Transnet Port Terminals

Ngqura Container Terminal

Document Title:
SCOPE OF WORK

Scope Of Work Title:
PROVISION TO MANUFACTURE AND SUPPLY 3x LIEBHERR STS CRANES CABLE REELS FOR TRANSNET SOC LTD (REG NO. 1990/000900/30) OPERATING AS TRANSNET PORT TERMINALS (HEREINAFTER REFERRED AS "TPT") FOR NGQURA CONTAINER TERMINAL AS ONCE OFF.

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5. INSTALLATION / COMMISIONING
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9. MANDATORY DOCUMENTS (TO BE SUBMITTED AS PART OF TENDER)

ANNEXURE - TRANSNET SPECIFICATIONS – EEAM DOCUMENTS

- EEAM-Q-006 _ Structural steelwork _ HE9/2/6
- EEAM-Q-008 _ Corrosion protection _ HE9/2/8

1. BACKGROUND

The Ngqura Container Terminal has been operational since October 2009 and is mainly used as a transhipment hub. The terminal uses various types of container handling equipment inside the port. NCT operates on the system whereby a container will be offloaded from a vessel by a Ship-to-shore (STS) Crane onto a Hauler & Trailer and then taken to the stacking area where a RTG crane or Reach Stacker will offload the container and place it in the stack.

Currently NCT have eight (x8) Liebherr Ship-To-Shore Cranes. STS 1-6 have been commissioned in 2009 and STS 7-8 in 2014. All the STS cranes are powered thought a 7kVA cable and cable reel system to be able to operate the entire STS crane.

2. PURPOSE

It is required for a contractor to manufacture and supply x3 new cable reels for the STS crane below:

Manufacturer:	***Liebherr***
Model no.	P200 L-Super
Serial no.	IR1750-55
Year	2009

Table 1: STS crane details

3. SCOPE OF WORK

3.1 Manufacture 3x (three) new cable reels as per attached drawings. ***Refer to Annexure A.***

3.2 All material to be used mild steel and with the grade S355JR+AR (SANS 50025 / EN 10025) as specified in the Transnet Structural Steel work (EEAM-Q-006). ***Refer to Annexure B.***

3.3 All paint preparation and paint work to be done as to Transnet Corrosion Protection (EEAM-Q-008). ***Refer to Annexure C.***

3.4 Paint finishing color: Orange - RAL 2008. Refer (Strictly adhere to the paint type (SIGMA), procedure and processes) ***Refer to Annexure C.***

3.5 All bolts, washers, and nuts 12mm and below must be stainless steel A4 grade.

4. PACKAGING & DELIVERY:

The successful bidder is required to package deliver each new STS cable reel to the Ngqura Container Terminal as following:

4.1 All cable reels to be split in halve sections and securely packaged.

4.2 Contractor to make use of own transport to collection and delivery.

4.3 Contractor to liaise with TPT NCT representative prior to the collection and delivery dates to ensure all necessary vehicle permits are in order.

4.4 TPT NCT will assist contractor with forklift to off-load THE cable reels.

5. INSTALLATION / COMMISIONING:

Not required by the contractor, TPT NCT will do installation.

6. TURNAROUND / LEAD TIME

Due to the business requirements at the Port of Ngqura, it is important to always have maximum equipment available to operations.

The expected turnaround lead time for the manufacturing and delivery of x3 new STS cable reels not to exceed 16 weeks upon PO award.

The bidder to confirm / acceptance in writing on a signed company letterhead that work will be completed within allocated time frame or state otherwise.

7. WARRANTY

All cable reels to carry a warranty for paintwork and workmanship, which must be a minimum of 12 months. Warranty with terms and conditions to be submitted in writing on a signed company letterhead by the bidder.

8. GENERAL CONTRACTOR REQUIREMENTS

8.1 Any unforeseen changes or amendments to discuss with TPT NCT representative before work carried out. When in doubt ask.

8.2 All work to be carried out according to Transnet specifications (EEAM documents) as follows:

- EEAM-Q-006 _ Structural steelwork _ HE9/2/6
- EEAM-Q-008 _ Corrosion protection _ HE9/2/8

9. MANDATORY DOCUMENTS (TO BE SUBMITTED AS PART OF TENDER)

9.1 Submit confirmation of lead time on a signed company letterhead as per returnable schedule T2.2-1.

9.2 Submit warranty for paint and workmanship on a signed company letterhead as per returnable schedule T2.2-2.

9.3 Submit contactable references for previous fabrication work done of industrial components in writing on a signed company letterhead as per returnable schedule T2.2-3.

ANNEXURE A – DRAWINGS.

ANNEXURE B - EEAM-Q-006 _ Structural steelwork _ HE9/2/6

ANNEXURE C - EEAM-Q-008 _ Corrosion protection _ HE9/2/8

COMPILED / SUBMITTED BY:

13.05.2024

Signature **Date:**

Name: Christo Vermeulen

Designation: Acting Technical Manager (STS & HZ)

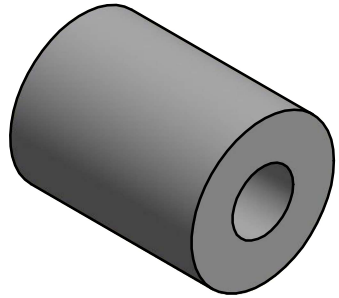
RECOMMENDED BY:

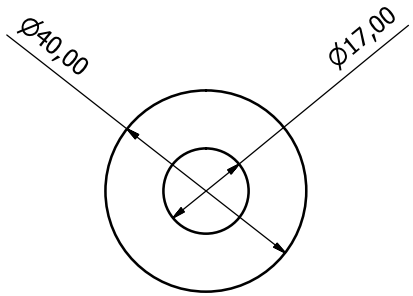
13.05.2024

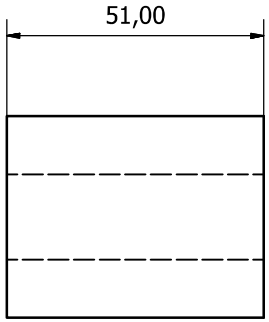
Signature **Date**

Name: Adriaan Stadler

Designation: Senior Engineering Manager







ITEM 6
31 OFF MILD STEEL

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JLR				12/07/2023	

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bush 1	Edition	Sheet
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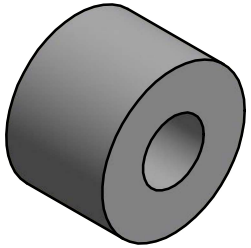

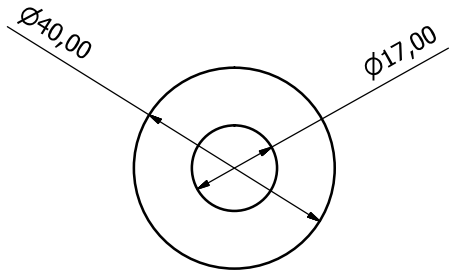

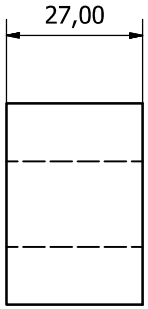

ITEM 7
45 OFF MILD STEEL

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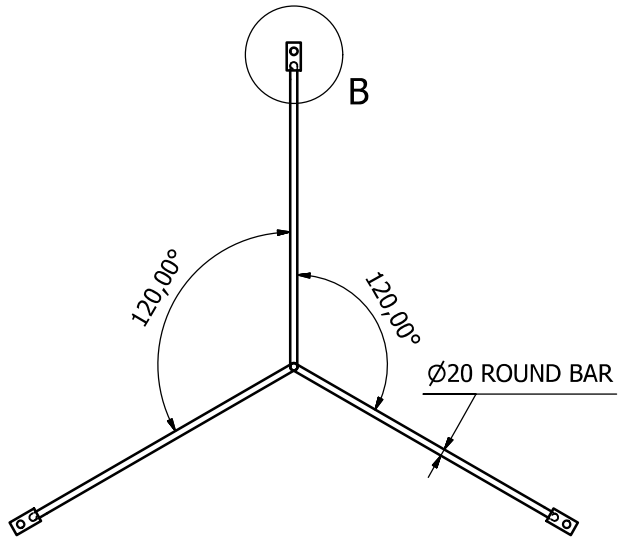

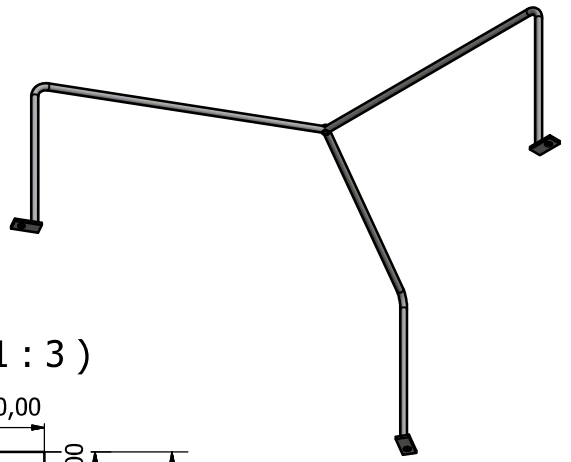

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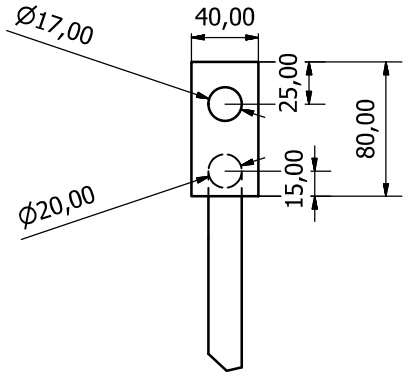

