



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION .

LME/ PUR/311
ISSUE DT:03.03.2012
REV.NO.- 00
REV. DT:
SHEET 1 OF 9

SUBJECT:


PURCHASE SPECIFICATION FOR DESIGN MANUFACTURING INSTALLATION
OF FIXTURES FOR MANUFACTURING OF SHELL ASSEMBLY OF WAG7
LOCOMOTIVE

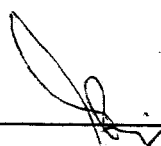
Enclosures:

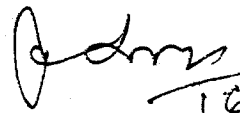
Rev	Date	Prepared	Rev	Date	Prepared	Rev	Date	Prepared
		Approved			Approved			Approved
Rev	Date	Prepared	Rev	Date	Prepared	Rev	Date	Prepared
		Approved			Approved			Approved

Distribution:

LMM. (001) LMP (002) Loco QC (003) Tech. (004) CQX (005) LME (DV) (006) Master folder (Original copy)

Prepared by: 

Checked by: 

Approved by:  16/6/12



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.03.2012

REV.NO.- 00

REV. DT:

SHEET 2 OF 9

1. General:

BHEL Jhansi manufactures WAG7 electric locomotives for Indian Railways. The shell assembly is the major fabricated assembly of WAG-7 loco where all equipments are installed. It consists of Underframe assembly, Sidewall assembly (left hand and right hand) and cabin assembly (2 nos.). At present the total annual requirement of Underframe assembly is manufactured in house. The super structure assembly (side wall cabin and roof) is fabricated in house and is partially outsourced.

In order to increase the production capacity of locomotives and also to ensure consistency in quality we need to increase the manufacturing capacity of shell assembly up to 7 nos. per month by way of introducing proper jigs and fixtures at various stages of manufacturing of under frame and shell assembly.

This specification covers design, manufacture and installation of required jigs and fixtures at BHEL Jhansi works to achieve production rate of shell assembly of 7 nos. per month.

To understand existing process / stages of manufacturing of underframe and shell assembly the interested parties may visit BHEL Jhansi plant at least one week prior to the bid submission.

2. Technical requirement


- Achieve repeatability through maximum use of jigs & fixtures.
- Cycle time reduction to improve overall delivery cycle.
- Cut down on inventory cost, rework, rejection and cutting down inspection stages & inspection time by ensuring the quality.
- Training, Support & Supervision till the target of Shell @7 nos. per month is achieved for continuous 6 months.
- The Jigs and Fixtures shall be designed in such a way so that minimum time shall be required to load and unload the job on fixtures.
- The jigs and fixtures shall be robust enough to avoid any distortion during the welding.
- Easy removal of job after welding to be ensured, any welding distortion should not occur after removal of job from the fixtures.
- Clamping arrangement shall be designed in such a way so that adequate and easy access must be there for welding.
- Over head welding to be avoided; only down hand and vertical welding are allowed.

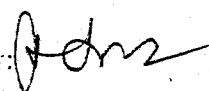
3. Scope of Work:

Design, manufacture, supply installation and to prove suitability of Jigs and fixtures for manufacturing the shell assembly of WAG7 locomotive as per drawing no.-0 719 10 05 000 at BHEL Jhansi works. The manufacturing stages, no. of fixtures required to achieve the target of 7 nos. shell assembly and critical requirements for shell assembly shall be as under.

BHEL shall provide components duly prepared according to the BOM / component drawing to the vendor.

Prepared by: 

Checked by: 

Approved by: 



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/PUR/311
ISSUE DT:03.03.2012
REV.NO.- 00
REV. DT:
SHEET 3 OF 9

3.1 STAGE-I

The description of sub assemblies, critical requirements and maximum cycle time including loading and un loading the job on fixtures shall be as given below

(i) Longitudinal End Beam

The end beam is a box section with the stiffeners inside as per annexure-1. Drawing no.- 27193105006 to be followed at this stage. 2 nos. such end beams are required to form one long beam and 2 nos. long beams shall be required to manufacture one under frame.

