

# SCHEDULE 4

## TECHNICAL SPECIFICATIONS WITH GENERAL ARRANGEMENT DRAWINGS

### Technical Specification

**Shuttle Car**  
**Model 10SC32-48D-5**



### General Group

INSTALLATION COUNTRY	SPAIN
MACHINE MODEL	10SC32 M
APPROVAL TYPE /GOV. REGULATORY	SPAIN - NON COAL
<p>The machine must meet European ATEX directives for underground machinery, includes, but not limited to;</p> <ul style="list-style-type: none"> <li>* Directive 2006/42/EC Machinery,</li> <li>* Directive 2004/108/EC Electromagnetic Compatibility (EMC),</li> <li>* Directive 2014/53/EU Radio and telecommunications terminal equipment (RTTE),</li> </ul> <p>Compliance review by Notified Body in Spain, and other applicable European directives</p>	
PRODUCT LINE	SHUTTLE CARS
MINE DATA - MIN MINING HEIGHT	2.5 METERS
MINE DATA - MATERIAL MINED	POTASH
DENSITY MATERIAL AS CONVEYED	1360 KILOGRAMS PER CUBIC METER
MINE DATA - MINING HEIGHT	3.0 METERS



MINE DATA - HAULAGE WIDTH	8.0 METERS
MINE DATA - MAX. PERCENT GRADE	10 TO 15
MINE DATA - TYPE OF GRADE	LONG GRADES
MINE DATA - MINE BOTTOM CONDIT	MEDIUM SHALE
MINE DATA - ENTRY SIZE LIMIT	6M WIDE X 5M HEIGHT
MINE DATA - CROSSCUT ANGLE	120 DEGREES
DISASSEMBLING INSTRUCTIONS	CANOPY TOP
NOMINAL MACHINE HEIGHT	1680 MM - 10SC32D
MACHINE GROUND CLEARANCE (12-1/2") 56" MACHINE HEIGHT	350 MM - 10SC32D
OPERATOR LOCATION (-5 MODEL) DISCHARGE END FACING CONVEYOR ONE (1) OPERATOR'S SEAT	SIDE SADDLE
CONVEYOR WIDTH	1220 MM (48")
MAX. AMBIENT MINE TEMP.	46 DEGREES CELSIUS
CONVEYOR CHAIN TOOL	ASSEMBLY/DISASSEMBLY
LANGUAGE FOR NAME PLATES	SPANISH/ENGLISH
PAINT SPECIFICATIONS Export Machine Hose and Fittings must be free of paint or primer.	JOY ORANGE

### Electrical Group

TYPE OF CABLE GLANDS	GLOBAL GLANDS
GLOBAL GLAND ASSEMBLY TOOL The LOCKING PLATE tier Global Gland assembly tool includes a locking plate & Crow's Foot wrenches to accommodate Global Gland sizes: Ø50.8, Ø63.5, Ø76.2, Ø95.3, and Ø108.	PLATE W/KEEPERS
MACHINE INPUT VOLTAGE	1050 VOLT AC 50 HZ
HEADLIGHTS MCI 50XP Brass enclosure with 12/24VDC LED lamp. Lamp has one 10.8 Watt white LED (50 Watt Halogen equivalent) and three red LEDs. Headlights illuminate white in the direction of travel, and red in the direction opposing travel.	MCI LED RD/WT (DC)
REMOVABLE MAIN BREAKER HANDLE HANDLE IS LOCKABLE, NOT REMOVABLE.	NO
TRACTION DRIVE	VAR. FREQ. AC DRIVE
CONTROLLER FLUID COOLED SYS THE CONTROLLER FLUID COOLING SYSTEM CONSISTS OF A HYDRAULIC MOTOR DRIVING A WATER PUMP WHICH CIRCULATES ESTER-GLYCOL (ANTIFREEZE) FLUID FROM A TANK, INTEGRATED INTO THE LOADING END OF THE CHASSIS ABOVE THE BUMPER, THRU GROOVES MACHINED INTO THE CONTROLLER COVER AND THEN THRU TWO AUXILIARY COOLING TANKS, LOCATED IN THE CHASSIS UNDER THE CONVEYOR DECKPLATE, AND THEN BACK TO THE LOADING END TANK. THIS COOLING SYSTEM IS FOR SHUTTLE CARS OPERATING IN MINES HAVING GRADIENTS OF 10 DEGREES OR GREATER AND AN AMBIENT MINE TEMPERATURE OF 24 DEGREES CELSIUS (75 DEGREES FAHRENHEIT) OR GREATER. THIS COOLING SYSTEM	FLUID COOLED