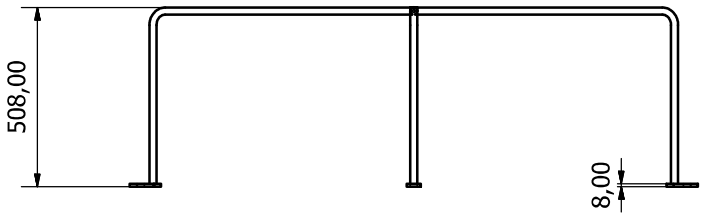

ITEM 16
1 OFF MILD STEEL

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cable support assembly

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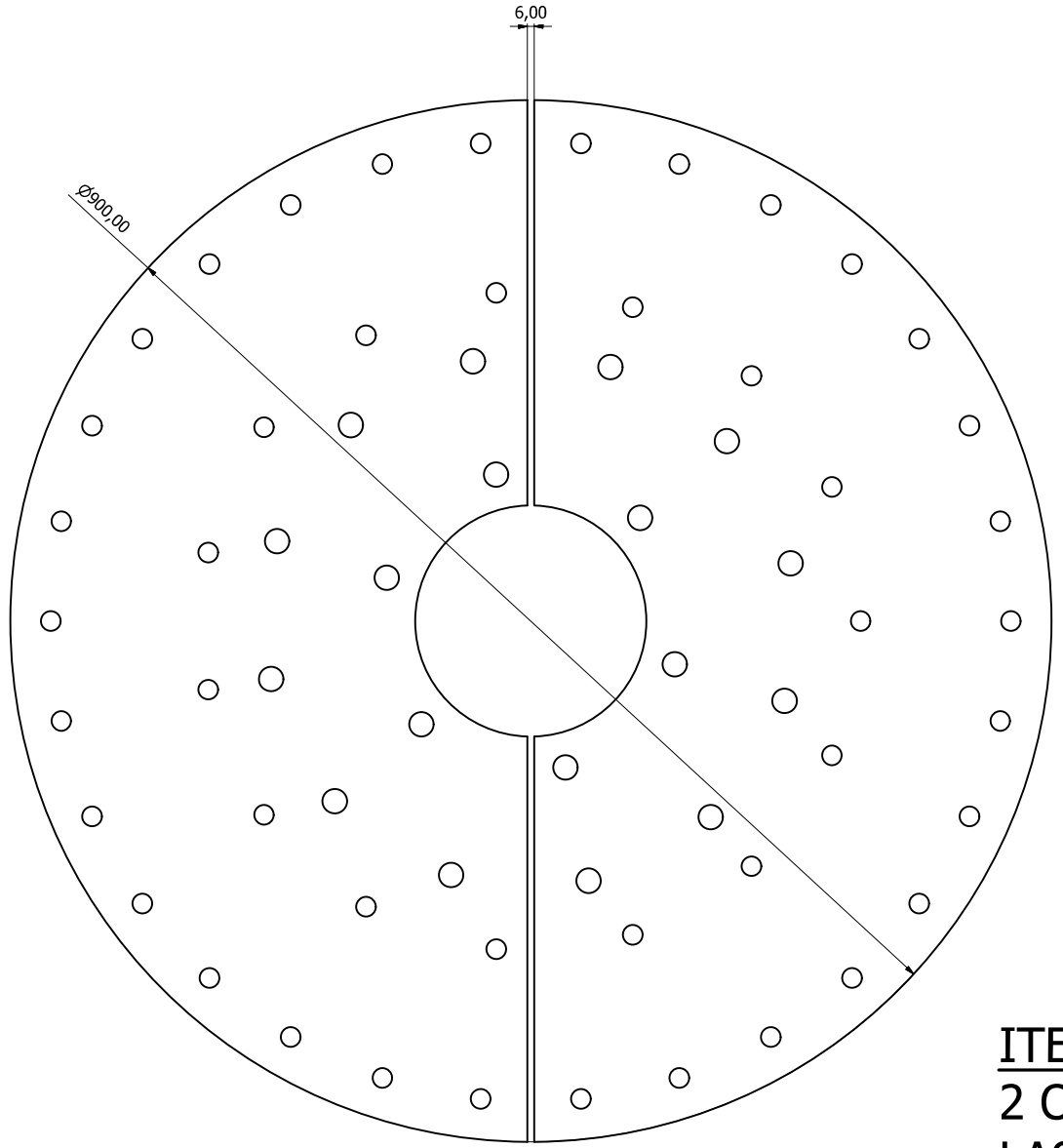

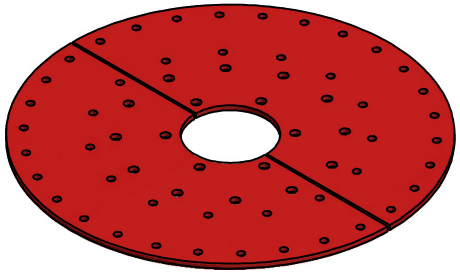

ITEM 2

2 OFF sets MILD STEEL LASER CUT ACC TO PROFILE

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flange discs

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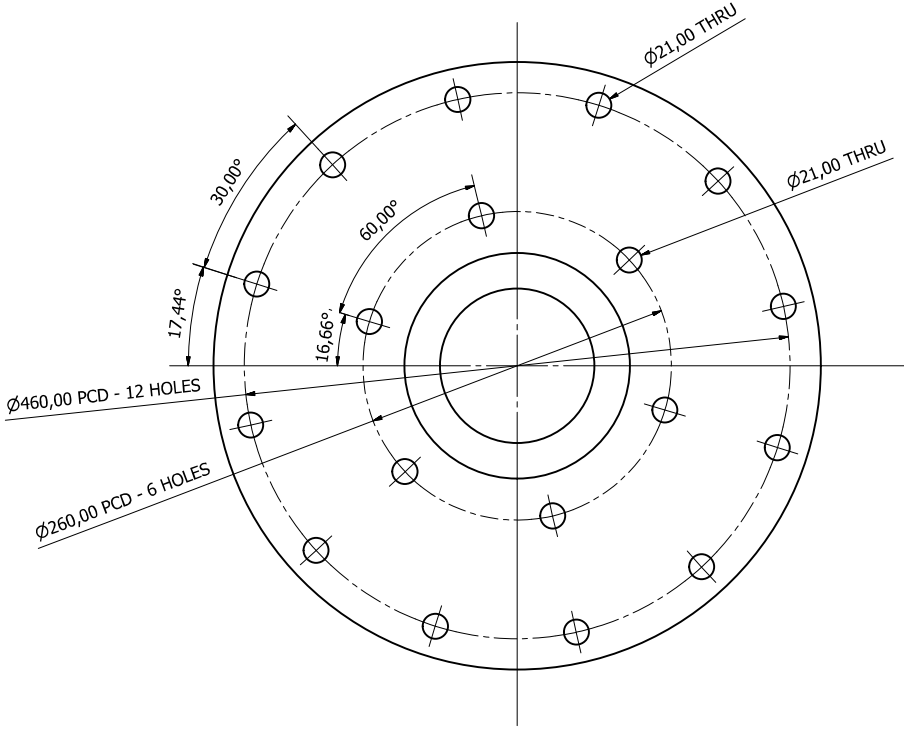
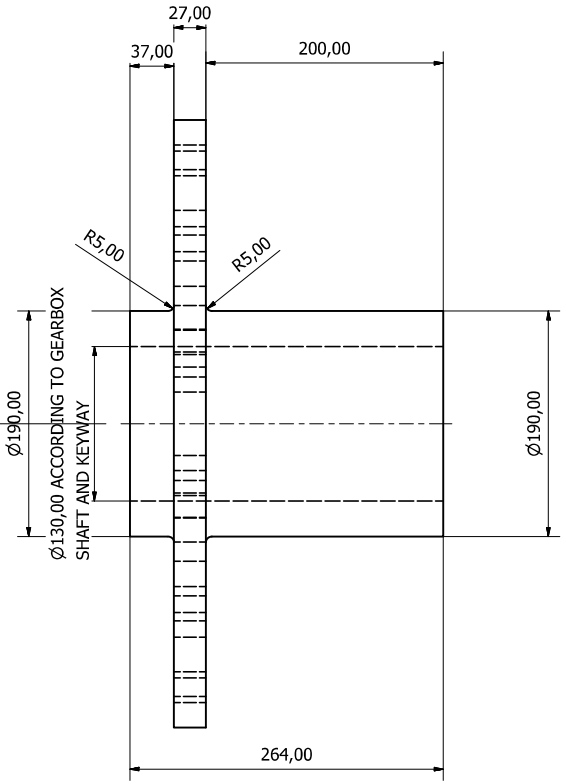
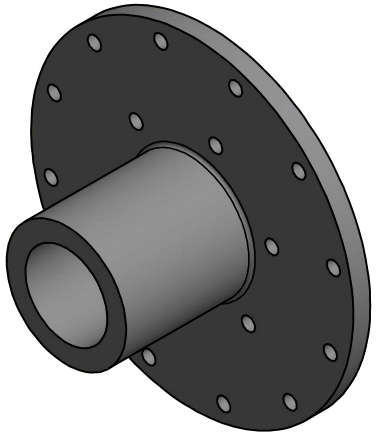
Sheet 1 / 1







ITEM 1
1 OFF MILD STEEL

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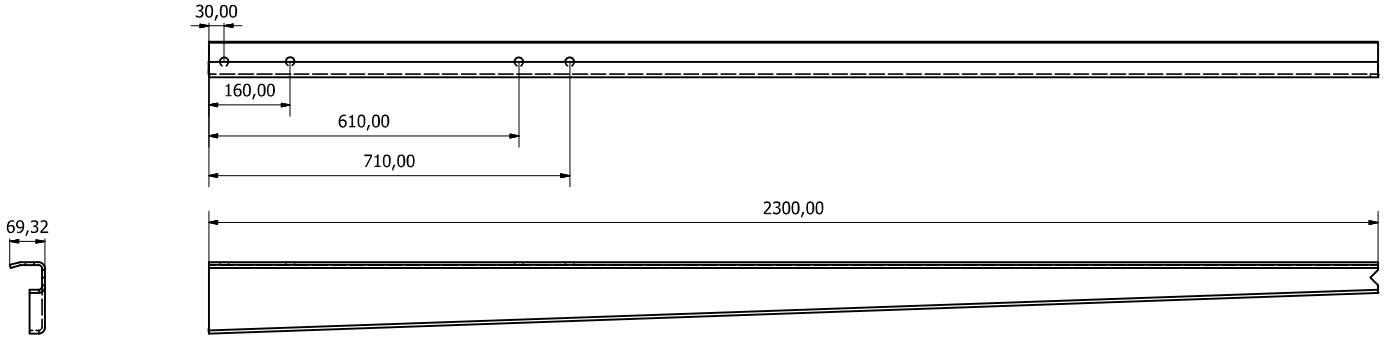
JLR					12/07/2023	
[redacted]				gearbox flange	Edition	Sheet 1 / 1



