



संवाद
Sanwaad

Online Workshop

for **Development of Local Suppliers**
for **sourcing of engineering items & raw materials**

29th December 2020, 10.00 AM

#AatmaNirbharBharat



#VocalforLocal

Second Workshop – Raw Materials - Special/ Alloy/ Electrical Steel

Hosted by Boiler Auxiliaries Plant (BAP), BHEL , Ranipet

Major items for indigenization

Item	Application	Requirement p.a. (INR Cr)	HSN Code	Whether required by other clients
CRGO Coils (23 DR 85 Grade and 27 DR 90,MOH)	Power Transformers	140	72251100	All Power Transformer manufacturers
CRNGO steel grade 50C270	Hydrogenerator	50	72251920	-
C276 sheets 0.1 / 0.2 / 2 mm	Flue Gas Desulfurization	84	75062000	L&T, GE Power, ISGEC, MHPS, Tata Project Ltd, BGR & Thermax
C276 Plate 4 / 6 mm		78	75062000	
Titanium Sheets (2 mm)		70	81089010	
Titanium Plate 6 mm		30	81089010	
Cladded Plates - C276 / Titanium over carbon steel plates		90	72109090	
Cladded Plates CS +SS, LAS + SS	Refinery Pressure vessels & columns	24	7210900000, 72259900	Vijaya Tanks, Godrej & Boyce, ISGEC

Major items for indigenization

Item	Application	Requirement p.a. (INR Cr)	HSN Code	Whether required by other clients
Seamless Carbon Steel & Alloy Steel Pipes P91 / P92	Super Critical Boiler & Piping for Thermal Power Plant	60	7304, 7305	M/s GE India, M/s L&T
Seamless Alloy Steel Tubes T91		20		
Seamless Alloy Steel Tubes T92 / T23		35		
Seamless Stainless Steel Tubes T347 H		15		
Grid Flats (2.9 mm THK, DIN EN 10028-7 17440 1.4550)	Nuclear Steam Generator	10	7219	M/s. L&T
Carbon steel plates with grades with thickness above 150 mm Tk	Hydro turbine & generators.	16	-	-
Alloy Steel Fin Flats of Grade SA387Gr12Cl2 Thk – 6 mm, 8 mm	Super Critical Boiler Panels	5	7208	M/s GE India M/s L&T

Raw Material – Electrical Steel

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
CRNGO steel grade 50C270	Hydrogenerator	AA10915	HEP Bhopal	50	72251920	
CRGO Coils	Power Transformers		HEP Bhopal TP Jhansi	140	72251100	All Power Transformer manufacturers
<p>Additional information for CRGO coils: Testing requirement as per IS 3024 (Maximum specific total loss and magnetic permeability measurement using Epstein / Single Sheet testing (SST). Electric tests of surface insulation resistivity ,Mechanical tests of ductility (bend test) and stacking factor. Type tests (ageing) etc)</p>						

Raw Material – Carbon Steel plates >150mm thick

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
Carbon steel plates with grades with thickness above 150 mm Tk	Hydro turbine & generators.	ASTM A 537 Cl .II, ASTM A 516 Gr. 70 & IS 2062	HEP, Bhopal	16	-	-

Raw Material – Special Steel

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
C276 Nickel sheets	Flue Gas Desulfurization	Sheet 0.1 / 0.2 / 2 mm Thick – ASTM B575 UNS N10276 Plate 5 mm - ASTM B575 UNS N06059	BAP, Ranipet	60	75062000	L&T, GE Power, ISGEC, MHPS, Tata Project Ltd, BGR & Thermax
Titanium Sheets	Flue Gas Desulfurization	ASTM B265	BAP, Ranipet	5	81089010	

Material Grade: Nickel Sheet - ASTM B575 UNS N10276 & Plate - ASTM B575 UNS N06059

Titanium Sheet - ASTM B265 Grade 2

Size Width x Length: Nickel Sheet – Thick 0.1 x Width 38/57/76/82 mm and Thick 0.20 x Width 200 mm

Thick 2.0 x Width 1000 x Length 3000- 6000mm

Nickel Plate – Thick 5 x Width 2500 mm x Length 6500 mm

Titanium Sheet – Thick 2 x Width 1000 mm x Length 6000 mm

Raw Material – Special Steel

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
C276 Nickel Plate	Flue Desulfurization Gas	Plate 4mm – ASTM B575 UNS N10276	BAP, Ranipet	1.23	75062000	L&T, GE Power, ISGEC, MHPS, Tata Project Ltd, BGR & Thermax
C276 Nickel Plate	Flue Desulfurization Gas	Plate 6mm – ASTM B575 UNS N10276	BAP, Ranipet	77		