LOWERS THE OPERATING TEMPERATURE OF THE VFD MODULES. INCLUDES WATER FLOW METER AND WATER PRESSURE GAUGE		
MACHINE DIAGNOSTICS INCLUDES HOUR METER, AMMETER AND PHASE INDICATORS.	VFD DIAGNOSTIC DISPLAY	
DATA RETRIEVAL SHUTTLE CAR EQUIPPED WITH 2.4GHz WI-FI JOYCONNECT OUTBY COMMS & USB DATA DOWNLOAD CAPABILITY	WI - FI ENABLED	
DATA LOGGER DOWNLOAD KEY The download key provides the ability to view and download machine data, recorded by the data logger, on a surface PC.	DOWNLOAD KEY	
TRACTION MOTOR RATING Traction motors are controlled by variable frequency drives. Traction motor temperature is monitored with analog RTDs and frame thermostats set to trip at 145°C.	85KW 50/60HZ AC	VFD
VFD COMMAND FREQUENCY Standard VFD Command Frequency for VFD shuttle car with ESX central controller to control max tram speed.	78.7 Hz	
TRAILING CABLE SUPPLIER AND IN JOY-FRANKLIN TO INSTALL	CUST SUPP	
TRAILING CABLE SIZE AND TYPE TYPE AM1T11 TRAILING CABLE CONSTRUCTION: 3 x 25mm² SCREENED POWER (RED, YELLOW, BROWN), 1 x 25mm² SCREENED PILOT (BLUE) VOLTAGE RATING: 640/1100 VOLTS CURRENT RATING: 110 AMPS Continuous @ 25°C Ambient 125 AMPS Intermittent @ 25°C Ambient CABLE OD: 34.42mm TO 36.52mm	25MM2 TYPE AM1T11	
TRAILING CABLE MANUFACTURER	TBC	
TRAILING CABLE LENGTH	250 METERS	
SPOOL & CABL REEL SPROCKET NO BUSHINGS SUPPLIED WITH SPROCKETS.	KEYED SPROCKETS	
CABLE LENGTH MONITOR CABLE REEL POP UP BUTTON BUILT INTO REEL HAS A CIRCUIT THAT TRIPS POWER CENTER IF REEL RUNS OUT OF CABLE.	YES	
CABLE REEL FLANGE DIAMETER 41" DIA. CABLE REEL FLANGE	1042 MM DIA 10SC32D	
CABLE REEL FLANGE MATERIAL	STEEL	
CONNECTION BOX MODEL The ROUND COVER W/ TABS connection box model is the half- round connection box, the access cover has tabs to aid in the removal of the cover; a special tool is required to gain access to the enclosure.	ROUND COVER W/ TABS	
CABLE REEL TYPE Cable reel with Joy brand slip rings	EUROPEAN MODEL	



and slip-fit compression gland trailing cable entry.

CABLE REEL SLIP RING MATERIAL STANDARD - ALL RINGS	BRONZE
SPOOLING DEVICE FULLY ENCLOSED - OIL FILLED.	CAM TYPE
PUMP MOTOR RATING Pump motor temperature is monitored with frame thermostats set to trip at 145°C.	25 KW
HOURLY METER	PUMP CONV & TRACTION
REVERSING CONVEYOR SWITCH SWITCH MOUNTED IN CONTROL STATION	IN CONTROL STATION
PHASE INDICATORS LIGHTS WILL INDICATE WHICH OF THE THREE PHASE LINES ARE ENERGIZED.	(3) PHASE LIVE LINE
SWITCH TO CONTROL POWER TO MAC	YES WITH TIMER
EMERGENCY SHUT-OFF Four flameproof latching E-Stops are provided: One e-stop is housed in the operator control station flameproof enclosure and located in the operator's compartment; Three e-stops are housed in flameproof enclosures and are located in the traction motor compartments and on the fender adjacent to the cable reel compartment.	FOUR SWITCHES LATCHING
EARTH LEAKAGE PROTECTION Earth leakage protection provided for low voltage (LV) 110/120VAC circuits.	LV CIRCUITS
CIRCUIT BREAKER LOCATION	IN CONTROLLER
CONTROL WIRE TERMINATION DOUBLE GRIP LUG FITTED TO A JOY TERMINAL BLOCK.	DOUBLE GRIP LUG
AUDIBLE WARNING DEVICE TYPE The type of audible warning device is a Hytronic flameproof multi-tone alarm.	HYTRONIC
EXTERNAL RESET SWITCH External reset switch must be lockable Earth leakage reset switch located in the control station. Resets the low voltage (LV) 110/120VAC and/or extra-low voltage (ELV) 12/24VAC earth leakage units.	E/L - CTRL STATION
CONVEYOR MOTOR RATING Conveyor motor temperature is monitored with frame thermostats set to trip at 145°C.	24 KW 50 HZ AC DUAL
HYD. OIL TEMP. & LOW LEVEL IND The hydraulic tank is equipped with low oil level switch and high oil temperature (80°C) switch. When the trip level is reached, the pump motor is de-energized.	LEVEL & TEMP-TRIP

