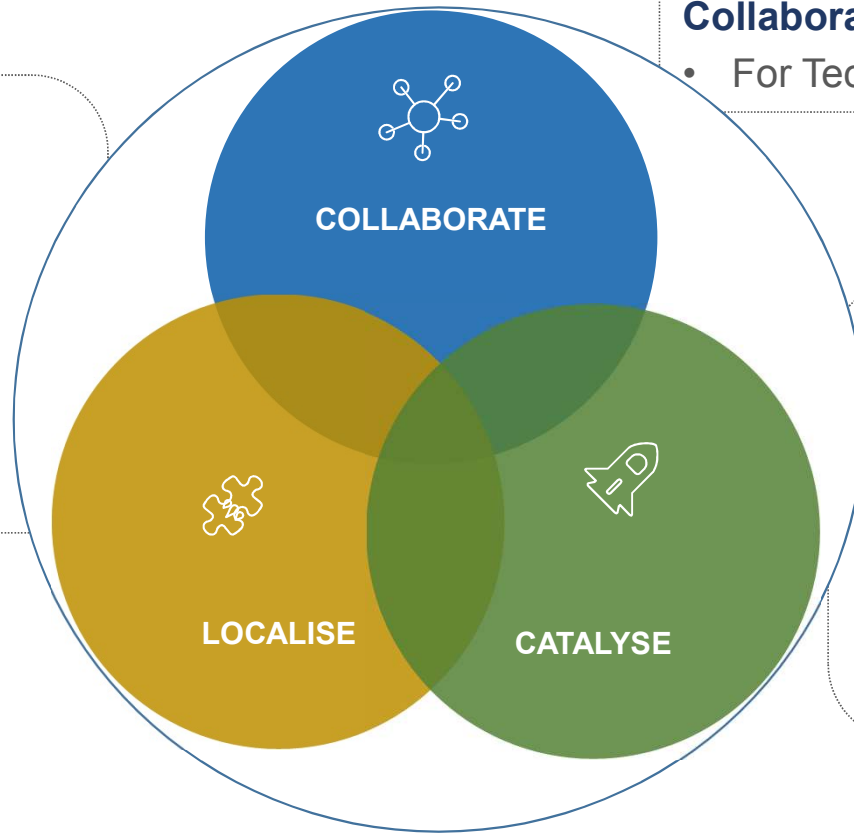
Type	Local content	Price preference
Class I	≥ 50%	✓
Class II	More than 20% but less than 50%	X
Non Local	≤ 20%	X

BHEL's Framework for AtmaNirbharBharat

Localise

Import substitution through

- in house engineering or manufacturing
- supporting domestic manufacturers for indigenization



Collaborate

- For Technology and Manufacturing

Catalyse

- Enable solutions for challenges faced in engineering and manufacturing
- Support domestic ecosystem with R&D and Testing infrastructure

Indigenized offerings with Indigenized supply chain

BHEL's Outreach Initiatives

COLLABORATE

April '20

Expression of Interest (29.04.20)

Manufacturing in India with BHEL

July '20

SANYOJAN (03.07.20)

Domestic Collaborations for Manufacturing

CATALYSE

Aug '20

SANRACHNA (24.08.20)

Technology Innovation Platform

LOCALISE

Nov'20

Expression of Interest (13.11.20)

for import substitution

Interaction (18.11.20)

with IEEMA

Dec '20 – Oct'23

Interaction (03.12.20)

with Local industry (coordinated by DPIIT)

SAMVAAD 1.0 (21.12.20 – 11.02.22)

Workshops with Local industry

SAMVAAD 2.0 (28.10.22 – 29.11.22)

Workshops with Local industry

BHEL SAMVAAD conducted till date

SN	Category of Material	BHEL Unit	Date
1	Raw Materials-Special/ Alloy/ Electrical Steel	Corporate Office	29.12.2020
2	Consumables for Foundry Applications	Hardwar	01.01.2021
3	Welding Consumables of Special Grade	Trichy	05.01.2021
4	Castings & Forgings	Hardwar	08.01.2021
5	Components-Mechanical	Hyderabad	12.01.2021
6	Insulating Materials	Bhopal	15.01.2021
7	Components - Electrical & Electronics	Bangalore	19.01.2021
8	Components – Solar	Bangalore	22.01.2021
9	Systems, Packages & BOPs	Noida	27.01.2021
10	Components - Electrical & Electronics (with IEEMA)	Bhopal	11.02.2022
11	Alloy Steel Pipes for supercritical projects	Trichy	08.06.2022
12	Castings & Forgings	Hardwar	26.08.2022
13	Mechanical & Electrical components/ Non-Ferrous items	Hardwar	05.09.2022
14	Insulating materials	Hardwar	09.09.2022
15	BQ plates of thickness >= 150 mm and SS plates of width 1500-2500mm	Hardwar	12.10.2022
16	Fibre Optic Generator End Winding VMS, Blade VMS, Calibrated Flow nozzle	Hardwar	14.10.2022

BHEL SAMVAAD conducted till date

SN	Category of Material	BHEL Unit	Date
17	Castings & Forgings	Hardwar	28.10.2022
18	Bearings	Bhopal	04.11.2022
19	Pipes, Tubes, Special steels	Trichy	09.11.2022
20	Items for Flue Gas Desulphurization (FGD)	Ranipet	11.11.2022
21	Electrical insulating materials	Bhopal	15.11.2022
22	Quality first in supplies	Corporate Office	19.11.2022
23	Electronics & Solar Items	Corporate Office	21.11.2022
24	Castings & Forgings	Corporate Office	12.05.2023
25	Seamless Pipes & Tubes (High Alloy steel Tubes/ Pipes, Alloy steel Pipes , Carbon steel Pipes)	Trichy	17.08.2023
26	Seamless Pipes (High Alloy steel, Alloy steel, Carbon steel)	Trichy	26.10.2023