3.1.1 Critical requirement

- Overall dimensions as per drawing.
- No welding distortion / twisting of beam.
- Fixture shall be so strong so that it should not allow any distortion in beam during welding.

3.1.2 Maximum Cycle Time 1.5 days *

3.1.3 No. of Fixtures 2 nos.**

3.1.4 Weight - 1404 Kg.

3.1.5 Welding Automation* - required to the maximum extent**

3.1.6 Welding manipulator** - Rotation not required**

(ii) Long Centre Beam

The center beam is a box section with the stiffeners inside as per annexure-1. Drawing no.- 17193105006 to be followed at this stage. One nos. centre beam is required to form one long beam and 2 nos. long beams shall be required to manufacture one under frame.

3.2.1 Critical requirement

- Dimensions as per drawing and check list.
- Weld size and weld quality to be maintained.
- Size of transformer well to maintained, shall be measured with templates.
- Pitch and location of holes for transformer mounting to be maintained.
- Automatic / Mechanized welding is required to reduce welding vendor to supply suitable mechanism and welding plant preferably submerged arc welding to cater this requirement

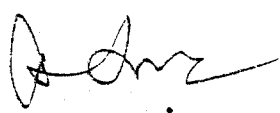
3.2.2 Maximum Cycle Time 3 days*

3.2.3 No. of Fixtures 2 nos.**

3.2.4 Weight - 2300 kg

Prepared by: 

Checked by: 

Approved by: 



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.03.2012

REV.NO.- 00

REV. DT:

SHEET 4 OF 9

3.2.5 **Welding Automation** - required to the maximum extent

3.2.6 **Welding manipulator** - Rotation not required

3.3 **Long Beam**

The long beam is to be manufactured by joining 2 nos. end beams (3.1 of above) and one no. centre beam (3.2 of above) as per drawing no.-07193105002, 2 nos. long beams shall be required to manufacture one under frame.

3.3.1 **Critical requirement**

- Over all dimensions as per drawing
- Ultrasonic testing of butt weld as per drawing
- Cambering of long beam
- Flatness of top surface of long beam shall be within ± 2 mm.
- Side deflection of the beam shall be within 5 mm.

3.3.2 **Maximum Cycle Time 3 days. ***

3.3.3 **No. of Fixtures** 2 nos.**

3.3.4 **Weight** - 5204 kg

3.3.5 **Welding Automation** - Not required

3.3.6 **Welding manipulator** - Rotation not required

3.4 **End structure**

The end structure to be made as per drawing no.- 07193105007, 2 nos. end structures are required to make one under frame.

3.4.1 **Critical requirement**

- Over all dimensions as per drawing
- weld joints as per drawing
- ensure matching with buffer beam, and long beam in stage-II
- Flatness of bottom portion to match with cattle guard
- To ensure accurate placement of pre drilled components.

3.4.2 **Maximum Cycle Time 3 days***

3.4.3 **No. of Fixtures 2 nos. ****

Prepared by:

Checked by:

Approved by:



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT:

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.05.2012

REV.NO.- 00

REV. DT:

SHEET 5 OF 9

3.4.4 Weight - 2256 kg

3.4.5 **Welding Automation** - Not required

3.4.6 **Welding manipulator** - Rotation not required

5. Stage-II Under frame assembly

A. Right way Up (RWU)

After manufacturing the long beam fixtures are required for stage-II i.e. Right Way Up position. At this stage both the long beams are kept in position and cross members and other items as per list enclosed at Annexure-2 are to be welded. The major activities at this stage are as under.

General arrangement drawing no. -07193105008 to be followed at this stage.

- locate both the long beam in position
- Place cross members as per drawing
- place side channel and supporting gussets
- Place both the end structures
- Under frame extension as per drawing
- damper bracket support

3.5.1 Critical requirement

- Dimensional measurement as per drawing and check list
- Flatness and right angle vertical of side channel
- Ensure accurate location of predrilled components
- Ensure accurate location and welding of cross members as per drawing.
- **No twisting is allowed after welding**
- **Only down hand and vertical welding is allowed.**

3.5.2 No. of fixtures 3 nos.**

3.5.3 Weight of under frame - 20t appr.

3.5.4 Maximum cycle time 10 days*

3.5.5 Welding Automation - required to the maximum extent

3.5.6 Welding manipulator - required, to ensure down hand welding the items which are to be welded from top shall be welded in right way up position and then with the help of manipulators complete under frame to be rotated in 180 degree to facilitate the bottom side welding in down hand position.