Material Grade: ASTM B575 UNS N10276

Size Width x Length: Plate: 4mm x 1000mm x (4000-5000)mm, Plate: 6mm x 1000mm x (4000-5000)mm

Major Technical Requirement: Plates to be solution annealed and descale after rolling, Thickness Tol: as per ASTM B906, Straightness as per clause 8.5 of ASTM B575 (edgewise curvature depth of chord of sheet shall not exceed 0.04mm multiplied by the length in cm) Squareness: as per clause 8.6(90+/- 0.15deg), Flatness: Commercially flat as per clause 8.7 of ASTM B575, (TDC:RTS:006/Rev00)

Testing Facility: Mechanical test-ASTM B906, Tensile strength-690MPa, Yield-283 MPa, Elongation:40% min, Hardness-100 HRB, Grain size test as per ASTM E112.

Testing Facility: Mechanical test, Tensile strength as per ASTM E8, Bend Test as per ASTM B265.

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
Cladding of sheets	Flue Gas Desulfurization	C276+CS Cladding - ASTM A265-12 Titanium + CS Cladding - ASTM B898-11	BAP, Ranipet	90	72109090	L&T, GE Power, ISGEC, MHPS, Tata Project Ltd, BGR & Thermax
<p>Material Grade: C276+CS Cladding – Class 5 conforming to ASTM A265-12 Titanium + CS Cladding – ASTM B898-11 Size Width x Length: C276+CS Cladding : Thick 7/8/12 mm x Width 1200/2200 mm x Length 6000 mm Titanium + CS Cladding : Thick 7 mm x Width 2500 mm x Length 6000 mm</p>						

Material Grade: SA516 GR 70+317L CLAD, SA387GR22CL.2+ SS 347 CLAD, SA387GR.22CL.2+304L CLAD , SA516 GR 60+316L CLAD.

Major Technical Requirement: For Fabrication of Shells, dished ends, Torricones of Pressure vessels required for various refineries.

Testing Facility: Heat treatment (Normalizing, Tempering, Quenching), NACE, HIC, IMPACT.