Items imported hitherto where local suppliers have been developed

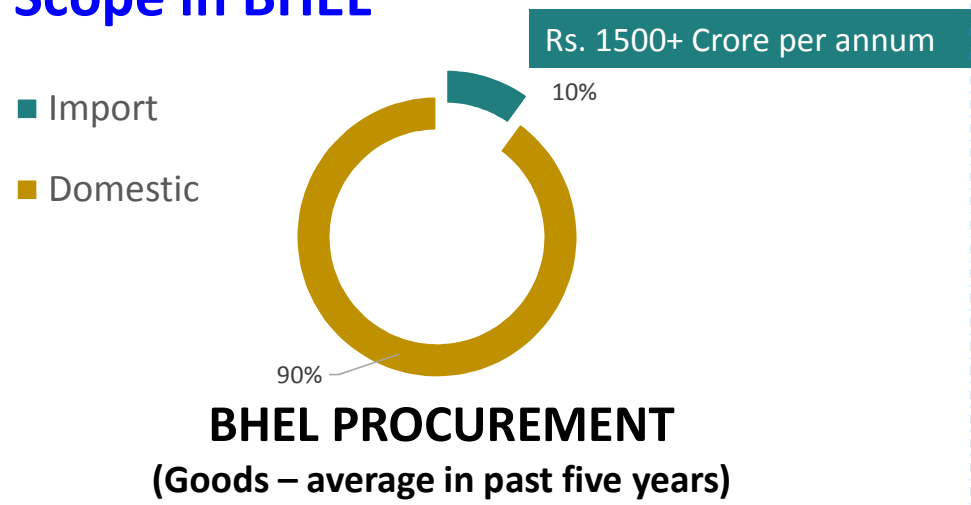
Orders Placed			
Sl.	Item description	Source identification through	Supplier, M/s
1		BHEL-SAMVAAD	
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Items imported hitherto where local suppliers have been developed

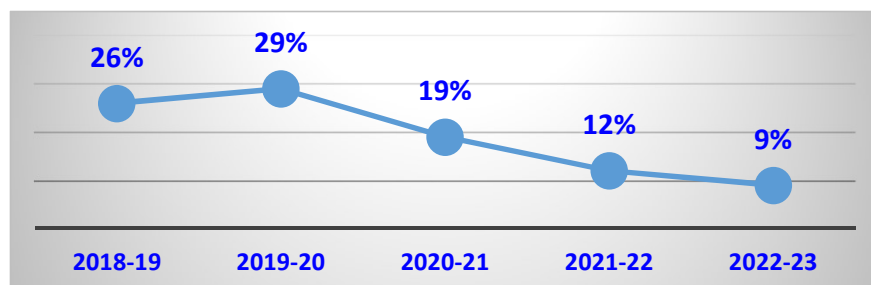
Orders Placed			
Sl.	Item description	Source identification through	Supplier, M/s
14		BHEL-SAMVAAD	
15			
16			
17			
18			
19			
20			
21			
22		Open Tender	
23			
24			
25		GeM	
26			
27			
28			

