TABLE OF CONTENTS

1. MAIN TECHNICAL FEATURES

The production of the rolling mill is calculated approximatively for 350.000 tpy of rebars with diameter from 8 mm to 36 mm., using square billets in the size of 130 mm x 130 mm x 12000 mm.

The material will be processed with 2 strand slitting system for the production of rebars with diameter from 8 mm to 12 mm and with 1 strand for the finished product with diameter from 14 mm to 36 mm.

Billets	
Square	130 mm x 130 mm
Length	12000 m
Weight	1550 Kg
Quality	common steel for reinforced concrete with a maximum tensile strength of 60 Kg/mm^2

2. RE-HEATING FURNACE AND SERVICES

2.1 RE-HEATING FURNACE AND COMBUSTION SYSTEM

The pre-fabricated re-heating furnace, with a capacity of 65 tph, is a "pusher" type one, foreseen to heat one row of steel billets.
The charge of the cold billets is carried out from the back side of the furnace through one system composed by trolley, hydraulic pushing cylinder and a dedicated hydraulic power pack.
The combustion system is divided in two zones (heating and normalization zone). The billets are heated by side burners foreseen to use natural gas. The control of the temperature inside the furnace is obtained by an automatic system complete with panel. The furnace steel structure body is lined with appropriate refractory materials and it is completed with doors, bolts, and air conburent pipes.
The exhaust fumes are evacuated through a top side opening and conveyed to the heat exchanger. At the end of the heat exchanger, it is located a steel chimney fitted with a dedicated centrifugal fan. Due to the high fume temperature, the first chimney meters are internally lined with refractory materials.
A dedicated expelling machine discharges the billets from the furnace at the end of the heating phase. The expelling machine is fitted with a water-cooled arm.

2.2 RE-HEATING SERVICES

2.2.1 BILLET CHARGING DEVICE

This system is located in the charging head of the furnace and it allows sustaining and pushing the cold billets inside the re-heating furnace.

2.2.1 Scope of supply

- Two (2) Billet charging devices
- One (1) Hydraulic power pack
- Two (2) Hydraulic cylinders
- Four (4) Billet guides

2.2.2 BILLET EXPELLING MACHINE

The purpose of this machine is to push-out the billets from the re-heating furnace to the roller table in service to the roughing stand.
The machine is located in the opposite side of the billet discharging door and it can adjust its position, parallel to the furnace, by a dedicated translation system through an electric gearbox.
A gearbox drives the water-cooled expelling arm via steel rope and wheels.

2.2.3 EXIT FURNACE ROLLERS TABLE

The purpose of this machine is to receive the hot billets at the exit of the furnace.

3. FIRST ROUGHING MILL SET (FROM STAND 1 TO 4)

3.1 Technical description

The roughing mill set is continuous type with one horizontal and one vertical housingless stands.
The stands are equipped with a groove changing device hydraulically operated.
This device, due to the transversal movement of the stand from the rolling line, allows to keep the rolling line fixed with a benefit of the operation of the plant.
The horizontal and vertical setting up of the first roughing mill set allows to avoid the twisting stress between the stands with a benefit in terms of quality of the product.

Pinion distance	500 mm approx.
Max diameter of rolls	600 mm approx.
Rolls barrel	600 mm approx.
Rolls neck diameter	260 mm approx.
DC motor power	200-300 Kw approx.

3.2 Scope of supply

- **No. Two (2) Housingless horizontal stands (stand 1 and stand 3),** each one composed as follow:

- One (1) DC electric motor, 200-300 Kw, complete with half toothed couplings

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 500 mm pinion centerline, foreseen for heavy duty. The two exit shafts are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, composed as follow:
- one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
- four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
- machined steel structure body
- two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
- two rest bars to fix the entry and exit guides to the stand

- One (1) Container to support the roll stand. The container is foreseen with screws to lock and unlock the roll stand to the basement

- One (1) Steel baseplates for roll stand to be fixed to civil works in horizontal position, composed as follow:
- machined steel structure body
- four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
- one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed. This hydraulic cylinder is connected to the spindles support.