### Conveyor Group

DUAL CONVEYOR MOTOR DRIVE STANDARD ON 10SC32 MODEL	YES (AC MOTORS) "D"
---	---------------------



CONVEYOR CHAIN  
HEAVY DUTY LOADER CHAIN  
WITH DIRT RELIEFS AND UNIVERSALS.

DISCHARGE CONVEYOR WEAR RUNNER UNDER LOADER CHAIN  
DUAL CONVEYOR CHAINS  
AND FLIGHTS RUN ON  
TOP OF WEAR RUNNERS.

CONVEYOR GEAR RATIO 34.59 TO 1

CONVEYOR CHAIN TAKE-UP GREASE  
INCLUDES NUT ADJUSTMENT  
AND SHIMS.

DUAL LOADER CHAIN TAKE-UP ADJU THREE ROD - STANDARD

CHASSIS AND CONVEYOR SIDEBBOARD 455 MM HEIGHT

DISCH.CONVEYOR OVERHANG 1595 MM 10SC32D  
1595 mm  
FROM DISCHARGE END OF  
CHASSIS TO  
DISCHARGE END OF  
CONVEYOR.

CHASSIS AND CONV SIDEBBOARD MTG BOLTED  
BOLTED PER REFERENCE DRAWING.

CONVEYOR REINFORCEMENT TWO REMOVABLE BRACES  
CONSISTS OF TWO BOLTED  
REMOVABLE BRACES ON THE  
CONVEYOR BUMPER.

SHEAVE BRACKET RECESSED & FLANGED

SHEAVE BRACKET MOUNTING BOLTED

CONVEYOR REDUCER DUAL HEVDUTY RED/HEVDUTY WRM89

### Chassis Group

CANOPY FOR OPERATOR'S PLATFORM TWO POSTS / ONE COL

CANOPY SCREENS CONV SIDE

TIRE SUPPLIER JOY SUPP & JOY INST

TIRE MANUFACTURER TBC

TIRE FILL TBC

TIRE SIZE 18.00R X 25

RIM CLAMP WELDED TO RIM

RIM CLAMP IS WELDED TO RIM.

STEEL HOSE PROTECTION INSIDE CAB  
Includes cover plates over all hydraulic items  
in operators compartment

CANOPY HEIGHT 2.497 M. TO 2.797 M.  
250 MM (10") MIN. CLEARANCE BETWEEN CANOPY  
TOP AND ROOF IS RECOMMENDED.  
APPLICABLE FOR A 10SC32D NON-SUSPENSION  
MODEL WHEN OPERATOR CONTROLS/CAB IS  
RAISED 650MM.

CANOPY TEST TEST CANOPY STANDARD

RAISED OPERATOR CONTROLS RAISED 650 MM (D CAR)  
OPERATOR CONTROLS ARE RAISED 650 MM  
IN OPERATORS CAB.

PEDAL ARRANGEMENT RIGHT FOOT TRAM-LEFT FOOT BRAK  
RIGHT FOOT TRAM-LEFT  
FOOT BRAKE.

CAB FOR OPERATOR EXTENDED (WIDER S.S. CAB)  
WIDER OPERATOR COMPARTMENT.