Opportunity for Indigenization

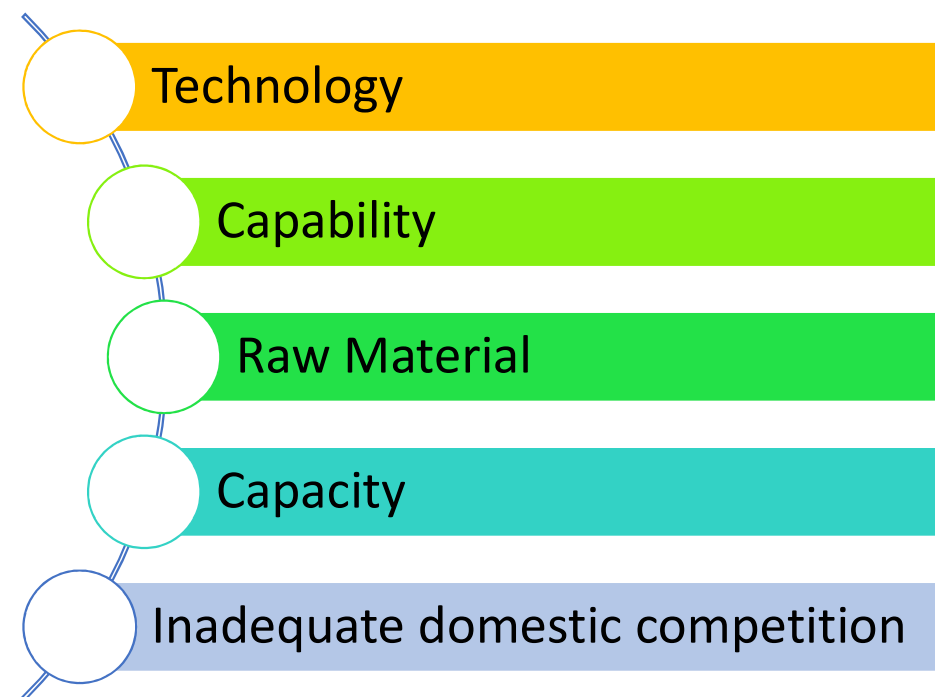
Scope in BHEL



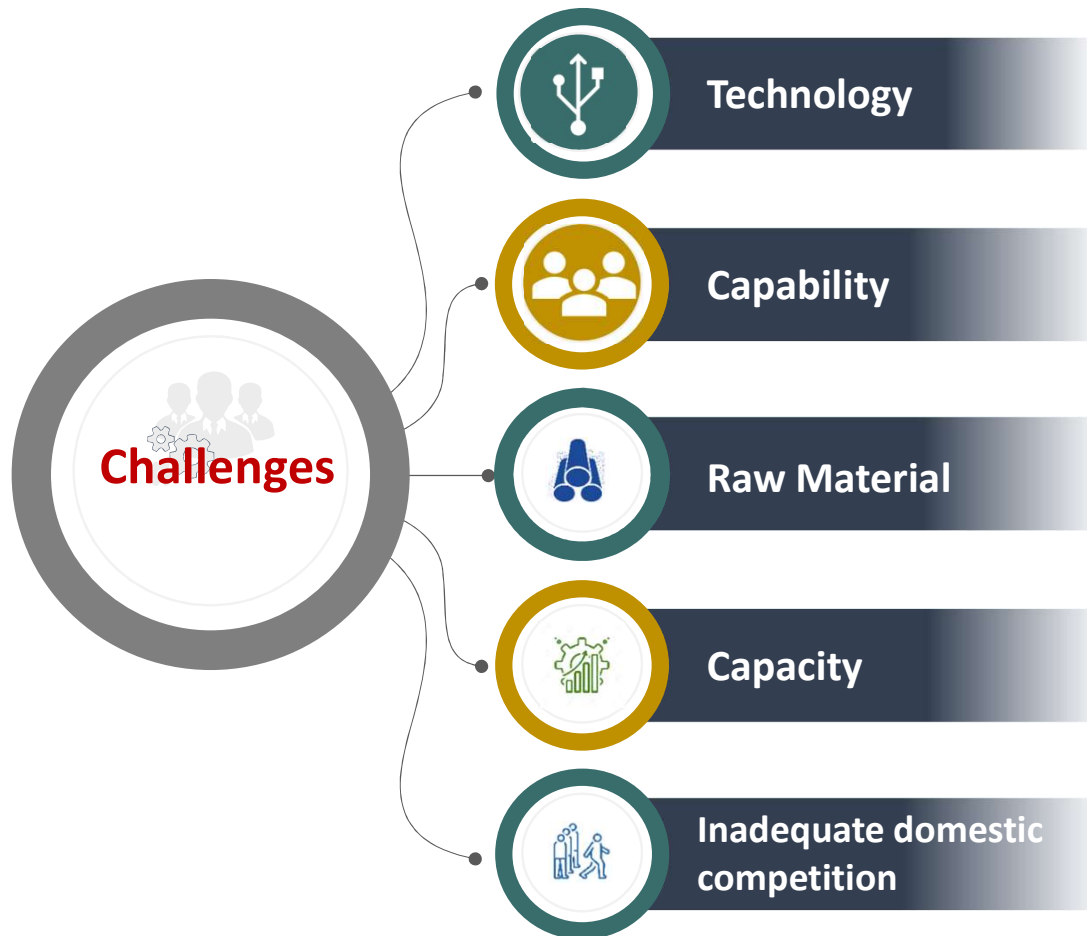
Trend of Imports in BHEL during the last few years



Overcoming the challenges...



Demand-supply gap – Few examples



Examples

Generator Circuit Breakers, Boiler Water Circulating Pumps, **Integrated Electronic devices**, Current Insulated Bearings, **Solar Ingots and Wafers**

LP & TG Forgings > 50 MT, HP & IP Forgings <50 MT, C276 sheets, Titanium Sheets

Nickel, Chromite Sand

Cladded sheets, Alloy Steel pipes & tubes (P91/ 92, T91/ 92)

Pressurization system for Motors, Armature Reversing Contactor, Mono PERC solar cells, Slurry Pumps, Gypsum Dewatering System, FGD Agitators, Mist Eliminators

BHEL SAMVAAD

an opportunity for local vendors to meet the Demand – Supply gap

9

Categories

300+

Items

16

Manufacturing Units

2000+

Crores per annum

- Raw materials – Special / Alloy / Electrical Steel
- Consumables for Foundry Applications
- Welding Consumables of Special Grade
- Castings & Forgings
- Mechanical components
- Insulating Materials
- Electrical & Electronic components
- Components – Solar
- Systems/ Packages

What's new in SAMVAAD 2.0



1.

Focus

on the core few
where gaps in
technology /
facilities are
prominent



2.

Collaborate

Invite ideas from the
domestic industry on
how, as part of a joint
effort with BHEL, one can
minimize the imports in
the Country



3.

Deliberate

on inputs w.r.t.
technical
alternatives

CONSTRAINTS FACED

Non availability of the following in India:

- Semiconductor wafer / solar wafer/ chip fab facility
- Semiconductor IC manufacturing facility
- Surface Mount Device manufacturing facility

BHEL EDN semiconductor components requirement

SNO	Item desc	Types	Value in Rs. Cr.
1	High power IGBTs	10+ types	75
2	Integrated circuits SMD/through hole	1500+ Types	40
3	Passive SMD components	2200+ types	10
4	Fibre Optic components	15+ types	10
5	Discrete semiconductors	550+ types	4
6	Misc components semiconductors, connectors etc	500+ types	20
Total		4775+ types	159



**Let's get down
to business!**



Electronic Components

Electrical Components/ Items/Systems

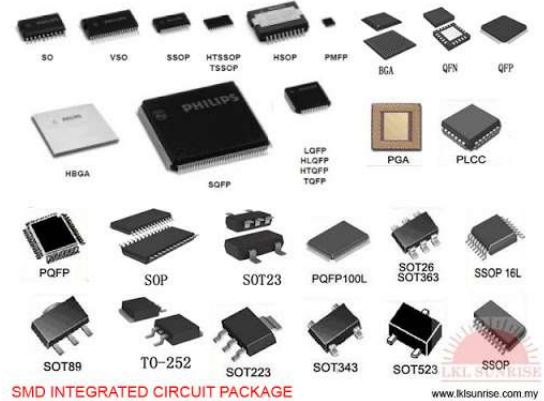
Components for Power Devices

Traction Equipment/Systems



Electronic Components

Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Integrated Circuits (ICs)	For Railways and C&I products	PFGA,DSP, Microcontrollers Comparators Multiplexers Timers Memory chips Regulators ADC, DAC, opto couplers PCB mountable DC DC converters	38.95	EDN	85235100 85437099 85415000 85044010	Electronic module manufacturers	

INTEGRATED CIRCUITS : 1510


EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
IGBT	For Railways	IGBTs: Up to 1500 A and Up to 4500 V	75	EDN	8541 3010	Power electronic module manufacturers	

IGBT : 14


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Fibre optic components	For Railways and C&I products	Fibre optic Transmitters and receivers	10	EDN	9001 1000	Power electronic module manufacturers	

FIBER OPTIC COMPONENT : 14


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
TRANSISTOR	For Railways and C&I products	TRANSISTOR, Mosfet, FET, FOR POWER CONTROL APPLICATIONS	0.52	EDN	8541 2900	Electronic module manufacturers	