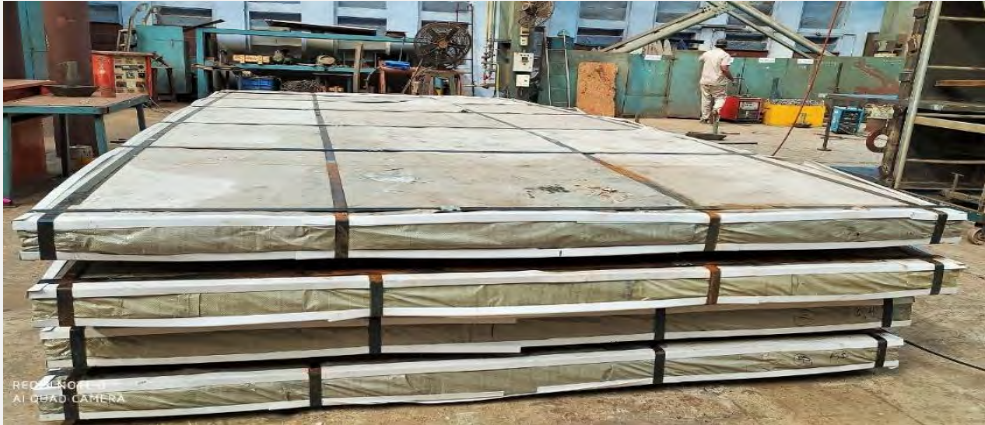
C276 sheets 0.1mm / 0.2 mm in coils



C276 Plates and Sheets



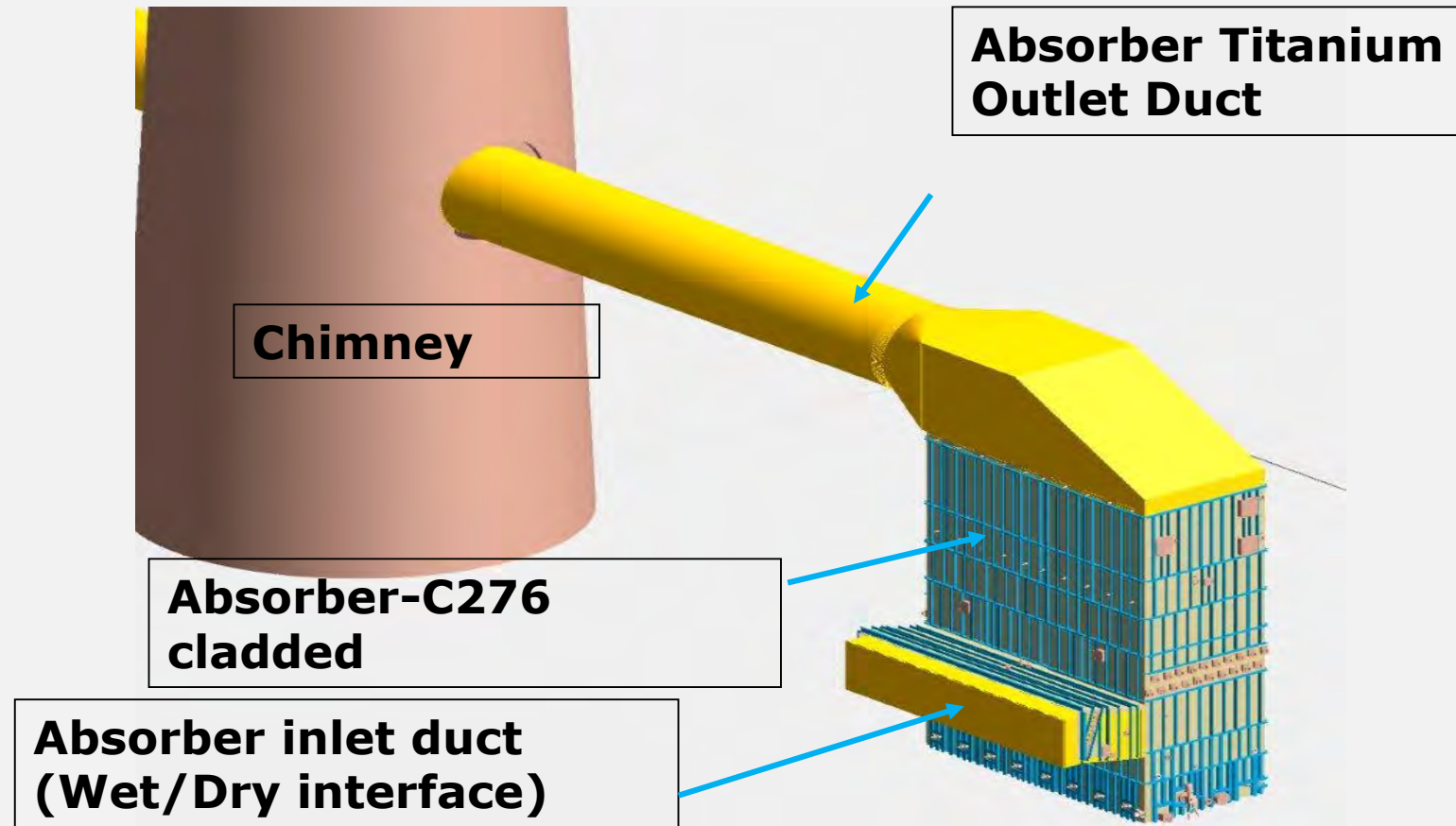
C276 Nickel sheets cladded over carbon steel plates



FGD Absorber



FGD Model – Key Areas



FGD Absorber & Outlet Duct



QUALITY REQUIREMENTS FOR C276 CLADDED CS PLATES

SL. NO	TYPE OF CHECK	REFERENCE DOCUMENT / ACCEPTANCE STANDARD
01	Chemical & Mechanical Properties of C276 Plate	Material Specification (ASTM B575 UNS N10276)
02	<u>Corrosion Test for C276 Plate</u>	<u>ASTM G48 – Method “A”</u>
03	Radiographic Testing of Butt joint on C276 Plate	ASME Sec. VIII Div 1 UW-51 <u>(Only one joint allowed per plate)</u>
04	Cladding by explosion bonding / hot rolling / combination of both – Visual Examination.	As per supplier internal procedure.
05	Cladded plate – Heat Treatment	Supplier Internal Procedure / ASTM A265
06	Cladded plate – <u>Bonding Quality (UT – 100%)</u>	ASTM A578 / A578M, with acceptance level C