Prepared by:

Checked by:

Approved by:



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.03.2012

REV.NO.- 00

REV. DT.:

SHEET 6 OF 9

B Stage-III Up Side Down (USD)

After completion of stage-II i.e. RWU stage as stipulated above in para 3.5 the position of under frame is made reversed i.e. under frame is placed upside down (USD) position through manipulator and the items which are to be fitted / welded on to the under frame at this stage have been listed in Annexure-3. **General arrangement drawing no.- 07193105008 to be followed at this stage.**

3.5.7 Critical requirement

- Dimensional measurement as per drawing and check list
- Ensure accurate location and welding of pivot pin .
- Location of secondary suspension pad with reference to pivot
- Ensure accurate location of predrilled components
- Ensure accurate location and welding of other items listed in annexure-II
- MCD / DP testing of pivot welding

3.5.8 No. of fixtures 2 nos.**

3.5.9 Maximum cycle time 6 days including loading and unloading time*

3.5.10 Weight of under frame - 22.5t appr.

3.5.11 Welding Automation - Required to the max. extent

3.6 Stage-IV Stool mounting stage

No additional fixtures required for this stage the welding of stools to be done in RWU position as mentioned above para 3.5

3.6 Stage-V Body shell assembly

After completion of stage-IV i.e. after welding of mounting stool and measurement of camber the under frame is brought to stage -V. In this stage the super structure is welded on under frame

3.6.1 Activities in stage-V

- **Shell assembly to be done as per drawing no.- 0 719 10 05 000.**
- Decambering of under frame with help of the dead load
- Locate and match the side wall with under frame
- locate and match the cabins with under frame and side wall
- locate and weld the cross girders

Prepared by:

Checked by:

Approved by:



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.03.2012

REV.NO.- 00

REV. DT:

SHEET 7 OF 9

- match the roofs with cross girder and side wall
- match and weld the roof mounting brackets and I bolts
- Full welding of side wall with under frame following the specified welding sequence to avoid the distortion
- Full welding of both the cabins with under frame
- Fitment of corridor door and bulk head to be done as per drawing
- Fitment of cabin doors to be done as per drawing

3.6.2 Critical requirement

- Dimensions are to be maintained as per drawing and check list.
- Verticality of side wall and cabin to be maintained within +/- 2 mm with respect to the under frame
- Waviness of the side wall to be maintained within +/- 5 mm
- Uniform gap between side wall and roofs both from inside and outside to be maintained as per drawing
- uniform gap between two adjacent roofs to be maintained as per drawing
- Height from floor to the cross girders to be maintained as per drawing
- Height from floor to cabin roof to be maintained as per drawing.
- Level of two adjacent roofs and level of all four roofs are to be maintained.
- Gap between roof and cross girder from inside shall be uniform and to be maintained as per drawing.
- Location of side wall with reference to center line of under frame to be maintained within the specified tolerance.
- The inside dimensions between both the side walls to be measured 3 places in height and 6-7 places horizontally all the dimensions shall be within the limit. Similarly for the cabin the distance between both the sides to be measured 3 places vertically and no deviation from the specified limit shall be allowed.
- Placement of cabin with reference to center line of to be ensured as per drawing
- All sharp edges, corners, welding burrs to be removed and surface to be made smooth
- Inspection by RDSO staff for dimensions, finish and workmanship etc.

3.6.3 No. of fixtures required - 3**

3.6.4 Maximum cycle time - 10 days including inspection time*

* Time indicated for stages is purely BHEL assessment based on manufacturing experience to meet desired output i.e; 7 shells per month. However Vendor may quote their own assessment to meet the desired target.

** The number of fixtures we decided, is based on time taken for different stages and to meet desired output i.e; 7 shells per month. However vendor may quote their own assessment for number of fixtures to meet the desired target, Vendor has to prove the same during commissioning.