- **No. Two (2) Housingless vertical stands (stand 2 and stand 4),** each one composed as follow:

- One (1) DC electric motor, 200-330 Kw, complete with half toothed coupling

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 500 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
- machined steel structure body
- alloy steel gears
- alloy steel shaft fitted on heavy duty bearing
- inside lubrication system made of copper pipes and fittings
- half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
- Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
- Chain balancing system to support the universal spindles by rotating chocks on the stand side
- Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, composed as follow:
- one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
- four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths

- machined steel structure body
- two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
- two rest bars to fix the entry and exit guides to the stand

- One (1) Container to support the roll stand. The container is foreseen with screws to lock and unlock the roll stand to the basement

- One (1) Steel baseplate for roll stand to be fixed to civil works in vertical position, composed as follow:
- machined steel structure body
- four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
- one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed

- One (1) Trolley to withdraw the stand from the rolling line, hydraulically operated, composed as follow:
- rail to be fixed to civil works
- trolley complete with free wheels
- hydraulic cylinder to drive the trolley

4. SECOND ROUGHING MILL SET (FROM STAND 5 TO 8)

4.1 Technical description

The second roughing mill set is continuous type with one horizontal and one vertical housingless stands.
The stands are equipped with a groove changing device hydraulic operated. This device, due to the transversal movement of the stand from the rolling line, allows to keep the rolling line fixed with a benefit of the operation of the plant.
The horizontal and vertical setting up of the second roughing mill set allows to avoid the twisting stress between the stand with a benefit in terms of quality of the product.

Pinion distance	420 mm approx.
Max diameter of the rolls	500 mm approx.
Rolls barrel	600 mm approx.
Rolls neck diameter	240 mm approx.
DC motor power	300-400 Kw approx.

4.2 Scope of supply

- **No. Two (2) housingless horizontal stands (stand 5 and stand 7),** each one composed as follow:

- One (1) DC electric motor, 300-400 Kw, complete with half toothed coupling

- One (1) Basements for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 420 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, composed as follow:
  - one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
  - four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
  - machined steel structure body
  - two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
  - two rest bars to fix the entry and exit guides to the stand

- One (1) Container to support the cylinder stand. The container is foreseen by screws for locking and unlocking the cylinder stand to the basement

- One (1) Steel baseplate for roll stand to be fixed to civil works in horizontal position, composed as follow:
  - machined steel structure body
  - four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
  - one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed

- **No. Two (2) housingless vertical stands (stand 6 and stand 8),** each one composed as follow:

- One (1) DC electric motor, 300-400 Kw, complete with half toothed coupling

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 420 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, composed as follow:
  - one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
  - four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
  - machined steel structure body
  - two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
  - two rest bars to fix the entry and exit guides to the stand

- One (1) Container to support the cylinder stand. The container is foreseen by screws for locking and unlocking the cylinder stand to the basement

- One (1) Steel baseplate for roll stand to be fixed to civil works in vertical position, composed as follow:
  - machined steel structure body
  - four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
  - one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed

- One (1) Trolley to withdraw the stand from the rolling line, hydraulically operated, each one composed as follow:
  - rail to be fixed to civil works
  - trolley complete with free wheels
  - hydraulic cylinder to drive the trolley.

5. INTERMEDIATE MILL SET (FROM STAND 9 TO 12)

5.1 Technical description

The intermediate mill set is continuous type with two horizontal and two vertical housing-less stands.
The stands are equipped with a groove changing device hydraulically operated. This device, due to the transversal movement of the stand from the rolling line, allows to keep the rolling line fixed with a benefit of the operation of the plant.
The horizontal and vertical setting up of the intermediate mill set allows to avoid the twisting stress between the stands with a benefit in terms of quality of the product.

Pinion distance	360 mm approx.
Max diameter of the rolls	400 mm approx.
Rolls barrel	600 mm approx.
Rolls neck diameter	200 mm approx.
DM motor power	400 Kw approx.

