

Audit questionnaire

TECHNICAL/FUNCTIONALITY QUESTIONNAIRE

The following are mandatory requirements that form part of the stage 5 (Technical/Functionality) evaluation which requires 100% compliance. Should your response be 'No', the respondent will be disqualified. Where questions require explanations provide detailed information.

| STEEL MAKING PROCESS | YES / NO | COMMENTS |
|--|----------|----------|
| Basic steel making material <ul style="list-style-type: none">• Blast furnace• Type of ore• Is Scrap used• Temp control• Tapping times• Capacity• Standing time of Torpedoes• Tracking | | |
| Steel Making BOF <ul style="list-style-type: none">• Furnace capacity• Chemistry Analysis• Temperature control• Sampling rates• Scrap metal addition• Stirring gas• Temperature control• Calibration of equipment | | |

| | | |
|--|--|--|
| <ul style="list-style-type: none"> • Argon String • EMS stirring • Oxidation protection • Ladle usage • Carbon temp control • Tapping Temperature • De oxidation process • Sequence and reason for alloying and deoxidation • Grain refining techniques • Sulphur and phosphorous reduction • Nitrogen and oxygen used • Time taken for analysis response. | | |
| <p>Vacuum Degassing</p> <ul style="list-style-type: none"> • Degassing method • Sampling frequency • Oxygen & nitrogen measurements | | |
| <p>General comments</p> <ul style="list-style-type: none"> • Look at history if casting records over the past two months | | |

| CASTING PROCEDURE | REMARKS | ACCEPT/REJECT |
|---------------------------------|---------|---------------|
| Stream Temperatures | | |
| Tundish practices Level control | | |

| | | |
|---|--|--|
| Hydrogen control | | |
| Machine Radius (Bloom Casting) | | |
| Casting speed and temperatures | | |
| Magnetic stirring: When and how | | |
| Number of Strands | | |
| Bloom sizes: reduction to UIC 860 Aspect ratio | | |
| Cropping length of bloom | | |
| Bloom Identification | | |
| QA of bloom: Internal quality Surface quality | | |
| Traceability | | |
| | | |

| ROLLING | REMARKS | ACCEPT/REJECT |
|---|----------------|----------------------|
| Bloom reheating | | |
| Furnace type | | |
| Reheating Practice Time spend in furnace | | |
| Reheating control | | |
| Surface control/Descaling | | |
| Tracking system and records | | |
| Rolling type | | |
| Rolling temperatures | | |
| Final pass temperature | | |
| Rail straightening | | |
| No of passes | | |
| Cooling Practice | | |
| Roller straightening | | |
| Residual stress | | |
| Hot stamping practice | | |
| Dedicated to rails | | |
| Quality assurance | | |

| Head Hardening | REMARKS | ACCEPT/REJECT |
|---|----------------|----------------------|
| Inline or off line process | | |
| Furnace type | | |
| Reheating Practice Time spend in furnace | | |
| Rail temp before quench Foot Web Crown | | |

| | | |
|--------------------------------------|--|--|
| Quenching medium | | |
| Time spend in medium | | |
| Residual stress control | | |
| Horizontal and vertical straightness | | |

| GENERAL | REMARKS | ACCEPT/REJECT |
|--|---------|---------------|
| Automatic inspection methods | | |
| Incubation period | | |
| Impact tests | | |
| Visual inspection & Eddy current Inspect | | |
| Ultrasonic testing: Specification used | | |
| Calibration | | |
| Operator qualifications | | |
| Type of machine | | |
| Ultrasonic testing: | | |
| Number of probes | | |
| Type | | |
| Angle if any | | |
| Frequencies | | |
| Ultrasonic testing: Areas that are scanned Head (70%) Web (60%) Foot (90%) | | |
| Minium defect size scanned | | |
| Other flaw detection methods | | |
| Dimentional control (See spec) | | |

| | | |
|-------------------------------|--|--|
| Straightness twist | | |
| Symmetry | | |
| Marking | | |
| Hot stamping/punch | | |
| Handling and transport system | | |
| Record keeping at each stage | | |
| | | |

| QUALITY CERTIFICATION | REMARKS [Frequency of tests] | ACCEPT/REJECT |
|--|---------------------------------|---------------|
| Rail Sulphur print (visual inspection) | | |
| Macrographic tests: Bloom Rail (Top and Bottom) | | |
| Microscopic test: Inclusions Grain size Decarburisation | | |
| Tensile test: results report (Bottom end) {UTS & elongation etc} | | |
| Charpy/Izod test result report | | |
| Hardness Test result report | | |
| Falling mass test result report [H=150*Rail/1000] | | |
| Chemical analysis results report | | |
| Non-destructive testing results Report | | |
| Dimensional results report | | |
| Length of rail Produced | | |
| Length of rail shipped | | |

“PREVIEW COPY ONLY”

Audit questionnaire

Name of Company:

Contact person:

Date of inspection:

Team Members: K.C. Mistry, S.S.B. Vilakazi (TRANSNET)