TRANSISTOR: 181

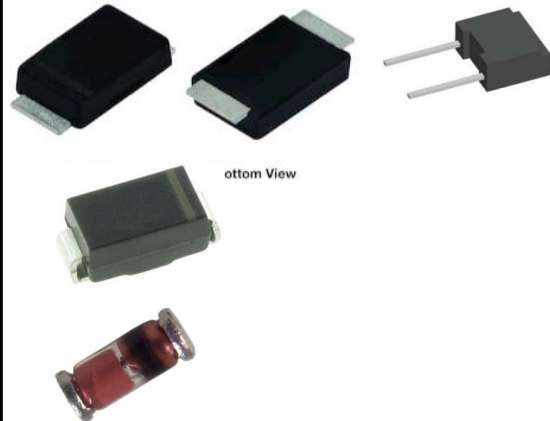
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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Diode	For Railways and C&I products	Rectifiers : SMT and Through hole	1.92	EDN	8541 1000	Electronic module manufacturers	 <p>ottom View</p>

DIODE SMT / through hole: 286


EFFORTS & STATUS OF INDIGENIZATION

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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
INDUCTIVE COMPONENTS	For Railways and C&I products	HF CHOKE, TRANSFORMER PCB MOUNTABLE : SMT and Through hole	5.61	EDN	8504 5090 8504 9010	Electronic module manufacturers	

INDUCTIVE COMPONENTS : 182



EFFORTS & STATUS OF INDIGENIZATION

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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Battery and accesories	For Railways and C&I products	Batteries: Lithium cells and its accessories	0.06	EDN	8507 1000	Electronic module manufacturers	 

BATTERY & ACCESORIES : 11


EFFORTS & STATUS OF INDIGENIZATION

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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Cable	For Railways and C&I products	Cables: Halogen free high voltage cables, Fibre Optic Cables, Fibre optic cable assemblies for power electronics	3.76	EDN	8536 9090	Electronic module manufacturers	

CABLE : 59

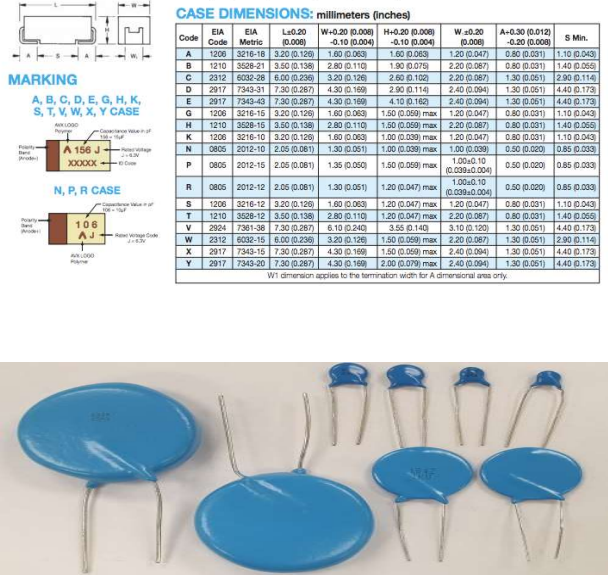
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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Passive components: Capacitor SMD and Through hole	For Railways and C&I products	Capacitors: MLCC, Al electrolytic, ceramic, tantalum etc	7.82	EDN	8532 1000	Electronic module manufacturers	

CAPACITOR SMD /Through Hole : 834

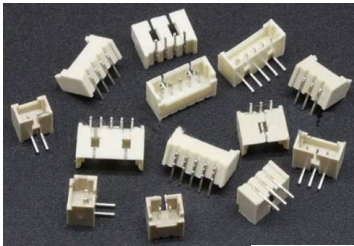
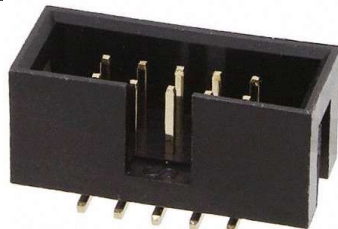
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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Connectors	For Railways and C&I products	PCB mountable SMT and through hole connectors	9.40	EDN	8536 9090	Electronic module manufacturers	 

CONNECTOR_PCB MOUNTED : 749

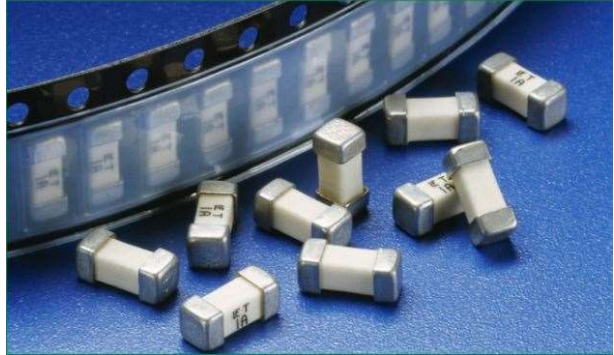
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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components - Electronic

Classification	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
FUSE	For Railways and C&I products	PCB mountable SMT and through hole FUSE	0.57	EDN	8536 1030	Electronic module manufacturers	

FUSE : 80

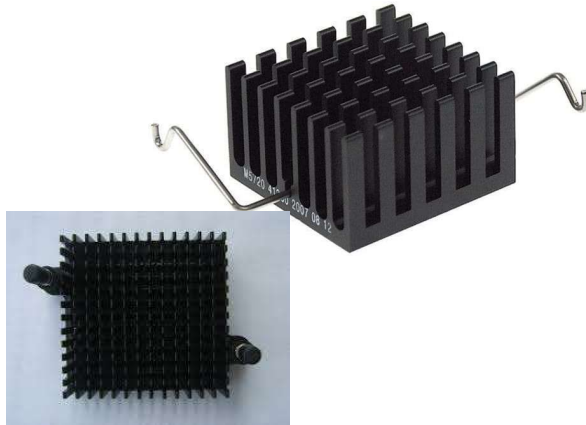
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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
HEATSINK	For Railways and C&I products	Heatsink for cooling electronic components such as FPGA, DSP, Microcontrollers etc Heatsink for very high power applications.	1.34	EDN	7318 2990	Electronic module manufacturers	