ITEM 9
- 1 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

ITEM 8
- 1 OFF 6 MM MILD STEEL PLATE
- OPPOSITE TO DRAWING

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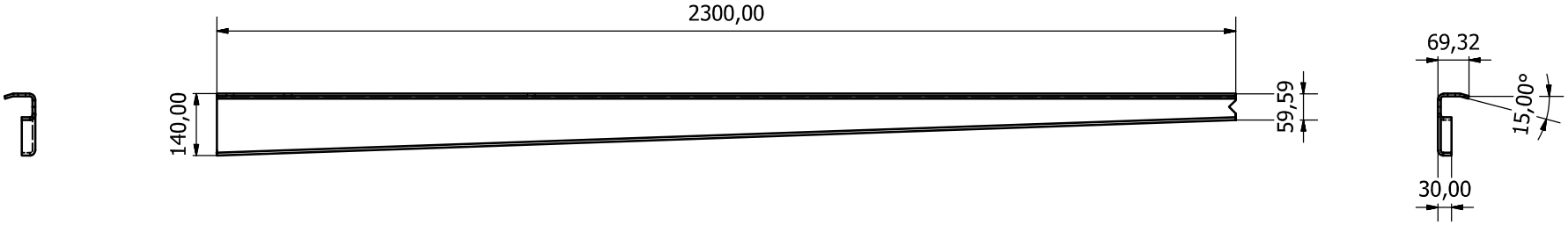
JLR					12/07/2023	

long spoke 3 hole

Edition

Sheet 1 / 1



ITEM 13
- 14 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

ITEM 14
- 14 OFF 6 MM MILD STEEL PLATE
- OPPOSITE TO DRAWING

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long spoke after bend new

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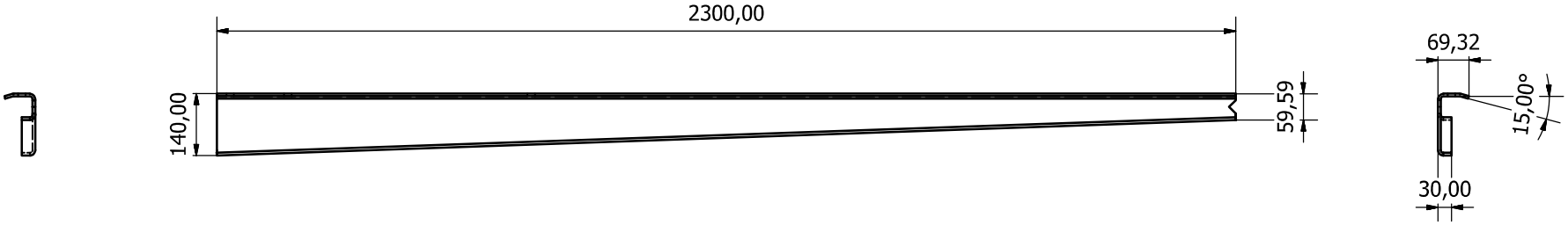

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- 14 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

ITEM 14
- 14 OFF 6 MM MILD STEEL PLATE
- OPPOSITE TO DRAWING

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long spoke after bend

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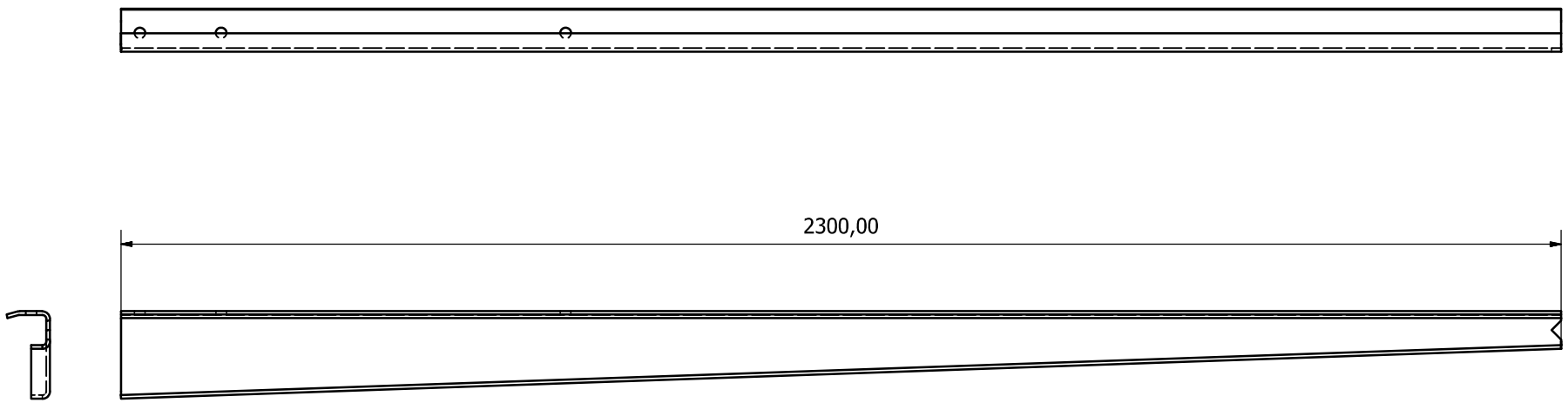

ITEM 13 - 14 OFF 6 MM MILD STEEL PLATE - ASS SHOWN

ITEM 14 - 14 OFF 6 MM MILD STEEL PLATE - OPPOSITE TO DRAWING

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long spoke

Edition	Sheet
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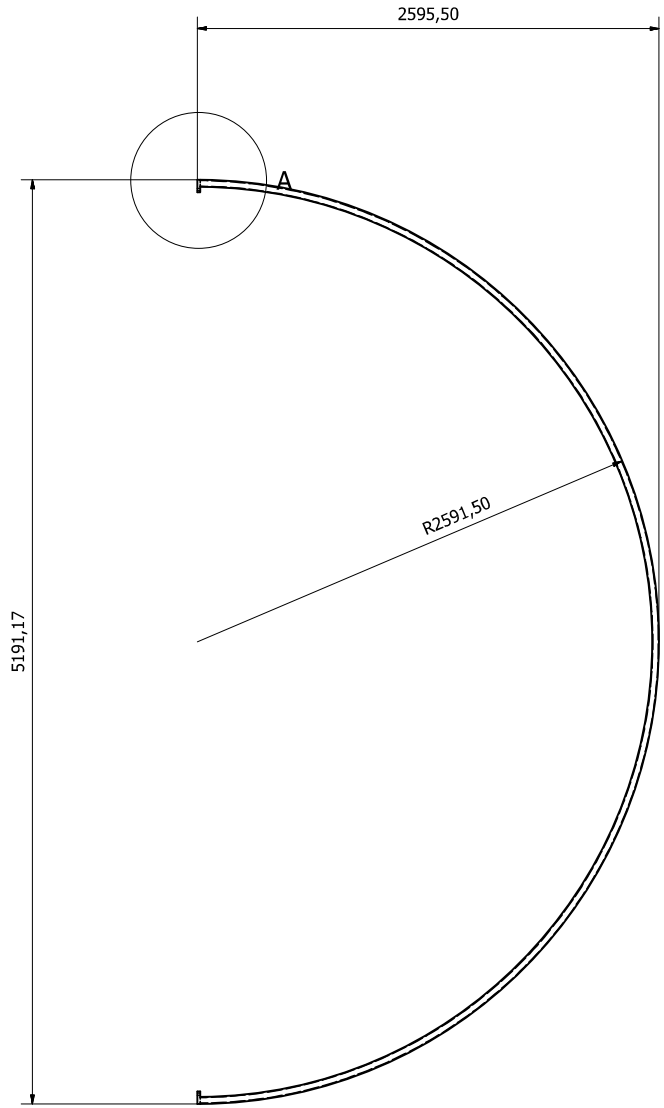

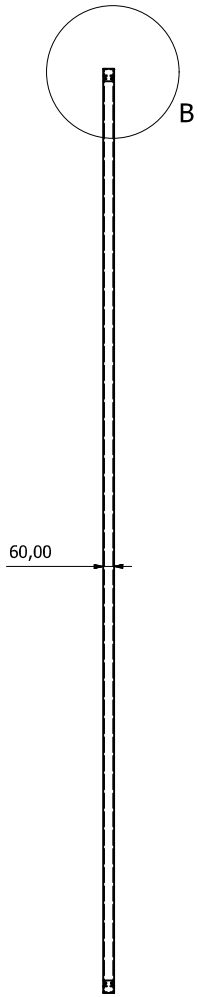

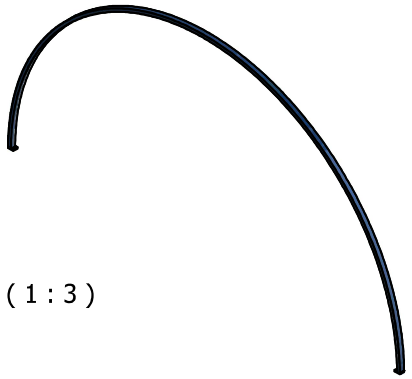

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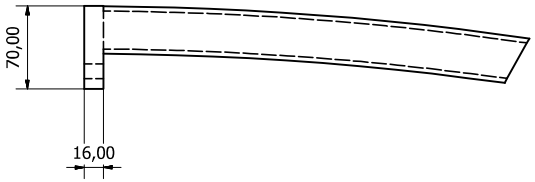

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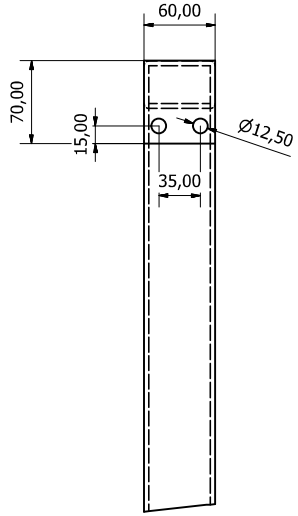