5.2 Scope of supply

- **No. Two (2) housingless horizontal stands (stand 9 and stand 11),** each one composed as follow:

- One (1) DC electric motor, 400 Kw, complete with half toothed coupling

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 360 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure,composed as follow:
  - one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
  - four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
  - machined steel structure body
  - two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
  - two rest bars to fix the entry and exit guides to the stand

- One (1) Container to support the cylinder stand. The container is foreseen by screws for locking and unlocking the cylinder stand to the basement

- One (1) Steel baseplate for roll stand to be fixed to civil works in horizontal position, composed as follow:
  - machined steel structure body
  - four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
  - one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed

- **No. Two (2) housingless vertical stands (stand 10 and stand 12),** each one composed as follow:

- One (1) DC electric motor, 400 Kw, complete with half toothed coupling

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 360 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, each one composed as follow:
  - one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw

- four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
- machined steel structure body
- two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
- two rest bars to fix the entry and exit guides to the stand

• One (1) Container to support the cylinder stand. The container is foreseen by screws for locking and unlocking the cylinder stand to the basement

• One (1) Steel baseplate for roll stand to be fixed to civil works in vertical position, composed as follow:
- machined steel structure body
- four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
- one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping fixed the rolling axe

• One (1) Trolley to withdraw the stand from the rolling line, hydraulically operated, composed as follow:
- rail to be fixed to civil works
- trolley complete with free wheels
- hydraulic cylinder to drive the trolley

6. FINISHING MILL SET (FROM STAND 13 TO 18)

6.1 Technical description

These machines allow to finish almost all the small sizes of the re-bars coming from the intermediate mill set through six horizontal housingless stands.
The stands are equipped with a groove changing device hydraulically operated. This device, due to the transversal movement of the stand from the rolling line, allows to keep the rolling line fixed with a benefit of the operation of the plant.
The horizontal setting up of the finishing mill set allows to roll the slitting bars by a proper twisting guides.

Pinion distance	320 mm approx.
Nominal diameter of the rolls	360 mm approx.
Rolls barrel	600 mm approx.
Rolls neck diameter	160 mm approx.
DC motor power	450 Kw approx.

6.2 Scope of supply

- **No. Six (6) housings horizontal stands,** each one composed as follow:

- One (1) DC electric motor, 450 Kw, complete with half toothed coupling

- One (1) Basement for electric motor and gearbox

- One (1) Speed reducer gearbox and pinion stand unit with 320 mm pinion centerline, foreseen for heavy duty. The two exit shaft are fitted with special coupling. Each unit is composed as follow:
  - machined steel structure body
  - alloy steel gears
  - alloy steel shaft fitted on heavy duty bearing
  - inside lubrication system made of copper pipes and fittings
  - half toothed coupling at the entry side

- Two (2) Universal spindles "cardan" type

- One (1) Spindles support made of steel structure. This special device allows changing the stands's rolls in a very short time through hydraulic cylinder. Each one is mainly composed of:
  - Hydraulic cylinder to connect and disconnect the spindles support to the stand's baseplate
  - Chain balancing system to support the universal spindles by rotating chocks on the stand side
  - Two chocks fitted by ball bearings and rotating into a special support

- One (1) "2-high" cartridge type roll stand, made of machined steel structure, composed as follow:
  - one upper and lower roll adjusting device made of four screw systems connecting the four chocks. Two double reducer gearboxes, hydraulically operated by hydraulic motor, are assembled on the top of the screw
  - four roll chocks fitted on heavy duty multiroll bearing complete with flanges and labyrinths
  - machined steel structure body
  - two machined rolls already grooved with a special shape according to pass design position, with barrel length 600 mm
  - two rest bars to fix the entry and exit guides to the stand

- One (1) Container for supporting the cylinder stand. The container is foreseen by screws for locking and unlocking the cylinder stand to the basement

- One (1) Steel baseplate for roll stand to be fixed to civil works in horizontal position, composed as follow:
  - machined steel structure body
  - four hydraulic locking devices to lock and unlock the base of the stand to the steel baseplate
  - one hydraulic cylinder to drive the stand during the groove changing phase trough the transversal position of rolling axe. This system allows keeping the rolling axe fixed.

7. FIRST CUTTING SET

7.1 Technical description

The purpose of this shear is to cut the head and the tail of the bars and to operate as emergency chopping in order to avoid the mill breakout. It is "start-stop" type.