QUALITY REQUIREMENTS FOR C276 CLADDED CS PLATES

SL. NO	TYPE OF CHECK	REFERENCE DOCUMENT / ACCEPTANCE STANDARD
07	Cladded plate – Bonding Quality (Shear Test or Bend Test)	ASTM A265, BHEL TDC / P.O
08	Chemical Test on Clad Plate (C276)	Material Specification (ASTM B575 UNS N10276), BHEL P.O & TDC
09	Mechanical Test on Cladded plate	ASTM A265 / BHEL P.O / TDC
10	Cladded plate - Ductility – Bend test on cladded plate	ASTM E290 / BHEL P.O / TDC
11	Cladded plate – Painting, Marking & Inspection	As per BHEL P.O & TDC

QUALITY REQUIREMENTS FOR TITANIUM CLADDED CS PLATES

SL. NO	TYPE OF CHECK	REFERENCE DOCUMENT / ACCEPTANCE STANDARD
01	Chemical Composition of Titanium	Material Specification (ASTM B265 Gr.2 UNS R50400)
02	Chemical Composition of Carbon Steel	Material Specification (ASTM A36 / IS 2062 Gr.A / IS 2062 E250 Gr. BR)
03	Radiographic Testing of Butt joint on Titanium Plate	ASME Sec. VIII Div 1 UW-51 <u>(only one joint allowed per plate)</u>
04	Cladding by explosion bonding / hot rolling / combination of both – Visual Examination.	Required quality as per ASTM B898-11.
05	Cladded plate - Dimension Inspection	As per BHEL TDC / P.O

QUALITY REQUIREMENTS FOR TITANIUM CLADDED CS PLATES

SL. NO	TYPE OF CHECK	REFERENCE DOCUMENT / ACCEPTANCE STANDARD
06	Cladded plate – Heat Treatment	Supplier Internal Procedure
07	Cladded plate – <u>Bonding Quality (UT – 100%)</u>	ASTM A578 / A578M, with acceptance level C
08	Cladded plate – Bonding Quality (Shear Test & Bend Test)	ASTM A265, BHEL TDC / P.O
09	Cladded plate – (Mechanical Test – Tensile & Ductility)	BHEL P.O & TDC
10	Cladded plate – Painting, Marking & Inspection	As per BHEL P.O & TDC

Raw Material – Seamless Carbon Steel , Alloy Steel Pipes

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
Seamless Carbon Steel & Alloy Steel Pipes	Super Critical Boiler & Piping for Thermal Power Plant	TDC 101 Rev 20 TDG 101 Rev 13	HPBP Trichy	60	7304, 7305	M/s GE India M/s L&T
<p>Material Grade : SA106GrC (OD >=406.4, Thk >=65), SA335P12, P22, P91, P92</p> <p>Size : Outer Diameter >= 114.3 to 965 mm, Thickness >= 17.12 to 120 mm, Length >= 3.5 m to 8.5 m,</p> <p>Major Technical Requirement : CS/AS – Billets/Blooms – Vacuum degassing, Chemical/Process requirements as per Specification,</p> <p>Testing Facility : Heat Treatment, NDT, Mechanical Tests.</p>						

Raw Material – Seamless Alloy Steel & Stainless Steel Tubes



BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
Seamless Alloy Steel & Stainless Steel Tubes	Super Critical Boiler Tubing for Thermal Power Plant	TDC 102 Rev 18	HPBP Trichy	70	7304, 7305	M/s GE India M/s L&T

Material Grade: Alloy Steel - SA213T12, T22, T23, T91, T92

Stainless Steel - TP347H, Super304H (With/Without Shot Peening)

Size : Diameter ≥ 31.8 to 76.1 mm, Thickness ≥ 4 to 14.1 mm, Length ≥ 5 m to 12 m,

Major Technical Requirement : Billets/Blooms : CS/AS - Vacuum Degassing, SS – VD/Argon Oxygen Decarburization
Cold Finish $t/D > 0.15$, Hot Finish $t/D < 0.15$; Stainless Steel – Cold Finished
Suppliers with Cold Mill Facility only, Mother Hollows shall be sourced from BHEL Approved Suppliers.
Chemical/Process requirements as per Specification.