HEAT SINK : 25


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
LED components	For Railways and C&I products	LED: SMT and through hole of industrial grade Light pipes	0.94	EDN	8539 5000	Power electronic module manufacturers	

LED components : 91


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
OSCILLATOR	For Railways and C&I products	Crystal and Oscillators	0.29	EDN	8533 3100	Electronic module manufacturers	

OSCILLATOR : 57


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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
POTENTIOMETER	For Railways and C&I products	Potentiometer, PCB mountable: SMT and through hole.	0.32	EDN	8533 4010	Electronic module manufacturers	

POTENTIOMETER SMD : 101


EFFORTS & STATUS OF INDIGENIZATION

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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Quick Coupling	For Railways and C&I products	Traction grade quick couplings	0.86	EDN	7307 9990	Power Electronic module manufacturers	

QUICK COUPLING : 1


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
RELAY	For Railways and C&I products	PHOTOMOS RELAY	3.05	EDN	8536 4900	Electronic module manufacturers	

RELAY : 74

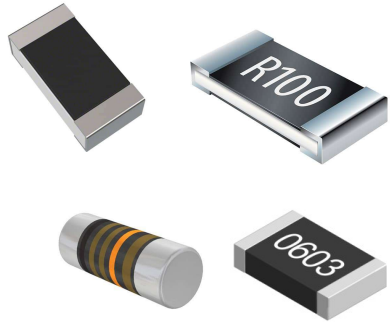
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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
RESISTOR SMD RESISTOR THROUGH HOLE	For Railways and C&I products	SMD resistors: Metal film, wirewound, precision resistors, power resistors etc	4.05	EDN	8533 1000	Electronic module manufacturers	

RESISTOR SMD : 1593


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
SD Memory CARD	For Railways and C&I products	SD MEMORY CARD : INDUSTRIAL GRADE	0.17	EDN	8523 5220	Electronic module manufacturers	

SD CARD : 6


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
SURGE SUPPRESSOR	For Railways and C&I products	Surge Suppressors	0.42	EDN	8535 4030	Electronic module manufacturers	

SURGE SUPPRESSOR : 45


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
SWITCH	For Railways and C&I products	Switches: SMT and through hole	0.74	EDN	8536 5005	Electronic module manufacturers	

Switches: 56


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
VARISTOR	For Railways and C&I products	Varistors for power application	0.30	EDN	8533 4090	Electronic module manufacturers	

VARISTOR: 28


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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
Electronic Modules with embedded controllers	For Railways and C&I products	The electronic module with embedded controllers, protocol converters.	8.97	EDN	8504 4090	Electronic module manufacturers	

ELECTRONIC MODULE : 23


EFFORTS & STATUS OF INDIGENIZATION

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Components - Electronic

Category	Application	Description	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
THYRISTOR	For Railways and C&I products	HV thyristors and Fast recovery diodes up to 1000 A and 4500 V	3.0	EDN	8541 3010	Power electronic module manufacturers	

THYRISTOR: 13


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Components - Electronic

Catyeogy	Application	Description	Require ment per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photograph
TRANSDUCER	For Railways and C&I products	Voltage sensros up to 3 kv and current sensors up to 5000 A	6.02	EDN	8504 9090	Electronic module manufacturers	

TRANSDUCER: 19

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Components - Electronic


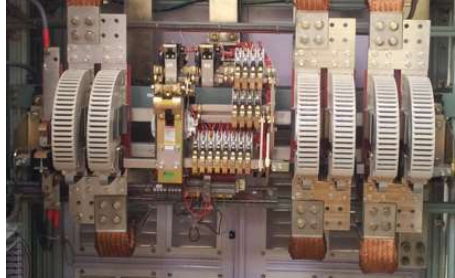
The image contains two tables of electronic components. The top table is a small 3-column list. The bottom table is a larger 4-column list with more detailed specifications.

Ref	Designation	Value
1	Resistor	10k
2	Capacitor	100nF
3	Inductor	100uH
4	Diode	1N4148
5	Transistor	2N2222
6	IC	741
7	IC	555
8	IC	7400
9	IC	7401
10	IC	7402
11	IC	7403
12	IC	7404
13	IC	7405
14	IC	7406
15	IC	7407
16	IC	7408
17	IC	7409
18	IC	7410
19	IC	7411
20	IC	7412
21	IC	7413
22	IC	7414
23	IC	7415
24	IC	7416
25	IC	7417
26	IC	7418
27	IC	7419
28	IC	7420
29	IC	7421
30	IC	7422
31	IC	7423
32	IC	7424
33	IC	7425
34	IC	7426
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91	IC	7483
92	IC	7484
93	IC	7485
94	IC	7486
95	IC	7487
96	IC	7488
97	IC	7489
98	IC	7490
99	IC	7491
100	IC	7492

List of Electrical and electronic components for electronic modules

Electrical Components/ Items/Systems

Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Bar mounted contactors, Mechanically latched,	<p>a) Field discharge circuit breaker(DC) used in excitation system for synchronous machines</p> <p>b) AC contactors</p>	<p>When the DC breaker opens, discharge pole to make, before main poles break. Rating 63 to 3000A</p> <p>PS4082070 Typical dimension in mm (width x depth x height : 800x 450x450)</p>	1 Cr	EDN	85365010 (contactors)	Manufacturers of Excitation systems,	 

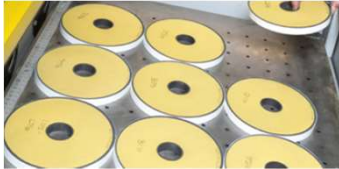
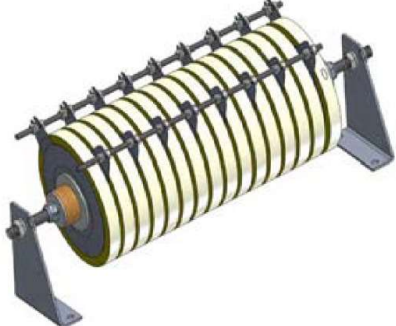
EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Silicon carbide voltage dependent resistor	To discharge the stored magnetic energy in the synchronous machines field	PS4082072 Typical dimension in mm (width x depth x height : 500x 155 x 225)	0.35 Cr	EDN	Not available	Generator excitation systems , high impedance relays, current transformers	 <p>Discs ←</p> <p>Assembled resistor ↓</p> 