7.2 Scope of supply

- One (1) Flying shear CV 70 type composed of the following parts:
- machined steel structure body
- alloy steel gears and shafts
- stationary pneumatic brake
- DC motor with basement
- rotating arms with knives
- safety protection
- on-board lubrication system with motor pump
- entry and exit rolled guides
- One (1) Scrap discharging device, pneumatically operated, composed of:
- steel structure support
- opening bottom part with levers
- pneumatic cylinder with solenoid valve

8. SECOND CUTTING SET

8.1 Technical description

This machine is located between the intermediate and finishing mills. It allows cutting the head and the tail of the bars and to operate as emergency chopping in order to avoid the mill's breakout. The shear is "start-stop" type.

8.2 Scope of supply

- One (1) Flying shear CV 30 type composed of the following parts:
- machined steel structure body
- alloy steel gears and shafts
- stationary pneumatic brake
- DC motor with basement
- rotating arms with knives
- safety protection
- on-board lubrication system with motor pump
- entry and exit rolled guides.
- One (1) Scrap discharging device, pneumatically operated, composed of:
- steel structure support
- opening bottom part with levers
- pneumatic cylinder with solenoid valve

9. QUENCHING SYSTEM MACHINE

9.1 Technical description

The machine is suitable to in-line cooling the re-bars.
The machine is equipped with 3 strands cooling pipes and nozzles, so you may use the same machine while rolling with slitting system for small re-bars diameters (i.e. DIA 10 : 12) and normal rolling in one strand.

The machine will be assembled and supplied with pipes, nozzles and strippers for 3 sizes of re-bars at your choice. For example:
- two strands for DIA 10:12 mm
- one strand for DIA 14:25 mm

9.2 Scope of supply

● One (1) Quenching Box composed as follow:
- support frame in welded steel structure, with wheels and gear-motors for machine shifting
- water collecting box with manual liftable cover
- series of machined support to hold the pipes and strippers inside the box
- three sets of pipes - nozzles and strippers (as above)
- on board piping with manual butterfly valves for water and compressed air
- two rails to be casted in the foundation, for the wheels

● Injector pipes composed of:
  - entry funnels made of spheroidal cast iron
  - support body made of cast iron
  - pipe made of common steel
  - exit funnel made of alloy stainless steel

● Strippers composed as follow:
  - entry funnels made of spheroidal cast iron
  - support body made of cast iron

● Two (2) Optical pyrometers

The length of the machine will be approximatively 11,5 meters.

10. PINCH ROLL IN ENTRY TO THE CUT TO LENGTH SHEAR

10.1 Technical description

The purpose of this machine is to pull the rolled bars coming from the rolling line and to push them in entry to the cut to length flying shear.
It is located very close to the shear in order to assure the continuity of the reference speed even when the bars leave the last finishing stand.

Diameter of the roll	250 mm approx.
Installed power	55 kw DC approx.

10.2 Scope of supply

- One (1) Pinch roll horizontal type, pneumatically driven, foreseen for heavy duty and fitted on roller bearing, mainly composed of:
- steel structure machined body
- roll in special steel complete with shaft fitted on heavy duty bearings
- gearbox with coupling
- pneumatic cylinder with electro valve
- machined steel structure baseplate for Pinch Roll and DC motor
- Main DC motor complete with steel basement and toothed joint

11. CUT TO LENGTH FLYING SHEAR

11.1 Technical description

A flying shear is foreseen to cut-to-length the rolled bars at the entry side of the cooling bed.
The system is designed to cut the round bars from 10 to 25 mm.

Max. speed	15 m/s approx.
Max. cutting capacity	500 mm^2 approx.
Min. cutting temperature	600 ^oC approx.
Installed power	180 kw DC approx.

11.2 Scope of supply

- One (1) Flying shear CV 25 type, in entry to the roller apron table, composed of the following parts:

- steel structure machined body
- alloy steel gears and shafts
- rotating arms with knives
- flying wheel manually inserting
- foundation baseplate in steel carpentry
- on-board lubrication system with motor pump
- entry and exit rolled guides

- Main DC motor complete with toothed coupling, pneumatic stationary break and steel basement
- Safety protection including opening door

12. LIFTING APRON ROLLER TABLE

12.1 Technical description

The purpose of this machine is to slow down the speed of the bars and discharge them in the right way at the entry side of the cooling bed. The slowdown of the bars is obtained by a single roller table lifting system driven by a gearbox and a "start- stop" type DC electric motor. Each roller of the apron roller table is individually driven by an AC electric motor.
The apron roller table is used to slow down and discharge all the bars with diameters from 8 mm to 36 mm.