Testing Facility : Heat Treatment, NDT, Mechanical Tests, Hydro Test.

Testing Facility: As per Specification.

Raw Material – Alloy Steel Fin Flats & Fittings for HPBP, Trichy

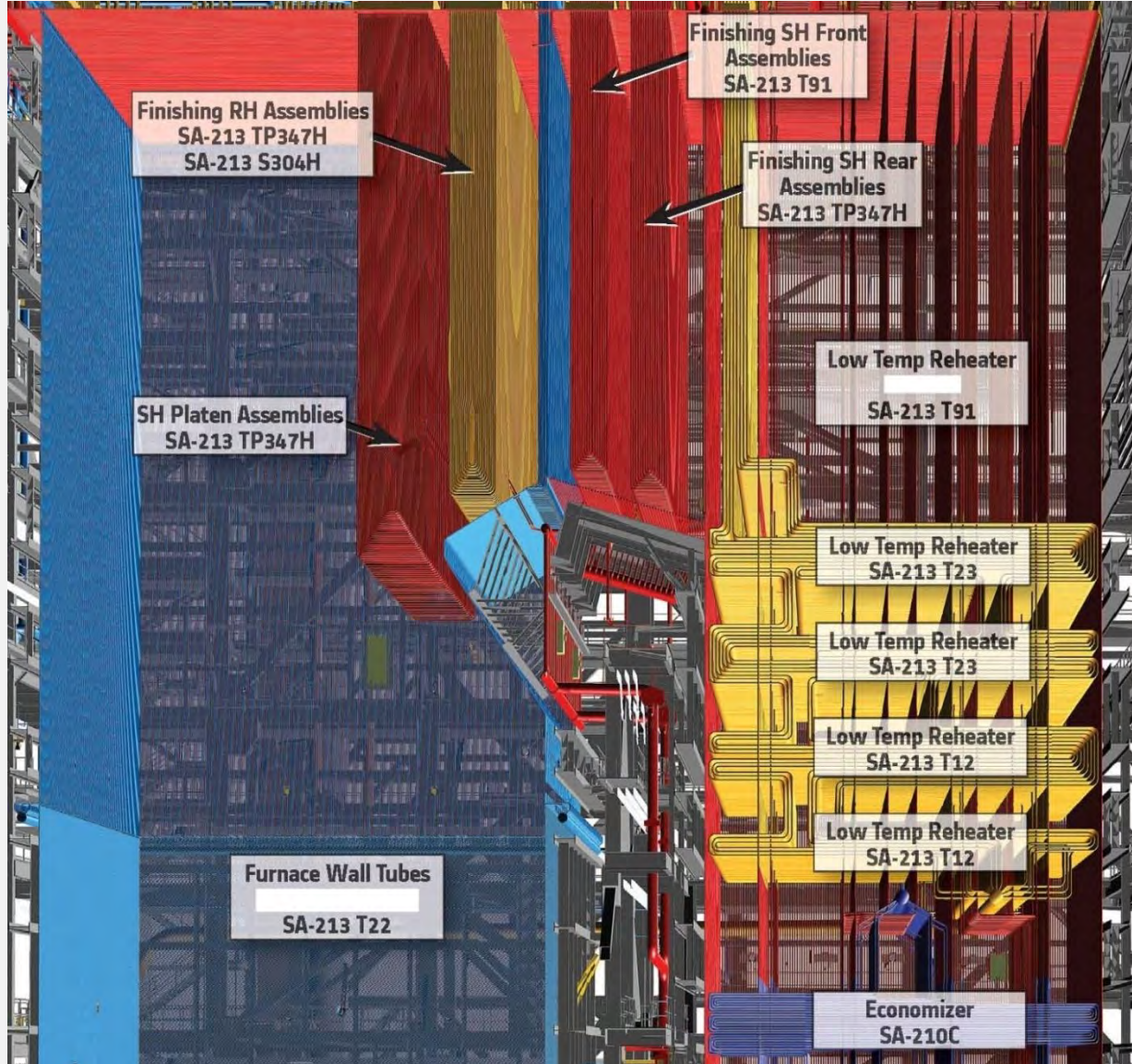


BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (INR Cr)		
Alloy Steel Fin Flats of Grade SA387Gr12Cl2 Thk – 6 mm, 8 mm	Super Critical Boiler Panels	TDC 303 Rev 08	HPBP Trichy	5	7208	M/s GE India M/s L&T