ITEM 3
4 OFF - MILD STEEL

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outer half boom

Edition	Sheet
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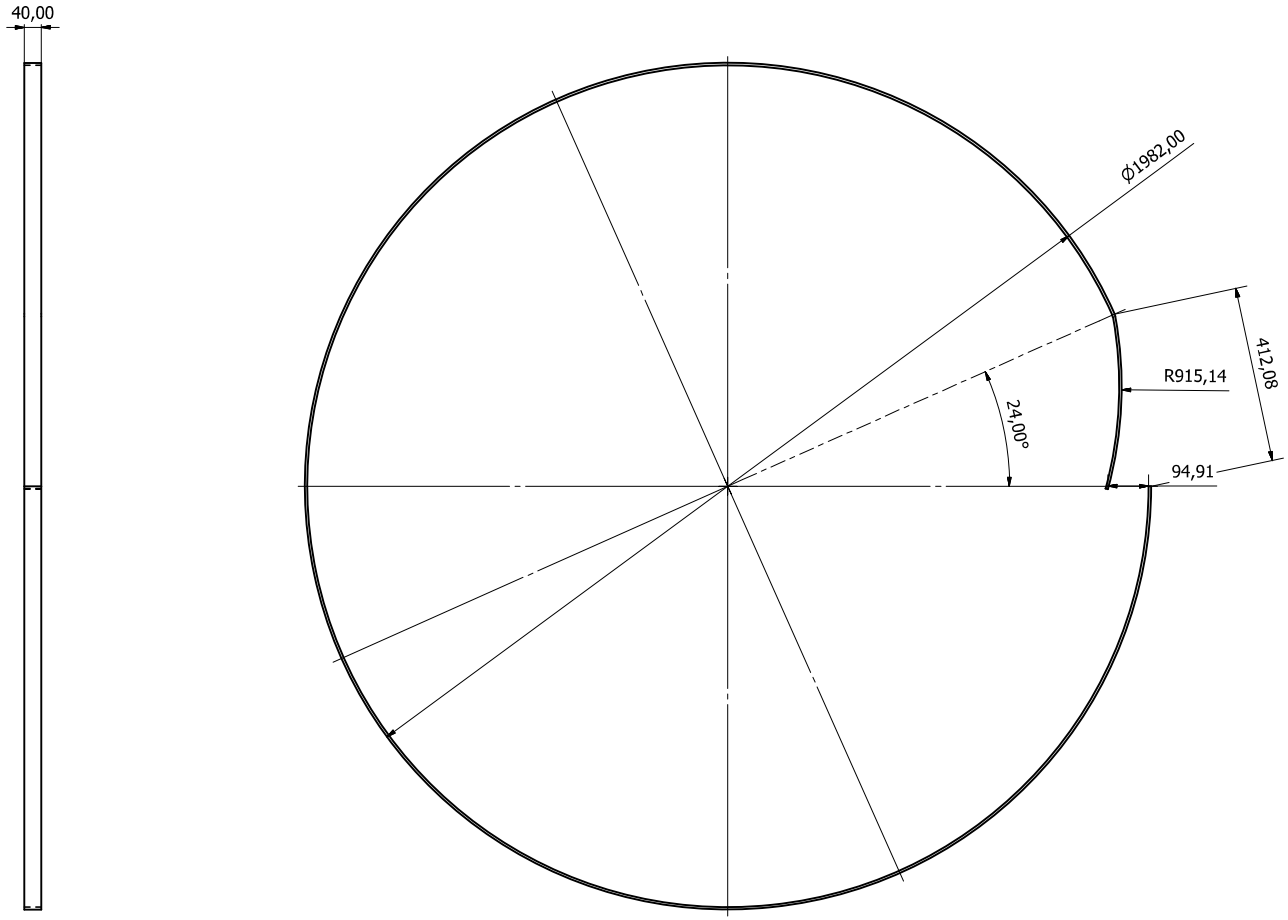

ITEM 15
1 OFF - MILD STEEL

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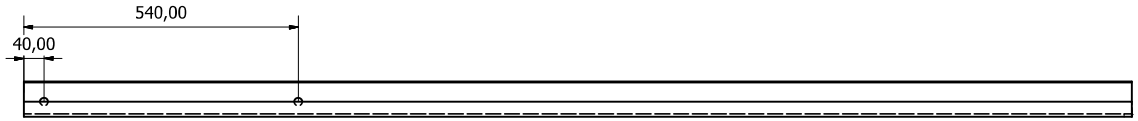

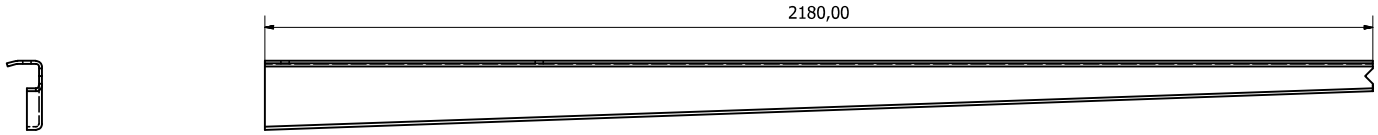

ITEM 12
- 1 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

ITEM 11
- 1 OFF 6 MM MILD STEEL PLATE
- OPPOSITE TO DRAWING

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JLR					12/07/2023	

short spoke shift holes

Edition

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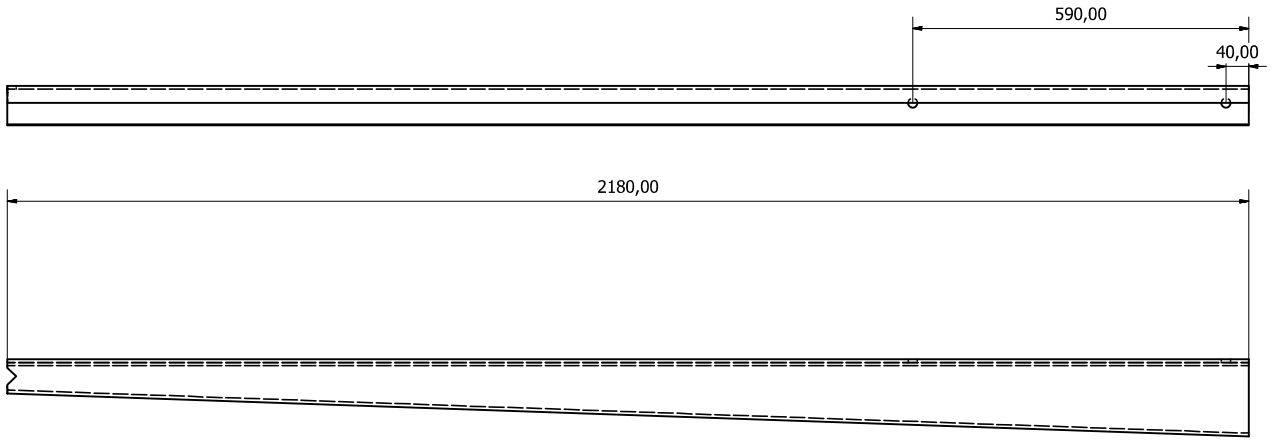

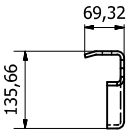

ITEM 5

- 13 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

ITEM 4

- 14 OFF 6 MM MILD STEEL PLATE
- OPPOSITE TO DRAWING

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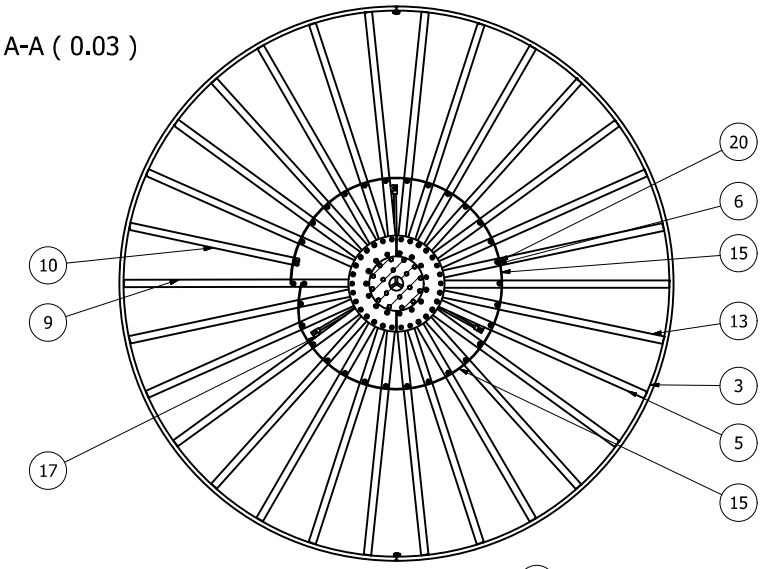
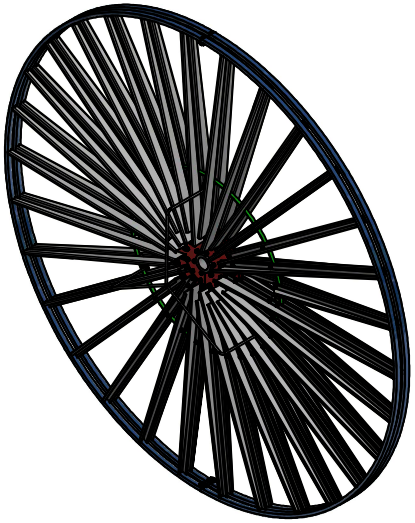
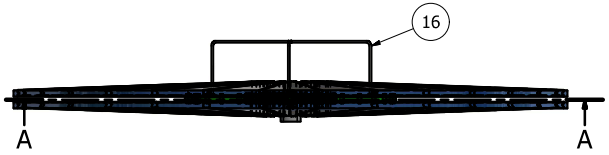
JLR					12/07/2023	
[redacted]		short spoke			Edition	Sheet 1 / 1

A-A (0.03)