Prepared by:

Checked by:

Approved by:



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT:03.03.2012

REV.NO.- 00

REV. DT:

SHEET 8 OF 9

*** **Welding Automation** - Robotic welding, vendor has to supply complete welding plant and other accessories for automatic welding

**** **Welding manipulator** - Mechanized rotating arrangement of welding fixture to facilitate welding in all position by rotating the fixture with job.

4. Details to be submitted along with offer:

- i. Details of similar projects done by party earlier, to be submitted with offer.
- ii. List of Tools, Jigs and Fixtures proposed and wherever possible a General Arrangement drawing for the Tooling, jigs and fixtures
- iii. Project schedule to be furnished by Party with offer.
- iv. Organization chart clearly defining the production and quality control.
- v. Clause wise comments against this specification
- vi. Description of the company supported by the printed literature
- vii. Certified Copies of Financial Report of last three year.
- viii. Foundations details if any shall be submitted with the offer.

5. Guidelines Regarding the Bid Submission:

- a. The Bidder shall prepare the bid in 2 parts i.e. techno-commercial bid and price bid and to be submitted in separate sealed envelopes clearly indicating the enquiry no. and techno-commercial bid and price bid on envelopes. Both envelopes are to be placed in the third envelop indicating the enquiry no. in top.
- b. The Bid shall contain no alterations, omissions or additions, except those to Comply with instructions issued by the BHEL Jhansi, or as necessary to correct errors made by the Bidder, in which case such corrections shall be done with proper initials.
- c. In the event of discrepancy between the original and any copy, the original shall prevail

6. Qualifying Criteria:

Bidder shall have wide experience in similar type of work i.e. design manufacturing erection and commissioning of the jigs and fixtures for fabrication, and assembly of components and carrying out heavy and light duty welding work. Bidder should submit documentary evidence for execution of a project of similar scale along with offer. Following shall also be applied.

- i. The Bidder shall be a registered private or public legal entity.
- ii. The Bidder has the requisite power and authority to submit the bid, and the Bid Security, and to execute the Agreement and perform its obligations there under.
- iii. The Bidder is not prohibited under any Applicable Law from submitting the bid or executing the Agreement and performing its obligations there under.
- iv. The Bidder has not been declared as a defaulter or debarred by any Government Authority from submitting the bid.

Prepared by:

Checked by:

Approved by:



LME:012: C

LOCOMOTIVE ENGINEERING DEPTT.

PURCHASE SPECIFICATION

LME/ PUR/311

ISSUE DT: 03.03.2012

REV. NO. - 00

REV. DT:

SHEET 9 OF 9

- v. There is no pending, active, or previous legal action that prevents the Bidder from submitting the bid, executing the Agreement or fulfilling the conditions of the purchase specification.
- vi. Bidder should have well established design office and facility of solid modeling and designing of fixtures.
- vii. Organization chart of design office and facility for designing shall be submitted along with offer.
- viii. The bidder should have experience of supplying and commissioning of similar fixtures minimum at one customer
- ix. Vendor shall indicate detail of such customer in their bid documents.

7. Erection, commissioning & proving

1. The erection of the jigs, fixtures & tooling shall be in scope of the party.
2. BHEL shall provide electricity, compressed air, cutting gas and crane facility.
3. Civil work if any shall be in the scope of BHEL Jhansi.
4. Proving the facilities provided by party shall be considered established only when desired output i.e; 7 shells per month is achieved for continuous six months.
5. The final clearance to all the jigs and fixtures shall be given only when parts and assembly manufactured out of the newly designed facility shall be accepted by the inspection agency (RDSO).

8. Delivery:

The delivery shall be six months from the date of placement of order.

9. Other conditions:

- a) Supplier shall give the manufacturing/ assembly procedure for every fixture.
- b) The manufacturing time mentioned in this specification is indicative only. Supplier is supposed to improve significantly upon the same and for every fixture the manufacturing time is to be declared / mentioned by supplier. The same shall be proved by supplier in prototype manufacturing.
- c) Supplier shall be responsible for ensuring the quality of products using the fixture and the interchangeability. The fixture should be capable of producing components of same quality every time.