Increase in unit sizes with higher parameters

UNIT SIZE	DESIGN TEMP DEG C	MATERIALS USED	MAX DIA/THK-TUBES	MAX DIA/THK-PIPES
210/250 MW	540/540	CARBON STEEL - GrA1, GrB & GrC ALLOY STEEL - T11, T22, T91 SS -TP347H	DIA 63.5 mm, THK 6.3 mm DIA 54 mm, THK 10 mm DIA 47.63 mm, THK 8.6 mm	DIA 457.2 mm, THK 55 mm (CS) DIA 558.8 mm, THK 95 mm(Gr22)
500/600 MW	540/540 540/568	CARBON STEEL - GrA1, GrB & GrC ALLOY STEEL - T11, T22, T91 SS -TP347H	DIA 63.5 mm, THK 12 mm DIA 54 mm, THK 11 mm DIA 63.5 mm, THK 5 mm	DIA 914 mm, THK 102 mm (CS) DIA 660.4 mm, THK 137.1 mm (Gr22)
660/800 MW	568/596 596/596 603/603	CARBON STEEL - GrC ALLOY STEEL - T12, T22, T23, T91 & T92 SS -TP347H, SUPER 304H (SHOT PEENING)	DIA 69.85 mm, THK 14.1 mm DIA 76.2 mm, THK 15.09 mm DIA 76.2 mm, THK 13.72 mm	DIA 711 mm, THK 95 mm (CS) DIA 813 mm, THK 120 mm (Gr91) DIA 508 MM, THK 120 MM (Gr92)

Materials in 660 MW (Typical)



Materials Used in Boilers (Typical)

SL.NO.	MATERIAL DESCRIPTION	660 MW	800 MW
		WT MT (Approx.)	WT MT (Approx.)
1	TUBES - CS	1850	2083
2	TUBES - T12/T22/T23	1894	2863
3	TUBES - T91/T92	657	632
4	TUBES - TP347H, SUPER304H (SHOT PEENING)	558	1245
5	PIPES - CS	1485	1513
6	PIPES - P12/P22	787	741
7	PIPES - P91/P92	1528	1635
8	FIN FLATS (Gr12 / Gr22)	176	218
	TOTAL WEIGHT	8935	10930

Other Materials

Sl. No.	Material Description	Quantity in MT
1	TITANIUM CLADDED PLATES (10 mm THK) (FGD SYSTEM TO CHIMNEY)	730
2	GRID FLATS (2.9 mm THK, DIN EN 10028-7 17440 1.4550) (NUCLEAR STEAM GENERATORS)	16

Material Consumption in Last 5 Years

MATERIAL		Total Ordered	Domestic Supplies
	Year	MT	MT
PIPES	2015	18482	196
	2016	9294	133
	2017	21471	709
	2018	23438	897
	2019	18220	1891
TUBES	2015	13351	299
	2016	5217	1107
	2017	19104	3525
	2018	19134	2173
	2019	7120	1594

Material Consumption in Last 5 Years

MATERIAL		Total Ordered	Domestic Supplies
	Year	MT	MT
ALLOY STEEL FIN FLATS	2015	1949	
	2016	10	
	2017	631	
	2018	1472	
	2019	307	

Material Projection for next 5 Years

Unit	Description of item	Projected Procurement Value (INR Cr.)				
		2020-21	2021-22	2022-23	2023-24	2024-25
HPBP, Trichy	Grid Flats	10.00	0.00	0.00	0.00	0.00
HPBP, Trichy	Seamless Alloy steel tubes of grades SA213T12, SA213T22, SA213T23, SA213T91 & SA213T92	11.00	40.00	40.00	30.00	30.00
HPBP, Trichy	Seamless Stainless Steel tubes of grades SA213TP347H & Super304Code2328 with/without shot peening	30.00	90.00	90.00	70.00	70.00
HPBP, Trichy	Alloy Steel Fin Flats of grade SA387Gr12Cl2	5.00	15.00	15.00	10.00	10.00
HPBP, Trichy	Seamless Carbon & Alloy Steel Pipes up to grade 92	20.80	80.00	80.00	65.00	65.00