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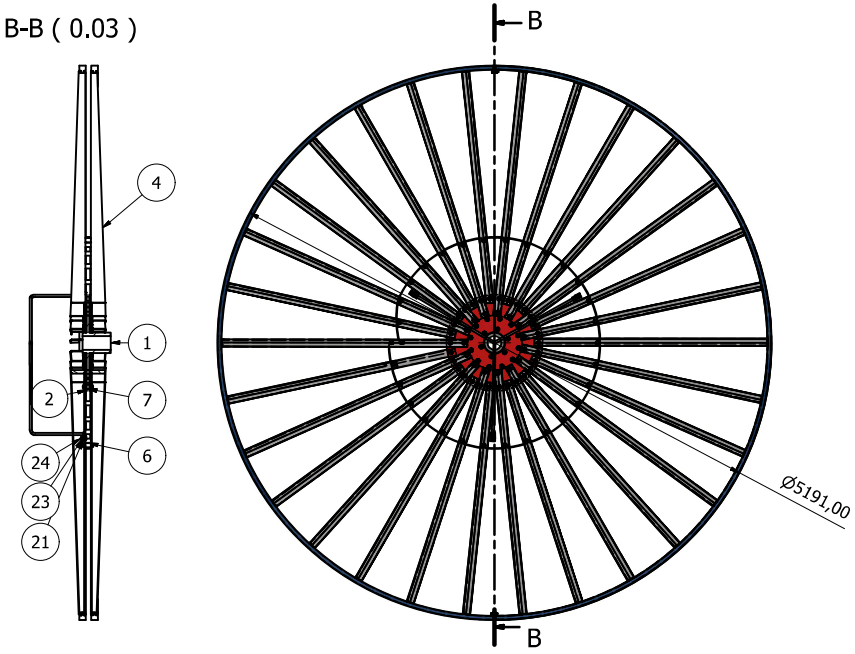

PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	gearbox flange	
2	2	flange discs	
3	4	outer half boom	
4	14	short spoke opposite	
5	13	short spoke	
6	31	bush 1	
7	45	bush 2	
8	1	long spoke 3 hole opposite	
9	1	long spoke 3 hole	
10	1	very short spoke	
11	1	short spoke shift holes opposite	
12	1	short spoke shift holes	
13	14	long spoke	
14	14	long spoke opposite	
15	1	pipe spiral	
16	1	cable support assembly	
17	3	support mouting plate	
18	18	AS 1252 - M20 x 70	High - strength steel bolts with associated nuts and washers for structural engineering
19	18	AS 1252 - M20	High - strength steel bolts with associated nuts and washers for structural engineering
20	76	AS 1111 - M16 x 80	ISO metric hexagon commercial bolts and screws
21	79	DIN 128 - A16	Spring Washer
22	45	ISO 4032 - M16	Hexagon nuts, style 1- Product grade A and B
23	34	BS 3692 - M16	Precision hexagon nuts
24	3	AS 1252 - M16 x 40	High - strength steel bolts with associated nuts and washers for structural engineering
25	8	AS 1252 - M12 x 50	High - strength steel bolts with associated nuts and washers for structural engineering
26	8	DIN 128 - A12	Spring Washer
27	8	BS 3692 - M12	Precision hexagon nuts

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Spigot assemly

Edition

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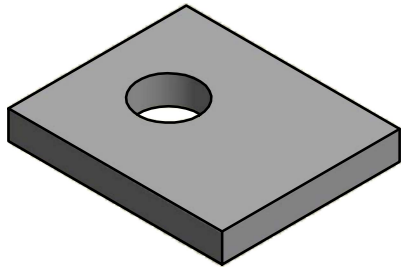

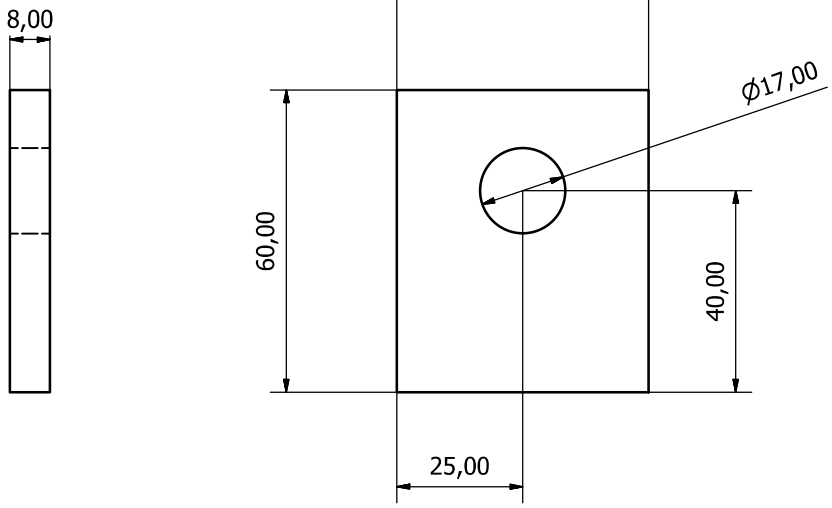

ITEM 17
3 OFF MILD STEEL

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support mouting plate	Edition	Sheet
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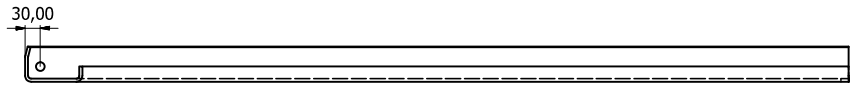

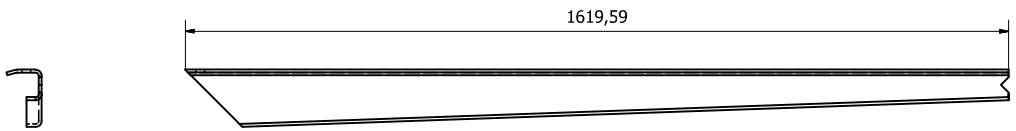

ITEM 10

- 1 OFF 6 MM MILD STEEL PLATE
- ASS SHOWN

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JLR					12/07/2023	

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very short spoke

Edition	Sheet
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REVISION	REFERENCE	TRANSNET port terminals
1	EEAM-Q-006	

DOCUMENT TYPE SPECIFICATION	AUTHORISATION DATE: Date signed by CEO

TITLE: SPECIFICATION FOR STRUCTURAL STEEL WORK	PAGE 0 of 11

COMPILED BY:	REVIEWED BY:	REVIEWED BY:
PROJECT ENGINEER (HARRY DICKINSON)	CAPITAL PROJECTS MANAGER (DAN - REDDY)	ACTING EXECUTIVE SHEQR MANAGER (RAYMOND Van ROOYEN)

AUTHORIZED BY :

GENERAL MANAGER – EQUIPMENT ENGINEERING & ASSET MANGER (HAMILTON NXUMALO

FUTURE REVISION RECORD NUMBER	DESCRIPTION OF REVISION	APPROVAL	DATE
			09/ 2005
-2-	5.0 FASTNERS		

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STRUCTURAL STEELWORK **SPECIFICATION HE9/2/6 [Version 9] February 2005**

1. SCOPE

1.1. This specification covers TPT's requirements for the design, manufacture and erection of structural steelwork for dynamic structures like cranes, including associated components.

2. GOVERNING CODES AND STANDARDS

ANSI/AWS D1.1 :	Structural Welding Code - Steel
BS-EN 287 Part 1 :	Approval testing of welders/fusion welding
BS-EN 288 Part 3 :	Specification and approval of welding procedures for metallic materials
BS 5135 :	Metal arc welding of carbon and carbon manganese steels
BS 4360/SABS 1431:	Weldable structural steel
BS 2573 : Part 1 :	Classification, stress calculations and design of structures
BS 3923 :	Methods for ultrasonic examination of welds
BS 2600 :	Radiographic examination of fusion welded butt joints in steel
DIN 1026	Metric channels
ISO R657	Angles
SABS 094	The use of high strength friction grip bolts and nuts
SABS 135	ISO metric bolts, screws and nuts (hexagon and square) (coarse thread free fit series)
SABS 136	ISO metric precision hexagon-head bolts and screws, and hexagon nuts (coarse thread medium fit series)
SABS 435	Mild steel rivets

3. STRUCTURAL STEELWORK

3.1. The design of all structural steelwork shall be such as to provide a robust and rigid structure requiring the minimum of maintenance and providing a long service life.

3.2. In the design of steel structures, due cognisance shall be taken of environmental and wind load conditions as specified in the main specification.

3.3. Due to the highly corrosive conditions experienced in Transnet Port Terminals, the permissible stresses shall not exceed those set out in British Standard No. 2573. The minimum thickness of steel for load bearing members shall be 15mm for gussets, 10mm for angles, tees, plates and flats and 9mm for webs of channels and joists. Punching of holes over and above that permitted in BS 2573, shall not be permitted. Other structural steel shall be of not less than 6 mm thickness.

3.4. The design of mobile structures shall be such that the induced von Mises stress (effective stress in triaxial loading) will not exceed 90% of the elastic limit strength of the steel when the equipment is travelling at maximum speed and colliding with either other stationary equipment or fixed stop blocks. In calculating von Mises stresses, due cognisance must be taken of stress concentrations. If the elastic limit strength of the steel is not known, it will be determined by using a 0,5% strain offset on the stress-strain curve of the material.

3.5. Where applicable, the design may be in bolted, riveted or welded box construction except that no site welding will be permitted in the final erection at the port except with the approval of TPT's.

3.5.1. Alternatively, a welded hollow section lattice type structure will be acceptable, subject to the following requirements:

3.5.1.1. The members must be structural sections manufactured from grade 43C/grade 300W weldable structural steel complying with BS4360/SABS1431. The hollow sections can either be seamless for all sizes (BS6323HFS) or welded for sizes above 114.3mm outside diameter (BS 6323HFW).

3.5.1.2. Tube wall thickness must not be less than 6mm.

3.5.1.3. All joints must be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into hollow section members by ensuring that each member is airtight.

3.5.1.4. Bolted or screwed attachments which require drilled holes through a hollow section will not be permitted.

3.5.1.5. Non-hollow structural sections and plate used on the structure, in conjunction with the hollow section framework, must comply with the relevant requirements of this specification.

3.6. All steel sections shall be manufactured in accordance with the following standards: -

Weldable structural steel :	BS 4360/SABS 1431
I and H sections :	BS 4 Part 1
Metric channels :	DIN 1026
Structural steel, hot rolled sections :	BS 4 Part 1
Angles :	ISO - R657
Hot finished hollow sections :	BS 4848 Part 2
Cold formed sections :	BS 6363
Forgings :	BS 29
Steel castings :	BS 3100
Cast iron :	BS 1452

3.7. All steel plates and rolled steel sections used in the construction of the structures shall be of steel made by the open hearth process (acid or basic) and shall comply in every respect with BS 4360, "A" quality Structural Steel for Bridges and General Building Construction, Grade 43A or Grade 50B. That is, the percentage of phosphorous and sulphur shall not exceed 0,06.