Prepared by:

Checked by:

Approved by:

STAGE-I (RWU)

[ANNEXURE-1]

LONGITUDINAL BEAM ASSY. TO DRG. 0 719 31 05 00 9 (CONSIST OF FOLLOWING)					
SI. No.	Drwawing No.	DESCRIPTION	WELDING POSITION	SPECIAL REMARKS	REMARKS
1		LONG. END BEAM	RWU	2 719 31 05 006	
1.1	06/4/31/5	Bottom Plate	USD	4 719 31 05 015	
1.2		TOP PLATE	RWU	3 719 31 05 028	
1.3	06/4/31/7	INNER RIB	RWU	4 719 31 05 018	
1.4	06/4/31/6	OUTER RIB	RWU	4 719 31 05 019	
1.5	06/4/31/96	Tie Channel	RWU	4 719 31 05 023	
1.6		Support 225x20x20	RWU		
2		LONG. BEAM CENTRE	RWU	1 719 31 05 007	
2.1	06/3/31/39	Long Beam Bottom Plate	USD	3 719 31 05 023	
2.2	06/4/31/38	Long Beam Top Plate	RWU	3 719 31 05 027	
2.3	06/3/31/40	Long Beam Vertical Plate	RWU	3 719 31 05 015	
2.4	06/3/31/57	Transformer Base Assy	RWU	3 719 31 05 016	
2.5	06/4/31/42	Vertical Suppor	RWU	4 719 31 05 020	
2.6	06/4/31/62	Gusset	RWU	4 719 31 05 021	
2.7	06/4/31/61	Gusset	RWU	4 719 31 05 022	
2.8	06/4/31/37	Rib	RWU	4 719 31 05 024	
2.9	06/3/31/41	Long Beam Vertical Plate	RWU	3 719 31 05 017	

STAGE II (RWU)

[ANNEXURE-2]

END STRUCTURE TO DRG. 06/1/31/135 (CONSIST OF FOLLOWING) 0 719 31 05 007				
2.1	05/4/31/55	Centre Plate Top		4 719 31 05 016
2.2	05/4/31/22	Fabricated Channel Assy		3 719 31 05 014
2.4	05/4/31/58	Coupler Pocket Top Plate		4 719 31 05 095
2.5	05/4/31/59	Coupler Pocket Side Plate		4 719 31 05 094
2.6	05/4/31/60	Angle 75x75x10tk.		4 719 31 05 093
2.7	05/4/31/61	Angle 75x75x10tk.		4 719 31 05 092
2.8	05/4/31/62	Side Buffer top Plate		4 719 31 05 091
2.9	05/4/31/63	Centre Plate Bottom		4 719 31 05 090
2.1	05/3/31/64	Coupler Pocket Bottom Plate		3 719 31 05 019
2.11	05/3/31/65	Coupler Pocket Bottom Plate		3 719 31 05 020
2.13	05/4/31/68	Coupler Pocket Back Plate		4 719 31 05 071
2.14	05/4/31/69	Side Boffer Support		4 719 31 05 070
2.15	05/4/31/70	Side Boffer Support		4 719 31 05 098
2.16		Angle 75x75x10tkx327Lg.		
2.17		Angle 75x75x10tkx542Lg.		
2.18	05/4/31/71	Angle 75x75x10tk		4 719 31 05 072
2.19	05/4/31/72	Angle 75x75x10tk		4 719 31 05 073
2.2	05/4/31/73	Support Plate Centre		4 719 31 05 074
2.21	05/4/31/74	Support Plate Side		4 719 31 05 097
2.25	05/4/31/78	Rear draft lug		4 719 31 05 077
2.26	05/4/31/79	Rear draft lug		4 719 31 05 076
2.27	05/4/31/80	Rear draft lug Rib		4 719 31 05 085
2.28	05/4/31/81	Rear draft lug Rib		4 719 31 05 084
2.29	05/4/31/84	Stiffener Plate		4 719 31 05 082
2.3	05/4/31/83	Stiffener Plate		4 719 31 05 083
2.32	05/4/31/85	Stiffener Plate		4 719 31 05 081
2.33	05/4/31/86	Stiffener Plate		4 719 31 05 080
2.34	05/4/31/87	Guide Plate		4 719 31 05 043
2.35	05/4/31/88	Support Plate		4 719 31 05 044
2.36	05/4/31/10	Make up Plate		4 719 31 05 088
2.38	05/3/31/213	Top Plate Assy.		4 719 31 05 016, 4 719 31 05 100 & 4 719 31 05 101
2.4	05/3/31/215	End Beam		3 719 31 05 018
2.41	05/4/31/261	Stiffener Plate		4 719 31 05 046
2.42	05/4/31/262	Side Buffer Bottom Plate		4 719 31 05 045
2.43	05/4/31/263	Side Buffer Seat		4 719 31 05 047
2.45	05/4/31/295	Bracket Assy.		3 719 31 05 036
MODIFIED END STRUCTURE TO DRG. 06/2/31/127 (1 719 31 05 004) [CONSIST OF FOLLOWING]				
B	06/3/31/126	Layout of Modified end Structure		
C	06/3/31/128	Front Board Centre		3 719 31 05 005
D	06/3/31/129	Support Strut 10TKx703x844		3 719 31 05 008
E	06/3/31/130	Front Strut Assy.		3 719 31 05 006
F	06/3/31/131	Front Board Side 10TKx697x1036		3 719 31 05 010
G	06/4/31/132	Angle		4 719 31 05 010
H	06/4/31/133	Rib 4TKx206x615		4 719 31 05 012
I	06/4/31/134	Anti-Collision Past		4 719 31 05 013
Sl. No.	Drwawing No	DESCRIPTION		BHEL DRG.NO.
1A	06/1/31/100	Under Frame Arrgt & Details.No. 1 of 2 end		0 719 31 05 004
B	06/1/31/101	Under Frame Arrgt (Centre).		0 719 31 05 005
C	06/1/31/102	Section And Details of U/Frame (Centre)		0 719 31 05 006
2	06/4/31/8	Top Plate (Cross member).		4 719 31 05 079
3	06/4/31/9	Stretcher		4 719 31 05 060