Indigenous Suppliers Registered with BHEL for Tubes

Sl. No.	Material Category	Indigenous Sources Available
a)	Seamless Carbon Steel Tubes (All OD & Thk)	Yes
b)	Seamless Alloy Steel Tubes upto Grade 11, 12 & 22 (for all OD & Thk)	Yes
c)	Seamless Alloy Steel Tubes of Grade 91 (for OD < 63.5 mm & Thk upto 7.11 mm)	Yes
d)	Seamless Alloy Steel Tubes of Grade 91 (for OD > 63.5 mm & Thk > 7.11 mm)	No
e)	Seamless Alloy Steel Tube of Grade 23 & 92 (for all OD & Thk)	No
f)	Seamless Stainless Steel Tube of Grade upto TP347H (for all OD & Thk upto 7.11)	Yes
g)	Seamless Stainless Steel Tube of Grade upto TP347H (for all OD & Thk > 7.11)	No
h)	Seamless Stainless Steel Tube of Grade Super 304	No
i)	Seamless Stainless Steel Tube for all Grade with Shot Peening (for all OD & Thk)	No

Indigenous Suppliers Registered with BHEL for Pipes

Sl. No.	Material Category	Indigenous Sources Available
a)	Seamless Carbon steel pipes (OD \leq 323.9 mm, Thk \leq 40 mm, OD $>$ 323.9 \leq 368, Thk \leq 36, OD $>$ 368 \leq 406.4, Thk \leq 21.44, OD $>$ 406.4 \leq 508, Thk \leq 15.9)	Yes
b)	Seamless Carbon steel pipes (FOR ALL OD, Wall Thickness $>$ 40 mm & Except listed in Sl.No. a)	No
c)	Seamless Alloy steel pipes (Grade 12 & 22) (OD \leq 273 MM, Wall Thickness \leq 36 MM)	Yes
d)	Seamless Alloy steel pipes (FOR ALL OD, Wall Thickness $>$ 36MM)	No
e)	Seamless Alloy steel pipes (Grade 91 & 92)	No