OPERATOR DOOR LATCHING ONE HANDED

OPERATOR CONTROL STANDARD HAND



OPERATOR IN THE SHUTTLE CAR IS ON THE LEFT HAND SIDE OF THE SHUTTLE CAR WHEN THE OPERATOR IS FACING THE DISCHARGE END OF THE SHUTTLE CAR.	
MAIN CONTROLLER MOUNTING	SWING OUT HINGED AT DISCHARGE END FOR OPP. STD. HAND CAR AND HINGED AT RECEIVING END FOR STD. HAND CAR AND SWINGS OUT.
TRACTION GEAR RATIO	75 TO 1 10SC32D
CABLE REEL COMPARTMENT TOP COV	STEEL
CABLE REEL COMPARTMENT FLOOR	GRID
CHASSIS CONVEYOR WEAR RUNNERS	UNDER LOADER CHAIN
DUAL CONVEYOR CHAINS AND FLIGHTS RUN ON TOP OF WEAR RUNNERS.	
REFLECTORS	FOUR
PROTECTED REFLECTORS ARE INSTALLED ON BOTH SIDES OF EACH END ON SHUTTLE CAR.	
REFLECTIVE TAPE	RED
OPER.& CABLE REEL COMPARTMENT	25 MM THICK
25MM VERTICAL PLATE ABOVE BUMPER ON BOTH OPERATOR AND CABLE REEL COMPARTMENT SIDES.	
MODIFICATION, C.R. COMPT.	ONE RUB RAIL BOLTED OVER DOOR
TRACTION MOTOR GUARD	PIN/REINFW/ANGLE 32D
PINNED ON BOTH ENDS OF GUARD AND REINFORCED. USE ON 10SC32D MODELS	
HANDLES FOR COVERS	CABLE REEL ONLY
HANDLES PROVIDED ON COVERS FOR CABLE REEL ONLY	
CONVEYOR DECK PLATE MATERIAL	A. R. DECK WITH LOADER CHAIN
SEAT MOUNTING	RATCH HT W/SL/LORD
USE WITH CUSTOM SEAT 00571905-0000.	
OPERATOR'S SEAT	CUSTOM W/ARM RESTS
OPERATOR RESTRAINT	SEAT BELT
LAP BELT	
LOWERED OPERATOR'S COMP. DECK	NOT LOWERED
SHEAVE BRACKET REINFORCEMENT	TOP/BOTTOM
HORIZONTAL REINFORCING PLATES	
TOW PIN	LOADING & DISCHARGE ENDS
TOW PIN LOCATED ON EACH END. OF SHUTTLE CAR.	
BUILT-UP LOADING END	500MM HGHT 10SC32
MEASURED FROM TOP OF THE REAR BUMPER	
WHEEL UNIT MANUFACTURER	JOY
WHEEL UNIT ACCESS COVERS	FOUR WHEELS
ACCESS HOLE IN CHASSIS ABOVE EACH WHEEL UNIT.	
WHEEL UNIT MOUNTING BOLT	(16) METRIC BOLTS
WHEEL UNIT SEAL	METALLIC FACE SEAL
TRACTION MOTOR ACCESS COVERS	YES
ACCESS HOLES IN CHASSIS ABOVE EACH TRACTION MOTOR	
STEERING TYPE	HORIZONTAL LEVER



#### STANDARD ON SIDE SADDLE MODELS (-5)

PIPING ACROSS MACHINE	ST STEEL PIPING
REPLACEABLE HEAVY WALL STAINLESS	
STEEL PIPES ACROSS CAR	
MACHINE IDENTIFICATION	150 MM
FABRICATED PLATE IS LASER CUT WITH 150 MM	
(6") HIGH, SPECIFIED MACHINE IDENTIFICATION	
INFORMATION.	
PROVIDE INFORMATION REQUIRED TO BE LASER	
CUT IN CUSTOMER SPECIALS.	

#### Brake Group

BRAKE PRESSURE SENSOR	GEMS - I.S. -DEUTSCH
A GEMS intrinsically safe pressure switch monitors park brake hydraulic circuit pressure and prevents the shuttle car from tramping with the park brakes engaged. The pressure switch is equipped with a Deutsch connector DT04-3P-E008, 3 pole, receptacle assembly.	
TRACTION BRAKES	WET MULTIDISC
BRAKE COOLANT TANKS	YES
BRAKE CONTROL	ONE MODULATING VALVE
Single modulating brake valve	
BRAKE HOSE	TOUGH COVER
Provides 5,000 psi (35 MPa) constant working pressure in all sizes (-4 to -32). Two-braid steel wire for sizes -4 to -6. Four- or six-compact spiral steel wires for sizes -8 to -32. Half ISO 18752 minimum bend radius and nearly 30% smaller O.D. by area than SAE spiral.	
BRAKE SYSTEM HOSE ENDS	JIC CRIMP
BRAKE CIRCUIT	PRIORITY FLOW CONTROL VALVE
MANUAL RELEASE FOR EMERGENCY	YES - STANDARD