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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Semi-Conductor Fuse. Blade type fuses to DIN standard construction	Used in thyristor bridge circuits,	<p>With microswitch with one changeover contact. Typical Voltage rating of fuse: 660V 1250V</p> <p>Current : 400A to 1000A(as per reqt) PS4082074</p> <p>Typical dimension in mm (width x depth x height : 60x 100 x 134)</p>	0.25 Cr	EDN	85361060 (This is for electronic fuses. Could not locate for Semi conductor fuses)	Thyristor bridge assembly manufacturers	


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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
AIR FLOW MONITORING UNIT, 1-20m/sec	Air flow monitoring unit for providing a potential free change over contact when the air flow in the duct is less than the setting. DIN rail mountable.	PS 4082071 Sensor weight: approx.: 150g Electronic unit: 150g	0.2 Cr	EDN		Heating Ventilation and Air Conditioning	

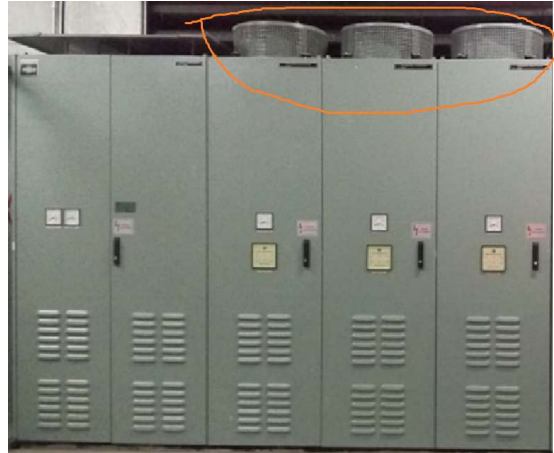
EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Industrial Fan with Impeller vanes	For forced cooling of thyristor bridge assemblies	<p>CENTRIFUGAL TYPE WITH CIRCULAR CASING MOTOR RATING: 0.45KW 415V,3PH SPEED: 900 RPM 46992250074</p> <p>Typical dimension in mm (Dia of cover: 580mm, Height of cover : 245mm)</p>	0.5 Cr	EDN	84149040	Air flow based cooling	



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Electrical Components / Items / Systems

Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Printers	Office use/Power plants	Multifunction A3/A4 colour printers with various features as per DA0659448199 DA0659451620 DA0659452294 DA0830000081	6.5 Cr	EDN		All users across industry	 

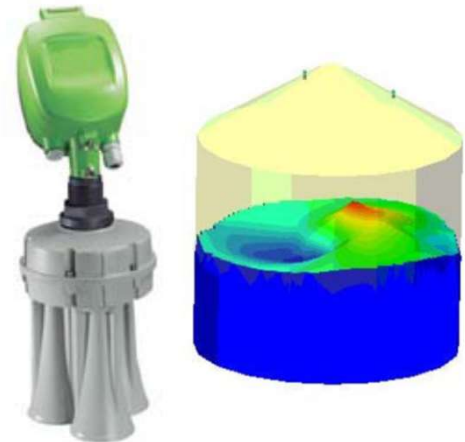
EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

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Electrical Components / Items / Systems

Category	Application	Description	Annual Qty (Rs. Cr.)	BHEL Unit	HSN Code	Types	Photographs
Coal Bunker Monitoring System	For Power Plants	Level monitoring system for the Coal Bunkers. 3D Acoustic Wave Level Type Transmitter	2.66Cr	EDN	90261020	3D type	

Key Features: 3D profiling of coal heaping inside the bunker using acoustic wave level technology.

Vendors: 01 No. (Class-I)

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
1.Ceramic metal brazed Housing & Cover flange	For manufacturing Diode & Thyristor to be used in Tracion - CREC module, DETC / AMR for BHEL Bhopal, BHEL RC puram -160 MW Brushless exciters and 800 MW TG sets for BHEL Haridwar		BHEL EDN	0.40	85419000	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Chemical Composition (Major Elements): Al ₂ O ₃ Ceramic brazed with FeNi42 flange, E-Cu copper brazed with FeNi42 flange Dimension: range OD: 57-120 mm, ID: 40-78 mm; Depth Range: 14 – 40 mm; Wt: 150 – 250 Gm				

Sl .	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Brazing of FeNi42 sheet with Cu contact disc, Brazing of Al ₂ O ₃ ceramic with FeNi42 sheet	Bimetal Brazing, Ceramic metal Brazing	No



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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
2. Molybdenum Disc	For manufacturing Diode & Thyristor to be used in Traction -CREC module, DETC / AMR for BHEL Bhopal, BHEL RC puram - 160 MW Brushless exciters and 800 MW TG sets for BHEL Haridwar	Moly disc for high temp eutectic alloying of wafer with Al: Si alloy	BHEL EDN	0.15	85419000	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Moly disc for high temp alloying of wafer Dimension: range : 19-78 mm;; Thickness1.5-3.5 mm; Wt: 15 – 250 Gm				

Sl .	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Manufacturing of Molybdenum disc	Moly rod manufacturing	No



EFFORTS & STATUS OF INDIGENIZATION

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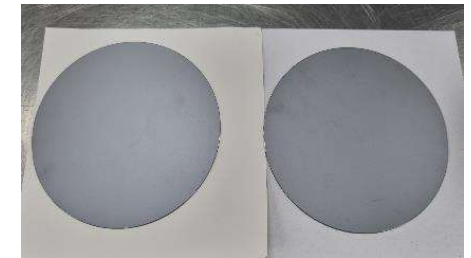
ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
3. Silicon Wafer	For manufacturing Diode & Thyristor to be used in Traction -CREC module, DETC / AMR for BHEL Bhopal, BHEL RC P uram - 160 MW Brushless exciters and 800 MW TG sets for BHEL Haridwar	n-type raw silicon wafer manufactured using FZ technology and NTD Doped	BHEL EDN	0.14	38180010	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		n-type silicon wafer (FZ), manufactured using FZ technology and NTD Doped (Ph), 38 mm- 125mm dia, Thickness- 400- 980 microns, resistivity 40-280 ohm cm				