BHEL support for Development of Suppliers



24x7 Online portal for registration 

- Simple registration form
- Timebound evaluation



Product development support

- Drawings, specifications
- Tooling

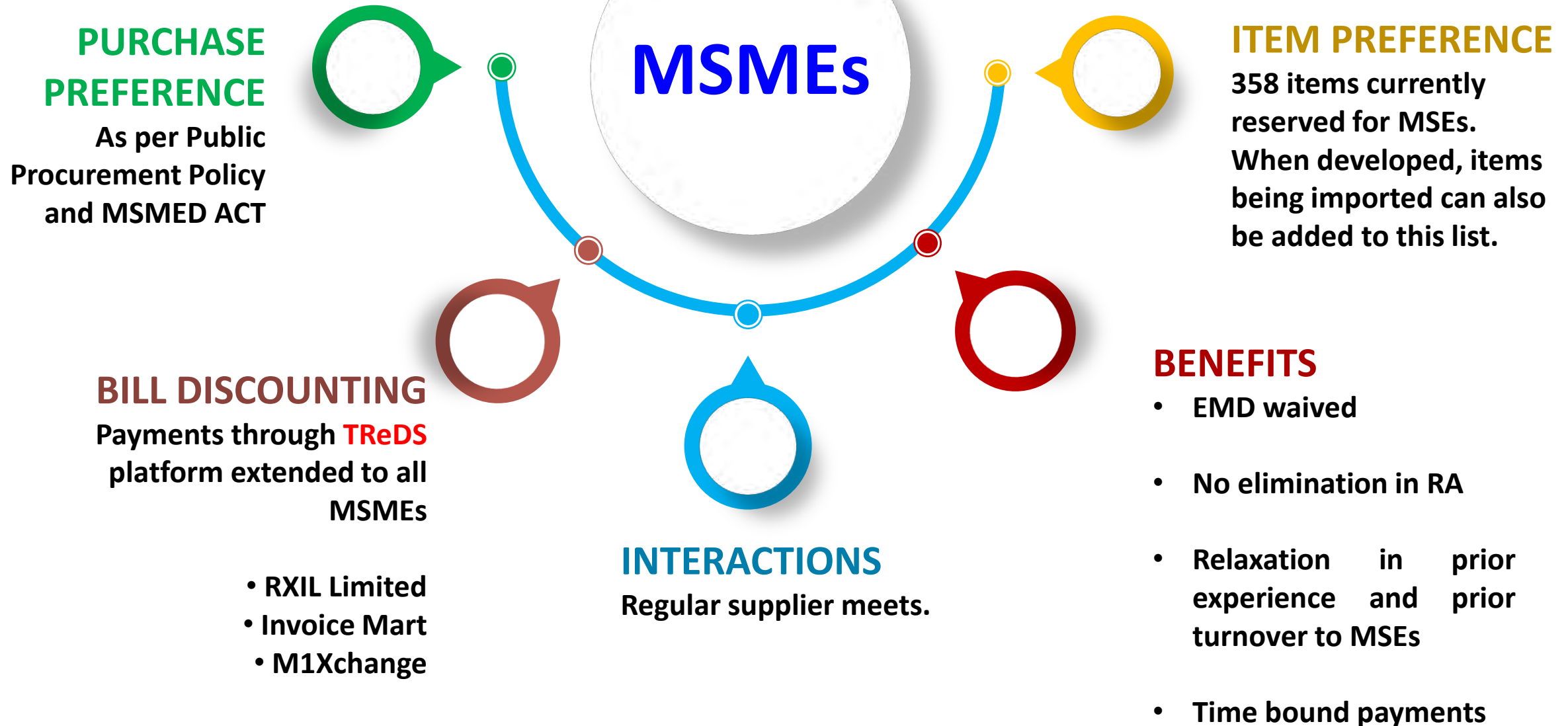


Hand holding with R&D and type testing



No LD/ penalty for developmental orders

BHEL support for MSMEs



BHEL support for Start-ups



BENEFITS

**Relaxation in prior
experience and turnover**



STARTUP RUNWAY

**BHEL is tendering its
requirements on GeM
wherein Startups can
supply goods as per the
Startup Runway on GeM**

Calendar for BHEL SAMVAAD

SNO	Category of Material	Date	Day	TIME
1	Raw Materials-Special/ Alloy/ Electrical Steel	29.12.2020	Tuesday	10:00 AM - 12:00 PM
2	Consumables for Foundry Applications	01.01.2021	Friday	10:00 AM - 12:00 PM
3	Welding Consumables of Special Grade	05.01.2021	Tuesday	10:00 AM - 12:00 PM
4	Castings & Forgings	08.01.2021	Friday	10:00 AM - 12:00 PM
5	Components-Mechanical	12.01.2021	Tuesday	10:00 AM - 12:00 PM
6	Insulating Materials	15.01.2021	Friday	10:00 AM - 12:00 PM
7	Components - Electrical & Electronics	19.01.2021	Tuesday	10:00 AM - 12:00 PM
8	Components – Solar	22.01.2021	Friday	10:00 AM - 12:00 PM
9	Systems & Packages	27.01.2021	Tuesday	10:00 AM - 12:00 PM

For any queries, please contact us on samvaad@bhel.in

Enrollment for BHEL SAMVAAD – Online Form submission

BHEL SAMVAAD

"An interaction forum with local industry for strengthening the cause of Aatma Nirbhar Bharat"

*Required

Supplier Name and address *

Your answer

Contact person Name *

Your answer

Contact person's email address *

Your answer

Contact person's Mobile No. *

Your answer

Category of Material (Kindly select your option, so that VC link invite is shared with you separately for the scheduled date and time) *

- ☐ Raw Materials-Special/ Alloy/ Electrical Steel - 29.12.2020 - 10:00 AM - 12:00 PM
- ☐ Consumables For Foundry Applications - 01.01.2021 - 10:00 AM - 12:00 PM
- ☐ Welding Consumables of Special Grade - 05.01.2021 - 10:00 AM - 12:00 PM
- ☐ Castings & Forgings - 08.01.2021 - 10:00 AM - 12:00 PM
- ☐ Components-Mechanical - 12.01.2021 - 10:00 AM - 12:00 PM
- ☐ Insulating Materials - 15.01.2021 - 10:00 AM - 12:00 PM
- ☐ Components - Electrical & Electronics - 19.01.2021 - 10:00 AM - 12:00 PM
- ☐ Components - Solar - 22.01.2021 - 10:00 AM - 12:00 PM
- ☐ System & Packages - 27.01.2021 - 10:00 AM - 12:00 PM

List of items proposed to be developed for BHEL *

Your answer

Submit



Thank You

Write to samvaad@bhel.in to convey your interest