#### Hydraulic Group

CABLE REEL BYPASS CIRCUIT	YES
ALLOWS CABLE TO BE PULLED FROM REEL BY HAND.	
CONVEYOR ELEVATE CYLINDER	ONE WITH LOAD LOCK
Conveyor lift cylinder equipped with load lock and located under the conveyor.	
HYDRAULIC FLUID TANK FILL	HAND PUMP/WET BRAKE
STANDARD WITH WET BRAKES	
HYDRAULIC FLUID	FILL WITH FUCHS FRF LT 100
TANK FILLED WITH FUCHS AQUACENT LT100.	
MIXING RATIO (60/40).	
NOTE: BETWEEN OCT. 1 AND MAR. 31 BECAUSE	
OF POSSIBLE FREEZING	





TANK WILL BE FILLED  
WITH STANDARD HYDRAULIC OIL.  
(WHEN USING FIRE RESISTANT  
FLUID, BRAKE COOLING  
TANKS ARE REQUIRED.)  
REQUIRES 25 MICRON  
FILTER ELEMENT.

HYDRAULIC HEADER TANK	REQUIRED
HYDRAULIC FLUID FILTER RETURN SPIN-ON 10 MICRON DONALDSON.	SPIN-ON 10MIC DONALD
HYDRAULIC HOSE Provides 5,000 psi (35 MPa) constant working pressure in all sizes (-4 to -32). Two-braid steel wire for sizes -4 to -6. Four- or six-compact spiral steel wires for sizes -8 to -32. Half ISO 18752 minimum bend radius and nearly 30% smaller O.D. by area than SAE spiral.	TOUGH COVER
HYDRAULIC HOSE ENDS	JIC CRIMP
HYD. SEGMENTED HOSE LENGTHS	SEGMENTED HOSE LENGTHS
HINGED HYDRAULIC MODULE	PUMP/PUMP MTR/TANK HINGED
CABLE REEL MOTOR	RINEER VANE MOTOR
CABLE REEL VALVE INCLUDES INTEGRAL BYPASS VALVE	SINGLE RELIEF
HYDRAULIC TEST UNIT INCLUDES ONE SENSOR IN EACH PUMP SECTION.	2 UCC IN-LINE
SIGHT GAUGE- OIL LEVEL AND TEM OIL LEVEL AND TEMPERATURE GAUGES MOUNTED EXTERNALLY ON TANK.	OIL LEVEL AND TEMP
HYDRAULIC PRESSURE GAUGE STANDARD. TWO GAUGES IN OPERATOR COMPT. ONE GAUGE IN CABLE REEL COMPT.	THREE GAUGES
SERVICE JACKS INDIVIDUAL CYLINDER CONTROL, FOUR HANDLES LOCATED OVER TRACTION MOTORS.	FOUR CONTROLS "D"
SERVICE JACK LOCKING DEVICES CONSISTS OF FOUR STEEL TUBES FOR SUPPORTING THE SERVICE JACKS WHEN JACKS ARE EXTENDED.	YES COLLAR

### Fire Suppression Group

DRY CHEMICAL FIRE EXTINGUISHER	MOUNTING ONLY
FIRE EXTINGUISHER BRACKET TYPE	TUBE TYPE

### Lubrication Group

LUBRICATION HOSE Provides 5,000 psi (35 MPa) constant working pressure in all sizes (-4 to -32). Two-braid steel wire for sizes -4 to -6. Four- or six-compact spiral steel wires for sizes -8 to -32. Half ISO 18752 minimum bend radius and nearly 30% smaller O.D. by area than	TOUGH COVER
---	-------------





SAE spiral.	
LUBRICATION HOSE ENDS	JIC CRIMP
HYDRAULIC OILER	REEL & SPOOLER CHAINS
One injector for cable reel chain and one injector for spooling device chain.	