Length	90 m approx.
Roll installed power	64 x 1,5 kw approx.
Lifting installed power	55 kw approx.

12.2 Scope of supply

- One (1) Lifting apron roller table, complete with:

- set of frames made of electro welded steel structure to be fixed to civil works
- set of machined movable aprons made of cast-iron
- set of machined chutes made of cast iron
- set of autonomous rolls driven by AC motors and fixed to the chutes by special support
- pulling shafts with supports and levers to lift the aprons

- Lifting apron drive unit composed of:

- crank eccentric shaft
- gearbox unit
- toothed coupling with stationary pneumatic break
- main DC motor start-stop type
- steel basement to be fixed to civil works

13. COOLING BED WALKING BEAM TYPE WITH ALLIGNING ROLLERS

13.1 Technical description

The purpose of this machine is to cool down the hot bars coming from the mill stands in a natural way in order to have them at a proper temperature and straight before the cold cutting operation.
The cooling bed is equipped by a set of alignment rolls in order to line up the heads of the bars before to discharge them.
The cooling bed's movable racks are driven by a complex unit composed of set of shafts with eccentric wheels, supports with bearings, gearboxes and DC electric motors.

Cooling Bed	
Type	Walking beam
Length	54 m approx.
Width	6,5 m approx.
Pitch of notches	80 mm approx.
Installed power	55 kw DC approx.

Alligning rollers	
Number of rolls	48
Dimension of the rolls	∅ 120 x 500 mm approx.
Installed power	48 x 0,55 kw AC approx.

13.2 Scope of supply

- One (1) Cooling bed walking beam type, including:
- set of fixed beams
- set of fixed rakes
- set of mobile beams
- set of mobile rake
- set of grids made of machined cast-iron
- set of frames made of steel structure
- set of shafts with supports, counterweight, eccentric wheels and couplings

- One (1) Drive unit for mobile frame complete with two gear-box, DC motor "start- stop" type and steel basement

- One (1) Set of aligning rollers with support and gear motors

14. LAYER EXTRACTOR DEVICE

14.1 Technical description

The purpose of this machine is to extract the layers of the cooled bars from the cooling bed and to deposit them to the exit cooling bed roller way.
It's mainly composed of a set of lifting and self transferring cradles with a proper shape.
The lifting movement is performed by a set of chains driven by the main shaft and AC electric gear-box.

Length	54 m approx.
Lifting stroke	150 mm approx.
Transfer stroke	920 mm approx.
Pitch of cradles	1200 mm approx.
Installed power	4 x 7,5 kw AC approx.

14.2 Scope of supply

- One (1) Layer extracting device, including:
- set of steel frame to be fixed to civil works
- set of lifting cradles
- set of mobile beams
- set of pulling chain
- set of shafts with supports
- set of lifting levers
- electric gearbox to move the cradles
- lifting electric gearboxes

15. EXIT COOLING BED ROLLER TABLE

15.1 Technical description

The purpose of this device is to receive the layers of the bars and to transfer them to the cold shear. It is mainly composed of a set of frames with a set of rolls driven by gearbox fitted on the top. A set of covers guides the bars during the transferring phase.

Length	58 m approx.
Diameter of the rolls	215 mm approx.
Rolls barrel	700 mm approx.
Pitch of rolls	1.200 mm approx.
Installed power	48 x 1,5 kw approx.

15.2 Scope of supply

- One (1) Exit cooling bed roller table, including:
- set of frames to be fixed to civil works
- set of rolls complete with ball bearing supports and driven by electric gearbox
- set of covers with a "U" shape to contain the bars

16. COLD CUTTING SHEAR

16.1 Technical description

The purpose of this machine is to cut the bars at length of 12 meters, at the exit of the cooling bed. The machine is start-stop type in order to avoid the clutch and break device's problems and heavy maintenance.
It is completed with a knife's quick changing device operated through an hydraulic cylinder in order to save time during the changing of the knife.