3.7.1. The above is laid down as a standard, but tenders will also be considered for rolled steel not conforming strictly to the above standard. Full particulars of the guaranteed properties of the steel tendered for should in this case be furnished, i.e. chemical composition, tensile strength, yield point, reduction in area, bend tests, etc.

3.8. Forgings and drop forgings shall be free from flaws and surface defects of any kind and be accurately finished to the prescribed dimensions.

3.9. Steel castings shall be sound, clean and free from all defects and distortion of any kind and should, except where otherwise specified, conform with the conditions and tests specified in B.S. No. 3100/Latest Edition, for grades A, B and C according to requirements. They shall be thoroughly annealed and all working parts and bearing surfaces shall be machined and turned accurately with correct finish.

3.10. Cast iron used throughout must be close grained, tough and free from all defects, and shall conform with the conditions and tests specified in B.S. 1452/Latest Edition, for grades 12 to 14 according to requirements.

This applies to functional components only. A lower grade is acceptable for portal and machinery house ballast. Tenderers to state grade of cast iron proposed.

3.11. The dimensional and out-of-square tolerance as specified in the above Standards shall also apply to built-up components. Edge preparations, welding techniques, straight beds and material fit-up shall be considered when welded joints are designed.

3.12. The shape of all members and connections must allow easy accessibility for maintenance painting of all surfaces. No members shall comprise a double member which cannot be painted and maintained.

3.13. Structural details must be so designed as to eliminate or seal off any cavities or pockets where water or condensation could collect and promote corrosion. Horizontal members with upstanding flanges require special drainage.

3.14. All hollow sections shall be completely closed and airtight, and all welding is to be of such size and quality as to ensure complete airtightness. No tapping or drilling of holes into sealed sections will be permitted.

4. WELDING

4.1. All the provisions of BS 5135 shall be complied with as far as applicable.

4.2. Design of weld joints shall be such that crevices, overlaps, pockets, arc strikes and dead ends do not exist.

4.3. All joints shall be completely seal welded in accordance with BS 5135. Special care must be taken to prevent the ingress of moisture into the tubular members by ensuring that each such tubular member is airtight. “Stitch” welding will not be permitted. Only continuous welding will be accepted.

4.4. Weld cracks, undercut, or pock marks will not be accepted.

4.5. All welds on the load bearing frame structure, containers, piping, pipe line flanges, etc., shall be continuous and shall be visually inspected for cracks and other discontinuities.

4.6. Welds on the main chords must be tested ultrasonically in accordance with BS 3923 or X-rayed in accordance with BS 2600 and those on minor joints by the dye-penetrant method. The equipment required for these tests must be supplied by the Contractor and the testing done at his cost.

4.7. Steel, except in minor details, which has been partially heated, shall be properly annealed. (Electrically welded structural members excepted.)

4.8. All brackets, clamps, lugs, straps, suspenders, etc. required for attaching mechanical and electrical equipment must be welded on prior to erection and special precautions must be taken not to damage welds or puncture tubes during erection.

4.9. The welding of all rails shall be done by an approved method.

4.10. Welding shall only be carried out by a coded welder according to SABS 044, BS-EN 287 Part 1 and BS-EN 288 Part 3 or ANSI/AWS D1.1.

4.11. All parts to be welded shall be thoroughly cleaned and dried before welding. The welding will only be done in dry surroundings and all steps taken to prevent hydrogen embrittlement.

4.12. Where materials of different compositions are joined by welding, especially carbon steel to chrome steel, the filler welding method and post welding treatment shall be such that embrittlement and other degradation of both steel and filler are prevented.

4.13. It must be ensured that welded joints are ductile.

5. FASTENERS

5.1. All bolts, nuts and rivets shall be manufactured in accordance with the following standards: -

Commercial bolts and nuts Grade 4,6:	SABS 135
Precision bolts and nuts Grade 8,8:	SABS 136
Friction Grip Bolts and nuts Grade General:	SABS 094
Rivets:	SABS 435

5.2. All fasteners (excluding friction grip) shall be hot dipped galvanised (and their nuts and washers), structural rivets and Huck Bolts.

5.2.1. All holding down bolts and nuts and brackets, as well as all fixing bolts, washers, studs and nuts, less than 12mm diameter shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

5.3. Bolts and setscrews shall be locked in an approved manner and shall not be stressed in tightening to beyond the recommended loads.

5.4. The quality of friction grip bolts, nuts and washers, bolt lengths, sizes of holes, tightening standards, surface condition of clamped components, shop and site assembling and acceptance inspection of friction grip joints shall comply with the latest edition of SABS 094. Certificates shall be supplied for all bolts of grade 8.8 and 10.9.

5.5. All bolt and rivet holes must be accurate to size and location, the centres of holes shall not be placed nearer the edge of a plate than 1,5 diameters with an extra allowance of 3mm for sheared edges. All holes in the structural work shall be drilled or otherwise punched to a diameter not exceeding 1,5mm less than the diameter of the finished hole on the die side, and afterward reamed out to the exact size

Where possible the adjoining parts forming a connection shall be drilled or reamed together, with holes not exceeding 1,5 mm diameter the rivet or bolt for which it is made. No rough or broken edge shall be left around any of the holes.

5.6. For turned and fitted bolts, the holes shall be accurately drilled or reamed, the diameter of the hole shall not exceed the finished diameter of the bolt by more than 0,25mm.

5.7. The holes, after assembly of the parts, shall be true throughout the thickness of all the parts and perpendicular to the axis of the member.

5.8. Rivets shall be cup-headed or countersunk as required, unless otherwise specified. No rivet head shall contain less metal than does a length of the rivet equal to 1,25 times its diameter. All loose and defective rivets shall be cut and replaced by sound ones; also others when required for the purpose of examining the work. Rivets shall be driven with pressure tools whenever possible and pneumatic hammers shall be used in preference to hand driving.

5.9. All field rivets must be supplied with shanks of suitable length for pneumatic riveting.

5.10. Bolts shall be of such length as to accommodate a full nut and washer when tightening up, and protrude a maximum of 3 thread pitches beyond the nut. Excessive projection of threads beyond the nut must be avoided. Bolts that are flush or under top of nut are not acceptable.

5.11. All bolts having countersunk heads shall have strong feathers forged on the neck and head to prevent turning and the bolt holes shall be cut to receive same. All nuts and bolts (excluding countersunk bolts) shall be furnished with circular washers of sufficient thickness, the outside diameter being at least twice the nominal diameter of the bolt, and washers fitted correctly.

5.12. Where bolt heads or nuts are seated on bevelled surfaces of beams or channel flanges, bevelled washers must be inserted.

6. JOINTS AND MATING SURFACES OF MEMBERS

6.1. Mating surfaces of members to be joined by high tensile steel bolts in friction grip shall be cleaned and primed as specified for the rest of the steelwork. Mating surfaces shall lay flat against each other to eliminate gaps which may allow ingress of water. After joining, the edges shall be sealed with an approved brand of Butyl/ Rubber sealing compound by means of a suitable caulking gun, or shall be seal welded.

6.2. Other joints shall be formed by one of the following methods:

6.2.1. The mating surfaces of members shall be blast cleaned, primed and protected prior to sub-assembly by the liberal application of caulking compound. While the compound is still wet, the members shall be bolted together and caulking compound which is squeezed out shall be completely removed.

6.2.2. The mating surfaces shall be protected with the full corrosion protection system as specified, the surfaces joined together and the joint so formed shall be sealed with butyl rubber sealer.

6.2.3. After being cleaned and primed the surface shall be joined together and the joint so formed shall be seal welded.

6.3. The primer coating on mating surfaces must be applied not more than 4 hours after cleaning and the edges must be sealed within 3 weeks of assembly of the part.

7. FABRICATED PARTS

7.1. All fabricated parts shall be properly fitted during assembly to result in properly aligned equipment having a neat appearance. Fabrications of load bearing members shall have no abrupt changes in cross section and regions of severe stress concentration. All sharp corners accessible by personnel during erection or operation shall be ground, rounded, or removed by other methods. Burrs, welding spatter and stubs of welding wire shall be removed.

8. BALLAST OR COUNTER MASS

8.1. Tenderers must include for the supply of all necessary ballast or counter mass.

8.2. These must preferably be of cast iron and be removable for maintenance of structural steelwork.

8.3. Concrete ballast is not recommended but will be accepted provided the Tenderer satisfies TPT that it will not cause corrosion of any steel parts.

8.4. Fastenings used for removable pieces must be of non-corrosive material.

8.5. Ballast must be in suitable shapes to be secured in position against movement but in sizes easily removable for maintenance.

8.6. Lifting hooks or eyes of non-corrosive material and of adequate strength must be provided in the removable ballast pieces.

8.7. Concrete ballast must be reinforced so as to prevent cracking or breaking, and must be coated with an approved corrosion protection system for concrete.

9. STAIRS, LADDERS, PLATFORMS AND WALKWAYS

9.1. Platforms, stairways, walkways, hatches and ladders, shall be provided where necessary to give easy access to all parts of the equipment for inspection, maintenance and lubrication purposes (including the insides of all box sections if inspection covers are provided).

9.2. The hand rails and ladders shall be complete with stanchions, knee rails, back hoops, mounting brackets etc. and shall be manufactured in

sections which are hot-dipped galvanized and painted and bolted onto the structure.

9.2.1. The handrail shall have a minimum diameter of 25mm and shall not be less than 1 050mm above the platform level. Toe boards shall not be less than 150mm high.

9.3. Stairs shall be inclined no more than 45° to the horizontal and shall be broken at suitable intervals by platforms.

9.4. Stairs and walkways shall not be less than 700 mm wide and working areas around drives etc. shall be of sufficient size to allow for ease of maintenance.

9.5. Vertical ladders must be provided with back hoops.

9.6. Trap doors and hatches must be of light, but robust, construction, suitably hinged with stainless steel hinges and provided with a catch to keep them in the open position, if necessary. Trap door openings are to be protected by means of toe boards and removable handrails.

9.7. All external platforms, stair treads and walkways shall be hot dipped galvanised open grating construction, similar to Andrew Mentis "Rectagrid" type RS40 to allow for free drainage and avoid the accumulation of water and dust. Bearer bar thickness shall not be less than 4,5 mm. The top surface shall provide for adequate grip to avoid underfoot slipping.