LOCATION AND PLANT NAME OF STEEL SUPPLIER: _____

| STEEL MAKING PROCESS | REMARKS | ACCEPT/REJECT |
|--|---------|---------------|
| Basic steel making material <ul style="list-style-type: none"> • Blast furnace • Type of ore • Is Scrap used • Temp control • Tapping times? • Capacity • Standing time of Torpedoes • Tracking? | | |
| Steel Making? BOF <ul style="list-style-type: none"> • Furnace capacity • Chemistry Analysis • Temperature control • Sampling rates • Scrap metal addition • Stirring gas • Temperature control • Calibration of equipment • Argon String • EMS stirring • Oxidation protection • Ladle usage • Carbon temp control • Tapping Temperature • De oxidation process • Sequence and reason for alloying and deoxidation • Grain refining techniques • Sulphur and phosphorous reduction • Nitrogen and oxygen used | | |

| | | |
|---|--|--|
| <ul style="list-style-type: none"> Time taken for analysis response. | | |
| Vacuum Degassing <ul style="list-style-type: none"> Degassing method Sampling frequency Oxygen & nitrogen measurements | | |
| General comments <ul style="list-style-type: none"> Look at history if casting records over the past two months | | |

| CASTING PROCEDURE | REMARKS | ACCEPT/REJECT |
|---|---------|---------------|
| Stream Temperatures | | |
| Tundish practices Level control | | |
| Hydrogen control | | |
| Machine Radius (Bloom Casting) | | |
| Casting speed and temperatures | | |
| Magnetic stirring: When and how | | |
| Number of Strands | | |
| Bloom sizes: reduction to UIC 860 Aspect ratio | | |
| Cropping length of bloom | | |
| Bloom Identification | | |
| QA of bloom: Internal quality Surface quality | | |
| Traceability | | |
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| ROLLING | REMARKS | ACCEPT/REJECT |
|---|---------|---------------|
| Bloom reheating | | |
| Furnace type | | |
| Reheating Practice Time spend in furnace | | |
| Reheating control | | |
| Surface control/Descaling | | |
| Tracking system and records | | |
| Rolling type | | |
| Rolling temperatures | | |

| | | |
|------------------------|--|--|
| Final pass temperature | | |
| Rail straightening | | |
| No of passes | | |
| Cooling Practice | | |
| Roller straightening | | |
| Residual stress | | |
| Hot stamping practice | | |
| Dedicated to rails | | |
| Quality assurance | | |

| Head Hardening | REMARKS | ACCEPT/REJECT |
|--------------------------------------|----------------|----------------------|
| Inline or off line process | | |
| Furnace type | | |
| Reheating Practice | | |
| Time spend in furnace | | |
| Rail temp before quench | | |
| Foot | | |
| Web | | |
| Crown | | |
| Quenching medium | | |
| Time spend in medium | | |
| Residual stress control | | |
| Horizontal and vertical straightness | | |

| GENERAL | REMARKS | ACCEPT/REJECT |
|--|----------------|----------------------|
| Automatic inspection methods | | |
| Incubation period | | |
| Impact tests | | |
| Visual inspection & Eddy current Inspect | | |
| Ultrasonic testing: Specification used Calibration Operator qualifications Type of machine | | |
| Ultrasonic testing: Number of probes Type Angle if any Frequencies | | |
| Ultrasonic testing: Areas that are scanned Head (70%) | | |

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| Web (60%) | | |
| Foot (90%) | | |
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| Other flaw detection methods | | |
| Dimentional control (See spec) | | |

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| Straightness twist | | |
| Symmetry | | |
| Marking | | |
| Hot stamping/punch | | |
| Handling and transport system | | |
| Record keeping at each stage | | |
| | | |

| QUALITY CERTIFICATION | REMARKS | ACCEPT/REJECT |
|--|----------------------|---------------|
| | [Frequency of tests] | |
| Rail Sulphur print (visual inspection) | | |
| Macrographic tests: Bloom Rail (Top and Bottom) | | |
| Microscopic test: Inclusions Grain size Decarburisation | | |
| Tensile test: results report (Bottom end) {UTS & elongation etc} | | |
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| Chemical analysis results report | | |
| Non-destructive testing results Report | | |
| Dimensional results report | | |
| Length of rail Produced | | |
| Length of rail shipped | | |

TECHNICAL/FUNCTIONALITY QUESTIONNAIRE

The following are mandatory requirements that form part of the stage 5 (Technical/Functionality) evaluation which requires 100% compliance. Should your response be ‘No’, a plan must be provided indicating timelines (in months) for ‘set up’ of the respective requirements which will enable your company to provide Transnet with the required materials.

| WELDING FACILITY REQUIREMENTS | YES/NO | COMMENT |
|---|--------|---------|
| <ul style="list-style-type: none"> An approved welding process and facility for welding of long rails and manufacturing of turnouts. | | |
| <ul style="list-style-type: none"> Welding of rails and manufacturing turnout, whether such rails and turnouts are purchased from the Supplier or supplied by Transnet, according to Transnet’s specific instructions through the issuance of Purchase Orders by Transnet on an “as and when required” basis | | |
| <ul style="list-style-type: none"> Provision of a pre-welding interim storage area for rails, pending welding operations | | |
| <ul style="list-style-type: none"> Provision of a post-welding staging area prior to collection of the welded rails by Transnet | | |
| <ul style="list-style-type: none"> Handling facilities and the trained personnel required to load , monitor in-transit and unload welded long rails (36m and above) on to transport [which transport to be provided by Transnet] on a “free on rail/road vehicle” basis | | |
| <ul style="list-style-type: none"> Provision of rail siding | | |