Cutting capacity	350 tons approx.
Blade barrel	800 mm approx.
Installed power	190 kw DC approx.

16.2 Scope of supply

- One (1) Cold cutting shear, mainly composed of:
- main gearbox complete with gears , shafts and bearings
- machined steel body
- main eccentric shaft fitted on heavy duty bearings
- upper knife holder
- lower knife keeper
- quick blade changing device hydraulically operated
- mobile stop for bars heads pneumatically operated
- bars press device pneumatically operated
- on board grease distribution system
- on board pneumatic distribution system
- on board hydraulic distribution system

- One (1) Main DC motor complete with steel baseplate and toothed coupling

- One (1) Hydraulic power pack in service to the shear complete with:
- hydraulic tank made of steel sheet complete with oil level control
- oil filter
- electric motor pump
- electric valves
- water/oil heater exchanger

17. EXIT COLD SHEAR ROLLER TABLE

17.1 Technical description

The purpose of this device is to receive the cut bars coming from the cold shear and to transfer them to the lateral transfer chain area.
It's mainly composed of a set of frames with a set of rollers, driven by a gearbox, fitted on the top; a set of covers guides the bars during the transferring phase.
The roller way is equipped with a disappearing stopper located at 12 meters from the blade of the cold shear. It allows to stop the bars at a predetermined length.

Length	25 m approx.
Diameter of the rollers	215 mm approx.
Rollers barrel	700 mm approx.
Pitch of rollers	1200 mm approx.
Installed power	20 x 1,5 kw AC approx.

17.2 Scope of supply

- One (1) Exit cooling bed roller table, including:
- set of frames to be fixed to civil works
- set of rollers complete with ball bearing supports and driven by electric gearbox
- set of covers with a "U" shape to contain the bars
- One (1) Disappearing stopper driven by pneumatic cylinder and electro valve

18. LATERAL CHAINS TRANSFER

18.1 Technical description

The purpose of this device is to transfer the cut bars from the after cold shear roller table to the bundles roller table.
It is mainly composed of a set of frames fitted with a set of transporting chains driven by a gearbox.

Lenght	12 m approx.
Total width (2 sections)	7 m approx.
Installed power	2 x 3 kw AC approx.

18.2 Scope of supply

- One (1) Lateral chains transfer, in 2 sections, composed of:
- set of frames to be fixed to civil works
- set of chain holders complete with ball bearing supports and driven by electric gearbox
- set of transportation chains
- Two (2) Drive units composed of electric gearbox and steel basement

19. BUNDLES FORMING ROLLER TABLE

19.1 Technical description

The purpose of this device is to receive the cut bars coming from the lateral chains transfer and to preform them in bundles.
It is mainly composed of a set of frames with a set of rollers driven by AC gearbox fitted on the top; a set of covers guides the bars during the transferring phase.
This machine is composed of 2 sections; the longest one is located in front of the chains transfer and the shortest one between the 2 binding machines.

Total length (2 sections)	14 m + 1,5 m approx.
Diameter of the rollers	240 mm approx.
Rollers barrel	320 mm approx.
Pitch of rollers	1200 mm approx.
Installed power	11 + 2 x 0,75 kw AC approx.

19.2 Scope of supply

- One (1) Bundle forming roller table, in 2 sections, composed of:
- set of frames to be fixed to civil works
- set of rollers complete with ball bearing supports and driven by electric gearbox
- set of covers with a "U" shape to contain the bars

Length	14 m
Diameter of rolls	210 mm
Rolls barrel	320 mm
Pitch of rolls	1200 mm

20. BINDING MACHINES

20.1 Technical description

The purpose of this machine is to tie the bundles coming from the bundles forming roller table.
It is controlled and driven by a dedicate hydraulic power pack.
The unit is "off line type", mining that it is fitted on a set of wheel in order to move it outside of the line during the maintenance phase.
A special decoiler device allows supporting the wire coils and filling the wir rod into the binding machine.

Max bundle diameter	300 mm approx.
Binding time	8 s approx.
Binding wire rod diameter	5,5/6 mm approx.