9.8. TPT's prior approval is required for all external platforms and walkways where open grating cannot be used. This will only be permitted where the primary purpose of the walkway/platform is for maintenance purposes. All such surfaces are to be provided with a non slip surface coating.

9.9. No obstructions or sudden changes in levels will be permitted on walkways.

10. MACHINERY AND ELECTRICAL HOUSES AND OPERATOR'S CABINS

10.1. Where required, separate, self contained fully weather proof machinery and electrical houses as well as operators cabins shall be provided. The houses shall be of the steel framed metal clad type, and shall allow ample space and strength for all equipment and control panels housed therein, permitting unrestricted access to all equipment for routine service and maintenance. Headroom shall not be less than 2,13 metres. A minimum of 700mmm working space must be provided around all machinery and in front of all panels.

10.2. The major items of machinery, electrical equipment and panels shall be so arranged that it can be removed for repairs or replacement without disturbing the walls, roof, floor or structural framework and furthermore shall be so arranged that full access to all holding down bolts is provided from inside the house.

10.3. For electrical houses both the inner and outer cladding must be stainless steel, unless otherwise approved. Side cladding plates are to be joined with butting joints with butt cover straps where required (no lap joints), and the plates must be in as large sizes as practicable to reduce the number of vertical joints, and to eliminate horizontal joints. Alternatively cladding may be welded to the frame and all joints completely seal welded. All angles around windows are to be suitably joggled to obtain a waterproof and flat surface butting on the side sheets. The whole of the framing shall be well stayed and fixed on its base. Air-conditioned electrical houses shall be provided with thermal insulation material of an approved type between the cladding.

10.4. Machinery houses must be cladded with prepainted Aluminium sheeting, minimum thickness 0.8 mm, colour coated with the appropriate colour. The profile and fastenings must be suitable for the spans and wind uplift forces corresponding to the windspeeds stated in the main specification. Flashing, corner trim, closure pieces ridge cappings etc. shall consist of prepainted Aluminium of minimum thickness 1.2mm

10.4.1. Sheeting fasteners shall be 6.3 mm grade 304 stainless steel self-tapping screws with hexagonal washer heads.

10.4.2. Galvanic isolation rubber strips shall be used between the metal frame and Aluminium cladding.

10.5. Both machinery and electrical houses shall be provided with two access doors, sealed to suit pressurisation and/or air-conditioning, one on each side of the house, arranged for external locking, but allowing exit from the inside without a key. Rain guards must be provided above external doors.

10.6. Operator's cabins shall be fully constructed from 3CR12 or similar type stainless steel. Cladding shall be welded to the frame and shall be smoothed over to provide an aesthetic appearance. The cabin shall be insulated from the heat of the sun with an approved material. A stainless steel or similar material door with a robust industrial type door lock shall be provided. The door must be lockable from the outside, but must allow exit without a key from the inside.

10.7 All windows shall be of solar heat reducing toughened safety glass.

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END OF SPECIFICATION HE9/2/6 [Version 9]
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1. SCOPE

1.1. This specification covers Transnet Port Terminals requirements for protective coating of iron and steel structures, electrical motors, gear boxes etc. against corrosion and must be read in conjunction with the main specification as well as the following (latest editions):-

SABS 064	"Preparation of steel surfaces for coating"
SABS 763	"Hot-dip (galvanized) zinc coatings"
SABS 1091	"National colour standards for paint"
BS 5493	"Code of practice for protective coating of iron and steel structures against corrosion"

2. TYPES OF CORROSION PROTECTION TO BE USED

2.1. The coatings specified in this specification are chosen according to BS 5439, Table 3, part 9, to ensure that the condition of the surface will be at least RE2 on the European scale of degree of rust, after 10 years in a environment of frequent salt spray, chemicals and polluted coastal atmosphere. During the 10 years, the normal maintenance painting will be done.

2.2. The paint manufacturer shall guarantee the paint for at least 10 years.

2.3. Should a tenderer wish to offer coating systems other than those specified, as an alternative, he shall submit full technical details and a list comparing all appropriate details of the alternatives proposed, with the original specified.

2.4. Tenderers must ensure that the different coats they offer in their tenders are compatible with each other.

2.5. The coating of proprietary items must be done according to Clause 3.

2.6. All galvanized components including bolts and nuts but excluding walkway gratings, must be painted with the specified system, unless otherwise approved.

The following coating systems must be used unless otherwise specified in the main specification:-

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
3CR12 steel	1	Surface tolerant epoxy primer	DULUX /SIGMA Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX / SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75
Galvanized Steel	1	Surface tolerant epoxy primer	DULUX /SIGMA- Sigmacover primer INTERNATIONAL (PLASCON) Intergard 269 STONCOR (CHEMRITE COATINGS) Carboline 193 Primer	65-75
	2	Two component recoatable, polyurethane finish (Gloss)	DULUX /SIGMA- Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

Substrate	Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
Mild steel	1	Two component self curing inorganic zinc ethyl silicate OR two component zinc rich polyamide cured	DULUX /SIGMA- Sigma MC60 OR Sigma-cover primer	65-75

		epoxy primer	INTERNATIONAL (PLASCON) Interzinc 233 OR Interzinc 52 or 53 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11 OR Carbo-line 658 Primer	
	2	Flexible recoatable high build polyamide cured MIO epoxy	DULUX/SIGMA – Sigmacover CM MIO INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	125-150
	3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

2.7. The paint manufacturer's recommendations for the application of the different coating systems, curing time before handling or application of subsequent coats, health and safety recommendations etc. must be carefully adhered to.

2.8. Paint contractors must have a quality management system which must be submitted to the Engineer for approval before commencement of the work.

2.9. Galvanizing shall be done to SABS 763 heavy duty hot dip galvanizing to a thickness of at least 85μm. Electroplated components in zinc or cadmium are not acceptable.

2.10. All mounting bolts, nuts, washers and brackets as well as all fixing bolts, studs nuts and washers shall be of stainless steel. Fixing rivets shall be of either stainless steel or brass.

2.11. High tensile bolts for friction grip joints must not be galvanised and must be primed and painted after installation. High tensile bolts must be certified.

2.12. The full paint system shall be applied to all surfaces which are to be covered with wear pads, linings etc.

2.13. For steelwork which will be transported over long distances and erected on site the two pack epoxy primers is preferred.

3. PROPRIETARY ITEMS

3.1. Proprietary items such as gearboxes, motors, brakes etc. must either be painted according to this specification or where the coating system is equal to or exceeds this specification sufficient proof of the coating system applied must be provided. Items which are nearly equal to this specification shall be given a finishing coat according to this specification's thicknesses and final colours and to the following procedure:-

3.1.1. A cross cut test must be done to SABS SM159 to determine if the original coating adheres correctly to the substrate;

3.1.2. The original coating shall be rubbed down to remove any smooth finishing to form a suitable key for the finish coat and any damaged areas prepared and patch primed with a suitable primer;

3.1.3. The item must then be detergent washed to remove any foreign matter, taking care that no dust, solvent etc. contaminates any working part of the item;

3.1.4. A test shall be done on the existing coat to ensure that the finish coat will not react with and cause undue dissolving and lifting of the existing coat. This can be done by applying a small quantity of the finishing coat thinners.

3.1.4.1. Should any undue dissolving or lifting occur, a suitable intermediate or barrier coat must be applied before the finishing coat is applied.

3.1.5. Proprietary items which failed the cross cut test and which generally have inadequate protection shall be dismantled and the full corrosion protection specification applied.

4. SURFACE PREPARATION

4.1. All steel surfaces shall be detergent washed and fresh water rinsed to remove all oil, grease and surface contaminates before shot blasting.

4.2. Sharp edges shall be radiused and major roughness of welds shall be removed by grinding. Welding spatter and flux shall be removed.

4.3. Components manufactured from hot rolled steel sections and steel plate shall be blast cleaned to base metal in accordance with SABS 064 grade SA2½ - very thorough blast cleaning, to remove all mill scale, rust, weld spatter etc.

4.3.1. "Sharp" chilled iron shot, chilled iron grit, or granular abrasive slag is to be used to produce a proper degree of surface roughness.

4.3.2. Blast profile shall be determined by micrometer profile gauge, Keane-Tator surface profile comparator or Testex press-o-film.

4.3.3. The profile height shall be between 40 and 50μm at any point.

4.4. Good quality blast cleaning and spray painting equipment shall be used. Air used for spraying and blast cleaning shall be free from all traces of oil, water and salinity. Water and oil traps must be fitted to all equipment.

4.5. Wheel abrading equipment shall not be used unless an angular profile the same as clause 4.3.3 is achieved.

4.6. When wet blasting is done the primer shall be applied before oxidization starts or surface contamination occurs.

4.7. Components manufactured from 3CR12 steel shall be lightly abraded. The components shall then be passivated by using a mixture of 10 - 15% nitric acid in water which is rinsed off after 10 - 15 minutes. The surface shall be neutralized to pH 7 before it is coated.

4.8. Hot-dip galvanized components, galvanized bolts and nuts etc. shall be lightly abraded with a galvanizing pre-cleaner. The components shall then be washed with detergent and water and washed down with clean water until a water break free surface is achieved. Allow to dry thoroughly.

5. JOINTS AND MATING SURFACES OF MEMBERS

5.1. Mating (faying) surfaces of members which have to be joined by high tensile steel bolts in friction grip shall be cleaned according to Clause 4 and painted with primer only.

5.1.1. After being assembled joints so formed shall be seal welded and painted or after the intermediate coat was applied the edges shall be sealed with an approved brand of paintable flexible sealant or mastic (e.g. Butyl rubber, polyurethane sealer or two component epoxy), by means of a suitable caulking gun.

5.2. All rivets, bolts, welds, sharp edges etc. must be covered with a "stripe coat" of the primer or intermediate coat specified to ensure the correct dry film thickness on sharp edges, as well as sealing of bolt threads to head etc.

5.3. All other mating surfaces must be sealed with an approved brand of flexible Butyl rubber, paintable Silicone, polyurethane sealer or two component epoxy sealer, and joined while still wet. All excess compounds must be completely removed.

6. PAINTING PROCEDURES

6.1. Directly before the application of paint, the area to be painted shall be degreased with a suitable degreaser and left to dry.