### Catalogs and Service Manuals

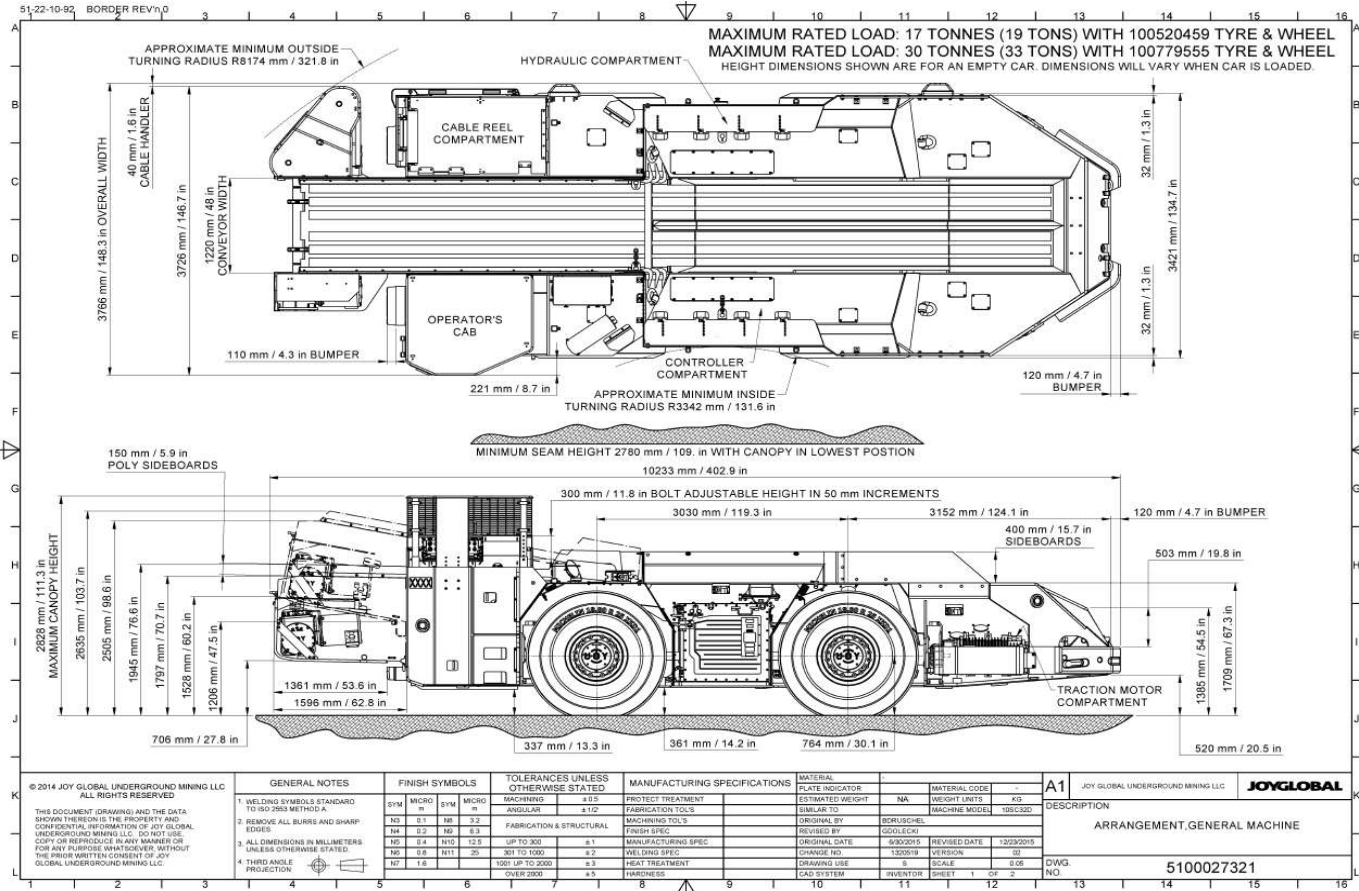
TRANSLATED PUBLICATIONS	REQUIRED
PARTS MANUAL	6
TECHNICAL SERVICE MANUALS	6
POCKET GUIDE ELECTRICAL	25 GUIDES
POCKET GUIDE CHAIN MAINTENANCE	25 GUIDES

### Customer Specials

- 001: Install one additional hydraulic cooling tube in chassis.  
 002: Quick release adaptors to be fitted to electrical controller wet door, ¾ hoses.

General Arrangement Drawing:- 5100027321

Shuttle Car:- Model 10SC32-48D-5



Supervision will be available for 6 weeks following arrival of equipment at Site. Commissioning and testing to follow the supervision of installation.

KMC will provide 8 x 8-hour shifts per piece of equipment performed by Komatsu machine specialists to complete the commissioning of Equipment.

Dynamic commissioning: checks of hydraulic pressures and test functions. Run in check of oil levels, check for abnormal vibrations and noise levels. Post run in checks. Trimming, turning and function checks.

Supervision of Installation and Commissioning is based on all four machines being available to commission and install at the same time. If machines require individual commissioning at separate times, additional charges may apply to cover travel, accommodation, and mobilization expenses as well as the Joy Global Standard service engineer rates.

6 x 8hr shifts of training to be provided by Komatsu specialist trainers during commissioning/warranty period.