SI	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Manufacturing of Si wafer	Si Ingot manufacturing	No



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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
4. Silicon Diffused Wafer chip	For manufacturing HVDC devices to be used in Static Excitation Equipments & Lift Irrigation systems.	Silicon diffused wafer / chip -using float wafer technology	BHEL EDN	0.70	38180010	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Silicon diffused wafer / chip made using float wafer technology for HVDC application Dia- 70-86 mm, thickness 800-1000 microns				

Sl .	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Diffused Si wafer	Float Si wafer manufacturing	No



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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
5. Silicon Diffused Thyristor chip	For manufacturing Diode & Thyristor to be used in Traction -CREC module, Lift irrigation system	Silicon diffused high voltage thyristor chip using alloying technology	BHEL EDN	0.60	38180010	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Silicon diffused high voltage thyristor chip using alloying technology for Convertor/ invertor /traction application, Dia-38 -55 mm, rating-2000-5000 V/ 500-1550 A				

SI	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	High voltage thyristor Chip	High voltage thyristor Chip Manufacturing	No



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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
6. Quartz Tube	Required as shop floor consumable used for high temp diffusion of wafers which are further processed to make diode & thyristor chips.	Quartz tube for 1600 Deg C temp diffusion	BHEL EDN	0.15	70171000	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Quartz tube for 1600 Deg C temp diffusion ID/OD: 67/75 mm, Length 490 mm				

Sl .	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Quartz Tube	High temperature quartz tube manufacturing	No



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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Components for Power Devices

Items/ Material with NO manufacturer/ facility available in India					HSN Code	Details of other clients in India who require the job
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
7. Silicon Boat	Required as shop floor consumable used for high temp diffusion of wafers which are further processed to make diode & thyristor chips.	Hyper pure Silicon boat for placement of wafers during high temp diffusion	BHEL EDN	0.06	8487900	Hind rectifier, Ruttonshaw, Vishay India
Special Features of the job		Hyper pure Silicon boat for placement of wafers during high temp diffusion Width 40 mm with curvature R28, Length 440 mm with 125 nos slot				

Sl .	Requirements of the job	Facility /Technology	Whether available in India (Yes / No)
1.	Silicon boat wafer carrier	High temperature hyper pure Silicon manufacturing	No



EFFORTS & STATUS OF INDIGENIZATION

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Silicon Boat

EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

samvaad@bhel.in

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

Silicon Boat

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Traction Equipment/Systems

Vande Bharat Express Train Sets

- BHEL is currently supplying 16 sets (4 rakes) of VB Trainsets.
- Supplies include propulsion system and Bought-out Items (Bols) from third parties.
- Bols are High reach Pantographs, IV couplers, Driver desks, Coach Monitoring systems, Event recorders, Battery & Battery charger, CCTV, Public Announcement and Passenger Information Systems, Fire detection systems etc.
- Rolling stock grade items for semi high speed trains are required
- Anticipating orders for VB Train sets Sleeper version



Advanced Propulsion Systems

Description	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Remarks
Li iron phosphate (LiFePO ₄) / NiCd battery (above 600Ah) BOI for train sets	Batteries for Vande Bharat Train	As per Indian Railway specification ICF MD SPEC - 398	30 Cr	EDN	3176N017	Required by all rolling stock suppliers of Indian Railways / Metro	03 hours battery Backup

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Inter Vehicular coupler and jumper cable assembly BOI for train sets	Distribution and transmission of Power, communication and control & monitoring signals across train	Traction Grade cables and connectors for High Vibration and Shock environment. As per Indian Railway specification ICF MD SPEC - 398	50 Cr	EDN	31769023	Required by all rolling stock suppliers of Indian Railways / Metro	For interconnection of power, control and data cables between coaches.

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
High reach pantograph BOI for train sets	For interconnecting 25KV OHE to train	RDSO spec no. RDSO/2017/EL/SPEC/0054 rev 03 or latest	5 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	Traction Grade for High Vibration and Shock environment.

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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
High Voltage cable assemblies BOI for train sets	25kV cable assembly running on roof connecting VCB to transformer and to other coach	Traction Grade cables and connectors for High Vibration and Shock environment. RDSO/ICF tender specification ICF MD SPEC - 398	11 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	Ebeam cables for rolling stocks

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Driver desk and accessories BOI for train sets	Console desk for Train pilot with pushbutton, lamps and driver displays	RDSO/ICF tender specification ICF MD SPEC - 398	8.5 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	Moulded FRP or better material. Supply to include various driver desk accessories like pushbuttons, TBs, lights, seats, provision to mount driver display (HMI), CCTV HMI, PAPIS HMI etc.

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs
Event recording system BOI for train sets	Blackbox Recorder for storing train events and critical data	RDSO/ICF tender specification along with EN 62625-1-2013 and GM/RT2472	2 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	Suitable for long term and short term data recording. Driver to cab voice recording and cab camera video recording to be stored in event recorder memory.

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Fire detection and alarm system BOI for train sets	For detection of fire/smoke hazard for passenger safety in rolling stock	RDSO/ICF tender specification and for aerosol RDSO/PE/SPEC/AC/0192-2018 (Rev.1)	30 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	Aspiration / point based detection system. Aerosol based extinguishing system.

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Public Address and Passenger Information and System (PAPIS) BOI for train sets	Journey details announcement for passenger information and emergency talkback to driver / guard	Traction Grade electronics and cabling for High Vibration and Shock environment. RDSO/ICF tender specification ICF MD SPEC - 398	50 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	GPS based display system. Voice communication. Emergency talk back feature. Interface with TCMS.

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
CCTV system BOI for train sets	CCTV for rolling stock with Ethernet communication with display at Driver cabinet	Traction Grade electronics and cabling for High Vibration and Shock environment RDSO/ICF tender specification ICF MD SPEC - 398	40 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	IP based CCTV roof, external and internal cameras. Visual images recording system in FIFO. CAT 6/7 communication. Data storage and transfer to Railway servers

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Centralized coach monitoring system (CCMS) BOI for train sets	Coach healthiness monitoring system	RDSO/ICF tender specification ICF MD SPEC - 398	2 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	For display of air conditioning healthiness, train axle bearing, suspension monitoring, gear hunting, etc. through train TCMS.