5	06/4/31/11	Bottom Plate (Cross member)		4 719 31 05 054
6	06/4/31/12	Vertical Rib of Cross member		4 719 31 05 061
7		Floor Plate 1620x495x3.15tk		
8	06/4/31/13	Top Plate		4 719 31 05 063
9	06/4/31/15	Side Channel		3 719 31 05 031
10		Sealing Sheet 865x1245x3.15tk		
11		Sealing Sheet 1452x1245x3.15tk		
12	06/4/31/16	Sealing Sheet		3 719 31 05 013
13	06/4/31/18	Gusset		4 719 31 05 065
14	06/4/31/19	Plate		4 719 31 05 066
15	06/4/31/20	Gusset		4 719 31 05 067
16	06/4/31/21	Gusset		4 719 31 05 068
17	06/4/31/22	Bottom Plate		4 719 31 05 056
19		Angle 220x100x6tkx512Lg.		
20		Floor Sheet 1560x495x3.15tk		
21		Angle 50x50x8tkx1245Lg.		
22		Angle 50x50x8tkx2175Lg.		
23	06/4/31/24	Bottom Plate		4 719 31 05 058
24	06/4/31/26	Centre Pivot Base		4 719 31 05 059
25	06/4/31/27	Base for Lifting		4 719 31 05 050
27	06/4/31/29	Side Top Plate		4 719 31 05 052
28	06/4/31/30	Gusset		4 719 31 05 053
29	06/4/31/31	Gusset		4 719 31 05 034
30		Floor Sheet 1305x495x3.15tk		
31		Floor Plate 2285x495x3.15tk		
34	06/4/31/34	Rib		4 719 31 05 075
35		Pressed Angle 50x50x3.15tkx940Lg.		
36		Pressed Angle 50x50x3.15tkx1040Lg.		
37	06/4/31/43	Side Sill		3 719 31 05 029
38	06/4/31/103	Sl. Support		4 719 31 05 038
39	06/4/31/45	Z - Section		4 719 31 05 064
40	06/4/31/46	Channel Assy.		3 719 31 05 030
41	06/4/31/47	Channel Assy.		3 719 31 05 012
42	06/4/31/48	Rib		4 719 31 05 028
43	06/4/31/49	Angle		4 719 31 05 029
44	06/4/31/50	Plate 20 tk		4 719 31 05 030
45	06/4/31/51	Rib		4 719 31 05 055
46	06/3/31/52	Cross member Assy.		3 719 31 05 022
47	06/4/31/67	Rib		4 719 31 05 099
48	06/4/31/68	Tie Angle		4 719 31 05 035
49	06/4/31/71	Bottom Plate		4 719 31 05 036
50	06/4/31/56	Z - Section		4 719 31 05 031
51	06/4/31/72	End Sealing Sheet		4 719 31 05 037
53	06/4/31/104	Angle		4 719 31 05 039
54	06/4/31/64	Rib 396x100x10tk		4 719 31 05 025
55		Angle 50x50x3.15tkx1800Lg.		
56		Angle 50x50x3.15x1560Lg.		
57	06/4/31/65	Angle		4 719 31 05 032
58		Floor Sheet 1100x495x2tk		
59		Floor Sheet 1254x495x2tk		
60	06/4/31/66	Gusset		4 719 31 05 033
61	06/4/31/108	Tie Angle		4 719 31 05 048
62	06/4/31/109	Tie Angle		4 719 31 05 017
64	06/4/31/110	Tie Angle		4 719 31 05 014
65	06/4/31/119	Pad 30x30x16tk		4 719 31 05 041
66		Spring Waser M 8x20		
67		Hex. Hd. Screw M 8x20		
68	06/4/31/124	Tie Angle		4 719 31 05 042