6.2. Paint shall only be applied under the following conditions:-

6.2.1. There is adequate light.

6.2.2. The steel temperature is between 5 and 50°C and at least 3°C above the dew point of the air.

6.2.3. The relative humidity of the air is between the limits specified by the paint supplier.

6.2.4. Wind does not interfere with the method used and sand and dust cannot be blown onto wet paint.

6.3. Steelwork shall be supported on trestles, at least 900 mm off the ground for painting purposes.

6.4. An adequate number of test readings shall be taken per square meter in order to determine the dry film thickness.

6.4.1. The paintwork shall be acceptable if the average of the test readings taken falls within or exceeds the ranges given.

6.4.2. Paintwork shall not be acceptable if any single test reading is less than the specified minimum thickness.

6.5. An ultrasonic or electronic magnetic flux thickness measurement gauge shall be used, but in case of dispute, destructive testing shall be applied. He painted steelwork shall present a clean, neat appearance of uniform colour and gloss as applicable to the paint used. Each coat of paint shall be applied as a continuous, even film of uniform thickness. More than one application of paint may be required to achieve the dry film thicknesses specified or to obliterate the colour of the previous coating.

6.6. The use of thinners or solvents at any stage of the work is prohibited, unless specified by the paint manufacturer.

6.7. Precautions shall be taken to prevent coatings from being applied to equipment nameplates, instrument glasses, signs etc.

7. COLOUR CODES

Machinery and equipment shall be painted in the following final colours:-

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.1	Mobile equipment (cranes, loaders etc.)		
	a) Structure, machinery and electrical houses, operator's cabins, chutes, hoppers etc.	Transnet Red	RAL 3020
	b) Undercarriage, travel bogies, rubber tyred rims	Transnet Red	RAL 3020
7.1.2	Industrial buildings, conveyor structures		
	a) Roofs and canopies	Pantone cool grey 10	RAL 7037 (Staubgrau)
	b) Painted walls	Pantone cool grey 3	RAL 7035 (Lightgrau) or SABS 1091 G62 (Pale grey)
	c) Steel columns, rafters, trusses	Pantone cool grey 5	RAL 7004 (Signalgrau)
7.1.3	General		
	a) Guards	Golden yellow	SABS 1091-B49 RAL 1003
	b) Sheaves	Orange	RAL 2008
	c) Cable reels (Stainless steel	Orange	RAL 2008
	Machine buffers and parts of machine which could constitute a serious hazard	Golden Yellow (High Gloss) with Luminous green stripes in chevron pattern	SABS B49 and Luminous green

Area	Colour	Code No. [SABS 1091 and International No's]
e) Any exposed rotating part of machinery, electrical Switch-gear (other than starting and stopping devices and emergency stop control), electrical services e.g. conduit and allied fittings	Light Orange (High Gloss)	SABS 1091 B26 BS 381C-557
f) Low voltage switchgear panels where orange is not aesthetically acceptable	Light grey	SABS 1091-G29 BS 381C-631
g) Medium voltage cable trays, switchgear and motors (3,3 kV and up)	Oxford Blue	SABS FO2 BS 381C-105 RAL5003
h) Starting devices, low voltage cable trays and switchgear	Mid brunswick green (high gloss)	BS 381C-228 SABS1091-EO4 RAL6005
i) Portnet Logo	Transnet White	RAL 3012
j) Parts of stationary machinery (Electrical, motors, gearboxes, brakes, transformers, etc.])	Light Grey	SABS G29 BS 381C-631
k) Hand levers, hand wheels, oiling points, handrails on walkways, ladders	Golden Yellow (High Gloss)	SABS 1091 B49 BS 381C-356
l) Stopping devices, grease points, motor fan covers and danger signs (not symbolic safety signs for which see SABS 1186)	Signal red (High Gloss)	SABS 1091 A11 BS 381C-537 RAL3001
m) Walkways (non slip surfaces) (galvanized gratings not to be painted)	Shop floor green	
n) Informatory signs and notices (not symbolic safety signs for which see SABS 1186)	White on Emerald Green (High Gloss)	White on SABS 1091 E14 BS 381C- 228

	Area	Colour	Code No. [SABS 1091 and International No's]
7.1.4	Pipe lines		
	a) Reclaim water piping	Aluminium	
	b) Slurry pipe lines	Dark admiralty grey	SABS 1091-G12
	c) Fire protection piping	Signal red	SABS 1091-A11
	d) Washwater drain pipes	Light grey	SABS 1091-G29
	e) Instrument air	White with Strong blue band	White and SABS 1091-F11
	f) Plant air	White with Flag blue band	White and SABS 1091-FO4
	g) Potable water	Grass green	SABS 1091-D14

7.1.5 Colour bands for pipes shall be 75 mm wide for pipe sizes up to 150 mm diameter and 100 mm wide for 150 mm and above. The colour bands shall be applied to the pipe flanges, valves, junctions, walls or structures etc. in such a manner that the pipe may be easily identifiable. On straight sections the maximum spacing shall be 100 x the pipe diameter.

8. FIELD TOUCH-UP PAINTING

8.1. Damaged and unpainted areas, fasteners, welds, etc. shall be cleaned by wire brushing with hand tool or power tool in a manner which will minimize damage to sound paint. Grinding will not be allowed. Rust spots shall be cleaned to bright metal. Thick edges of old paint abutting on bare metal surfaces shall be feathered by scraping and sanding.

8.1.1. Where welding is required on areas already coated with the coating system, the coat should be stepped back for ± 30mm around the weld area.

8.2. The paint shall be applied to match the original coats in accordance with the manufacturer's recommendations for the specific paint system.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

8.3. Areas of damaged galvanizing shall be repaired with an approved cold galvanizing product or metal sprayed by the wire spraying process with Zinc, and then touched up with the specific paint system.

9. GENERAL

9.1. All walkways, floors, maintenance platforms etc. must be painted with a durable, non skid coating of the appropriate colour.

9.2. Exposed machined surfaces must be coated with a strippable corrosion inhibitor (e.g. Tectyl).

9.3. Where different materials will be in contact with each other and galvanic corrosion can occur the contact areas of the materials must be isolated from each other or the joints made water proof to prevent ingress of moisture.

9.4. All components must be designed with corrosion prevention in mind and specifically the following:-

9.4.1. No entrapment of dirt, product, moisture etc.

9.4.2. No areas must be inaccessible for maintenance such as too narrow gaps etc.

9.4.3. Large flat areas rather than complicated shapes and profiles.

9.4.4. No sharp corners and discontinuous welds.

9.5. Parts of equipment which are exposed to high temperatures must be coated with the following system:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Two component self curing inorganic zinc ethyl silicate	DULUX /SIGMA-Sigma MC60 INTERNATIONAL (PLASCON) Interzinc 233 STONCOR (CHEMRITE COATINGS) Carbo Zinc 11	65-75
2	Single component high temperature moisture curing silicone with aluminuim flakes	DULUX/SIGMA – Sigmatherm Silicate INTERNATIONAL (PLASCON) Intertherm 50 STONCOR (CHEMRITE COATINGS) Carboline 1248	40

10. MAINTENANCE PAINTING OF STRUCTURES

10.1. Areas which are only lightly corroded must be cleaned by means of high pressure water blasting or wire brushing by power tool and the following system applied:-

Coat No	Generic Description	Approved Brand Products	Dry Film Thickness (μm)
1	Surface tolerant two pack epoxy primer with aluminuim pigments	Dulux/SIGMA Aluprimer STONCOR (CHEMRITE COATINGS) Carbomastic 15 INTERNATIONAL (PLASCON) Intergard 468,	125-150
2	Same as first coat OR micaceous iron oxide (MIO) epoxy	DULUX/SIGMA – Sigmacover CM MIO	125-150

		INTERNATIONAL (PLASCON) Interseal 010 MIO STONCOR (CHEMRITE COATINGS) Carboline 190 HB M.I.O. or Carboline 193 M.I.O.	
3	Two component recoatable, polyurethane finish (Gloss)	DULUX/SIGMA Sigmadur gloss INTERNATIONAL (PLASCON) Interthane 990 STONCOR (CHEMRITE COATINGS) Carboline 134	65-75

10.1.1. Alternatively, the Noxyde paint system can be used, consisting of two to three coats of water based Noxyde paint to achieve a DFT of 350 to 400 microns. Where the Noxyde system is used on areas other than slightly corroded structural areas, the following additional requirements must be observed:

10.1.1.1. Very smooth surfaces (e.g. 3CR12, stainless steel or hot-dip galvanized components, bolts, nuts and fittings, and HT bolts): Parts must be thoroughly degreased using OptiDegreaser, washed down with potable water, and immediately when dry, a single coat of OptiPrimeAqua applied.

10.1.1.2. Paintable flexible sealant/mastic: Only sealant approved by the paint manufacturer may be used, and an initial coat of OptiPrimeAqua applied over it before the further coats of Noxyde are applied.

10.1.1.3. Bolted/rivited connections: After blasting or and/or cleaning as required, apply a coat of OptiPrimeAqua and an additional stripe coat of Noxyde, in contrasting colour, to all bolt/nut and plate edges and crevices.

10.2. The adhesion of old coatings must be verified by doing a cross cut adhesion test on selected areas.

10.3. The compatibility of the new paint system on the old coating must be tested and guaranteed in writing by the paint supplier.

10.4. The work and coating system must be guaranteed for a minimum of 12 months.

10.5. All heavily corroded areas must be shot blasted to minimum SA2 and the three coat system indicated in clause 2.6 applied.

10.6. Areas where the old coating is still sound need only be high pressure cleaned with a suitable solvent and coated with one of the primers suggested in clause 10.2 (as tie coat) and then with one of the top coats suggested in clause 2.6 to get the appropriate colour and finish. The minimum dry film thickness of this tie coat must be 75 microns and top coat must be 50 microns, but the previous coating colour shall be completely obliterated to present a uniform colour.

Note: Inorganic zinc primers shall not be re-covered with an inorganic primer, but only with an organic zinc primer.

10.7. Repairs to the insides of all the enclosed sections of the booms as well as the insides of the crane legs, sill beams, cross beams, pylon cross bracing members etc. shall be done as above but the top coat need not be applied.

****** END OF SPECIFICATION HE 9/2/8 [Version 17] ******