20.2 Scope of supply

- Two (2) Binding machines

21. OFFLOADING BUNDLES MACHINES

21.1 Technical description

The purpose of these machines is to discharge the bundle after the binding phase.
They are located after the binding machines.

Rollers table's length	15 m approx.
Diameter of the rolls	240 mm approx.
Rolls barrel	320 mm approx.
Pitch of rolls	1200 mm approx.
Installed power	12 x 0,75 kw AC approx.
Bundles transfer's installed power	7,5 kw AC approx.

21.2 Scope of supply

- One (1) Offloading roller table, composed as follow:
- set of frames to be fixed to civil works
- set of rolls complete with ball bearing supports and driven by electric gearbox
- set of covers with a "U" shape to contain the bars

- One (1) Bundles chains transfer, composed as follow:
- one head lifting type, pneumatically driven
- set of chains with sprocket wheels
- set of steel structure frames
- shafting with sprocket wheel and supports
- electric motor gearbox

22. COLLECTING CRADLES

22.1 Technical description

The purpose of this equipment is to collect the bundles ejected from the bundles chains transfer.

Length	1700 mm approx.
Width	400 mm approx.
Pitch of cradles	2500 mm approx.

22.2 Scope of supply

- Five (5) cradles made of welded steel structure

23. VERTICAL LOOPER DEVICE

23.1 Technical description

These equipments are installed between the stands.
They allow to control the speed of each stand by infrared loop control. The looping movement is performed by pneumatic cylinder and solenoid valve.
Two types of loopers are foreseen for the rolling mill, one for the single rolling line and one for the slitting rolling line.

Length	2300 mm approx.
Width	680 mm approx.

23.2 Scope of supply

- one set of single line Looper devices mainly composed of:
- basement to be fixed to civil works
- body made of steel structure
- lower rolls fitted on ball bearings
- movable upper roll driven by pneumatic cylinder and pneumatic electro valves
- emergency snap shear driven by pneumatic cylinder and pneumatic electro valve

- one set of double line Looper devices mainly composed of:
- basement to be fixed to civil works
- body made of steel structure
- lower rolls fitted on ball bearings
- movable upper roll driven by pneumatic cylinder and pneumatic electro valves
- emergency snap shear driven by pneumatic cylinder and pneumatic electro valve

24. AIR COMPRESSORS

24.1 Technical description

The air compressors have the purpose to feed all the utilities driven by air through compressed air, like:

- electric pneumatic valves
- pneumatic cylinders
- re-heating furnace's utilities

Flow rate	215 m^3/h approx.
Working pressure	8 bars approx.
Installed power	3 x 22 kw AC approx.
Tank capacity	3.000 l approx.

24.2 Scope of supply

- Three (3) Air compressors screw type
- Three (3) Drying system complete with accessories
- One (1) Vertical air tank complete with all accessories

25. WATER TREATMENT PLANT

The water treatment plant has the purpose to clean and to cool the water coming from the rolling mill and to send it back. The plant is divided into two separated circuits:
- one with clear and softened water for the indirect cooling of the machines,
- one with scale water for the direct cooling of the rolling cylinders.

Indirect cooling circuit

Water type	clear softened
Flow rate	120 m^3/h
Inlet temperature	32°C
ΔT temperature, approx.	10°C
Inlet pressure	4 bar
Pressure drop, approx.	0,7 bar
Evaporation losses, approx.	2% of delivery

Direct cooling circuit

Water type	scale
Flow rate	250 m^3/h
Inlet temperature	35 °C
ΔT temperature, approx.	10°C
Inlet pressure	4 bar
Pressure drop, approx.	0,7 bar
Evaporation losses, approx.	2% of delivery

26. ELECTRICAL PART

The purpose of this equipment are:
- to drive all the AC motors,
- to drive all the DC motors,
- to control the automation.

Therefore, the following items are excluded from the scope of supply:
- Incoming line panels from public network,
- Feeding panels for the transformers,
- Transformers,
- Power factor correction system (compensation).