UNDER FRAME ASSY GROUP 31

STAGE-III (USD)		[ANNEXURE-3]		
Sl. No.	Drwawing No.	DESCRIPTION		REMARKS
1	06/4/31/23	Chegd. Plate	4 719 31 05 057	
2	06/4/31/10	Gusset	4 719 31 05 060	
3	06/4/31/28	Locking Bracket	4 719 31 05 051	
4	06/4/31/32	Side Stop	4 719 31 05 049	
5		Bear Plate 180x130x6tk		
6	06/3/31/85	Lateral Damper Bkt Assy.	3 719 31 05 021	
7	06/2/31/106	Centre Pivot Assy.	06/2/31/106	
AS PER DRG. 06/1/32/30,06/1/32/31,06/1/32/32 & 06/1/32/33 ITEM FITTED AS UNDER FRME ASSY.STAGE				
8		STEEL PLATE 10 THKx105x254		
9		STEE SHEET 3.15TKx400x820		
10	06/4/32/53	STEEL PLATE 12 THKx858x880 (DBR PLATE)	4 719 32 05 015	
11	06/4/32/54	STEEL PLATE 12 TKx331x839	4 719 32 05 014	
12	06/2/32/42	SL MTG. BRACKET (AS BELLOW)	1 719 32 05 003	
	05/3/32/216	3.15x714x980 COVER PLATE	3 719 32 05 013	
	05/4/32/271	4TKx154x550 GUSSET	3 719 32 05 048	
		4 TKx25x654 SUPPORT		
		4 TKx25x590 SUPPORT		
		4 TKx25x490 SUPPORT		
		10 TKx80x290 PAD		
		11 TKx80x105 PAD		
		12 TKx80x295 PAD		
		13 TKx80x590 PAD		
13	06/4/32/65	SUPPRT ASSY. Fr SL.	3 719 32 05 022	
		12TKx352x340 CHANNEL		
		12TKx78x166 RIB		
		10TKx65x206 RIB		
14	06/4/32/68	SUPPORT ASSY. Fr. SL	3 719 32 05 019	
		12TKx545x596 CHANNEL		
		12TKx78x359 RIB		
		12TKx78x359 RIB		
		12TKx65x196 PAD		
15	06/4/32/67	SUPPORT ASSY. Fr. SL	3 719 32 05 018	
		12TKX476x1188 ANGLE		
		12 TKX 78x378 RIB		
		13 TKX 78x378 RIB		
		10TKx65x810 PAD		
		12TKx78x238 RIB		