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Vigilance control device (VCD) BOI for train sets	Device for Pilot vigilance	RDSO/ICF tender specification ICF MD SPEC - 398	1 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	For vigilance of loco pilot. Application of emergency brakes.

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Cyclonic (Mechanical) Filter for EMU/MEMU's	Machine Room Air filtration EMU/MEMU	PS4452794	1.3 Cr	EDN	84211200	Locomotives Power Plants Process Industries Office / Industrial/ Commercial Buildings	

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
DC Link Capacitors (Dry type, resin filled, self healing)	750 μ F DC Link as main filter capacitor in IGBT based propulsion system	PS4452596	18.2 Cr	EDN	3921	Required by all rolling stock suppliers of Indian Railways / Metro	

EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Resonant Capacitors (Dry type, resin/N2 filled, self healing, polypropylene film metallized)	filter capacitor used in IGBT based propulsion system	1085 μ F, 2800V Dc, 300A 100Hz series Resonant capacitor PS4452714	13.34 Cr	EDN	8532	Required by all rolling stock suppliers of Indian Railways / Metro	

EFFORTS & STATUS OF INDIGENIZATION

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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
<p>Sine Filter Capacitors</p> <p>(Dry type, resin filled, self healing, polypropylene film metallized, Aluminium casing)</p>	Filter used in IGBT based propulsion system	<p>154 μF capacitor in sine wave filter</p> <p>PS4452653</p>	1.0 Cr	EDN	9032	Required by all rolling stock suppliers of Indian Railways / Metro	

EFFORTS & STATUS OF INDIGENIZATION

Number of indigenous vendors under approved category	Number of indigenous vendor under trial/ development category	Status of indigenization

ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Power Resistors	Precharge resistors ; Discharge resistors and Braking resistors for Propulsion system	PS4452542 PS4452543 PS4452544	6 Cr	EDN	9032	Required by all rolling stock suppliers of Indian Railways / Metro	

EFFORTS & STATUS OF INDIGENIZATION

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Advanced Propulsion Systems

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Sine filter Inductor	Magnetic component for Propulsion system	3 phase coil 0.18mH, 184A , 415VAC inductor PS4452498	4 Cr	EDN	8504	Required by all rolling stock suppliers of Indian Railways / Metro	

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Advanced Propulsion Systems

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Battery Charger Transformer	IGBT based Propulsion system	Three phase 15KVA, 415V/140VAC, 21.6A/61.7A Battery Charger Transformer PS4452499	2 Cr	EDN	3921	Required by all rolling stock suppliers of Indian Railways / Metro	

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SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

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Voltage Transducer	IGBT based Propulsion system	2800V/50mA Voltage Transducer as an Electronic sensor and for Earth fault detection PS4452691	2 Cr	EDN		Required by all rolling stock suppliers of Indian Railways / Metro	


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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Traction Grade Power Supplies)	For electronic cabinets and converters of rolling stock application	POWER SUPPLY STRU-02 -VT-110-24/24-480-FM	4.61 Cr	EDN	85044010	Required by all rolling stock suppliers of Indian Railways / Metro	


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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Power Capacitor for Traction application	For Railways	CAPACITOR (DRY TYPE-DC LINK) CAPACITOR C=750 μ F, Ue=2800V, In=150A	13.61 Cr	EDN	39219099	Required by all rolling stock suppliers of Indian Railways / Metro	


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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Traction Grade Special Contactors	For Railways	AC Line contactor type LTCH 1000 – 1Pole NO, Rating current – 900 A, Voltage -110 VDC, Aux. contact – 2NO, 2NC PartNO: LTCH10001SAS0 Make: Microelettrica Scientifica	4.0 Cr	EDN	90329000	Required by all rolling stock suppliers of Indian Railways / Metro	

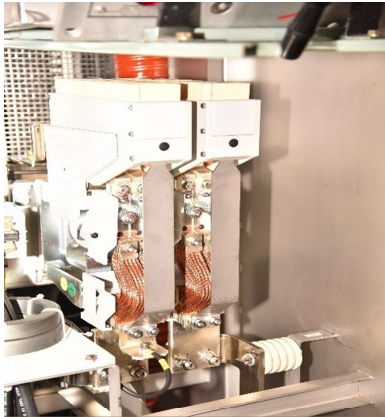
EFFORTS & STATUS OF INDIGENIZATION

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

SI	Suggestion	Recommended by	Responsibility	PDC	Remarks

Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Traction Grade Special Contactors	For Railways	CONTACTOR 2P NO 110VDC AUX.1NO+1 NC, Vertical Mounted, Minimum pick up control voltage pre- set at 60.5V	2.0 Cr	EDN	39219099	Required by all rolling stock suppliers of Indian Railways / Metro	


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Advanced Propulsion Systems

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Traction Grade Temp Management System	For Railways	AXIAL FAN 250M3/H 9,5W 48VDC	4 Cr	EDN	39219099	Required by all rolling stock suppliers of Indian Railways / Metro	


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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Communication equipment	For Railways	<p>Traction Grade for High Vibration and Shock environment</p> <p>Managed Backbone Routing Switch</p>	10.00 Cr	EDN	39219099	Required by all rolling stock suppliers of Indian Railways / Metro	


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IGBT modules	For Traction converters of rolling stocks	Traction Grade for High Vibration and Shock environment IGBT MODULE 1200V 449A.	114 Cr	EDN	85415000	Required by all rolling stock suppliers of Indian Railways / Metro	



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Advanced Propulsion Systems

Description	Application	Specific requirements / BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit	HSN Code	Required by any other clients	Photographs/Notes
Plug-in Relays	Control logics and signal multiplier in CRW (Electronic Cabinets) and TCMS panels of rolling stock	Traction Grade for High Vibration and Shock environment PS407415	2.60 Cr	BHEL EDN	85364900	Required by all rolling stock suppliers of Indian Railways / Metro	 

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Plug-in Relays

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ACTION POINTS DISCUSSED IN BHEL SAMVAAD 3.0

Plug-in Relays

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THANKS