MAIN TECHNICAL DATA	
Destination of equipments	Steel plant
Climate	Mediterranean
Chemical aggressiveness of environment	Industrial environment
Ambient temperature	From -5°C to +40°C
Air relative humidity	From 40 % to 85%
Feeding voltage (to be specified from the Purchaser)	11 kV ± 2,5% 50 Hz
Altitude above sea level	<1000 m
Phases	3
Feeding voltage of the DC motors boards	400 V - 50 Hz
Armature voltage of DC motors	440 V
Energizing voltage of DC motors	220 V
Feeding voltage of the auxiliary AC motor boards	400 V - 50 Hz
Feeding voltage of control boards	220 V - 50 Hz
Voltage of auxiliary circuits	110 V - 50 Hz
Voltage of solenoids	24 V DC
Breaking capacity - not less then	500 MVA

27. EXCLUSIONS

27.1 GENERAL EXCLUSIONS

- Erection and commissioning supervision for assistance and man power
- Technical assistance after start-up
- Lands, industrial buildings, service buildings and related services
- Civil works and foundations
- Calculation of the armored concrete
- All the service rooms and cabins inside the sheds
- Conditioning and heating systems
- Weighing devices
- Ladders and walkways
- Telephone and interphone system
- Rolled conveyor between the machines
- Fire or smoke detectors and fire fighting equipment
- Drinking water network
- Grouting of the machines in the foundations
- Safety protection not strictly concerning the machine
- Board, lodging, local transportation, pocket money and air tickets for our supervisory personnel
- Local permissions, duties or any local insurance for our supervisory personnel
- Any taxes, duties, custom clearance, fees, etc.
- Mechanic test laboratory

27.2 MECHANICAL EXCLUSIONS

- Pipes and fittings on field for compressed air, cooling water, fuel oil, lubrication fluids and hydraulic fluid, including: flanges, elbows, connections, tee, bolts etc.
- Spare parts
- Wear and tear parts
- Anchor bolts and shims/plates to level and fix the machines
- Covers for underground passages, pit etc.
- Boxes for scale and crop ends
- Stairways, walkways and railways
- All fixing straps, plates, rails, and other material to be routed in the civil works
- Lubricants, oils and greases for first filling
- Flushing liquid
- Handling, lifting and transport means, such as mobile cranes, trucks, chains, etc.
- Equipment for managing the plant, such as welding machines, cutting torches and tools in general
- Mechanic workshop for maintenance
- Weighing system and bars counter

27.3 ELECTRICAL EXCLUSIONS

- Transformers
- Power factor correction system
- Power distribution up to the medium tension panels
- Power correction system
- All cables and related accessories on field, as trays, conduits, junction box etc.
- Inside/outside lighting systems
- Earthing systems
- Power collectors for services inside the sheds
- Bus bar for cranes feeding lines
- Electric workshop for maintenance
- Protection system against atmospheric discharges
- Electric tools in general
- Spare parts

27.4 COMMISSIONING

- Spare parts
- Billetts
- Fuel for furnace
- Industrial water
- Tools and equipment
- Consumption materials for start-up such as electricity, fuel for furnace, oil, grease, refractory, oxygen, cutting gas, etc.

Everything non expressly indicated in the present offer.

28. COMMERCIAL CONDITIONS

28.1 TOTAL CONTRACT PRICE

Euro **13.950.000,00**

28.2 TERMS OF PAYMENT

The total contract price shall be paid as follow:

- 20% as advance payment on the date of signing of the Contract through bank transfer
- 5% as advance payment with the delivery of foundation drawings through bank transfer
- 75% by means of renewable, transferable, irrevocable and confirmable Letter of Credit available at sight upon each delivery of the goods and allowing partial shipments.

28.3 DELIVERY TIME

The overall delivery time is scheduled in approx. 10/12 months from the coming into force of the contract, while the partial shipment shall begin as soon as ready.
As per coming into force of the contract we mean the receiving of the first advance payment and acceptance from our side of the Letter of Credit in the proper form. The delaying or the failure in the receiving of the second advance payment will automatically extend the expected timetable.

28.4 DELIVERY TERMS

EX-WORK - ITALY (according to INCOTERMS 2000)

28.5 VALIDITY OF THE OFFER

The present offer is valid for 30 days from the issuing date

NOTE: All the technical data mentioned in the present offer must be considered preliminary and indicative.