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بسمه تعالی

ریاست جمهوری

معاون برنامه‌ریزی و نظارت راهبردی رییس جمهور

شماره:	۱۰۰/۱۱۵۰۶۳
تاریخ:	۱۳۸۸/۱۲/۸
موضوع: علایم استاندارد نقشه‌های فرآوری مواد معدنی (کانه‌آرایی)	

به استناد ماده (۲۳) قانون برنامه و بودجه و ماده (۶) آیین‌نامه استانداردهای اجرایی طرح‌های عمرانی مصوب سال ۱۳۵۲ و در چارچوب نظام فنی و اجرایی کشور (موضوع تصویب‌نامه شماره ۴۲۳۳۹/ت/۳۳۴۹۷هـ مورخ ۱۳۸۵/۴/۲۰ هیأت محترم وزیران)، به پیوست نشریه شماره ۵۰۸ دفتر نظام فنی اجرایی، با عنوان «علایم استاندارد نقشه‌های فرآوری مواد معدنی (کانه‌آرایی)» از نوع گروه سوم ابلاغ می‌شود.

دستگاه‌های اجرایی، مهندسان مشاور، پیمانکاران و عوامل دیگر می‌توانند از این نشریه به عنوان راهنما استفاده کنند و در صورتی که روش‌ها، دستورالعمل‌ها و راهنمای بهتری در اختیار داشته باشند، رعایت مفاد این بخشنامه الزامی نیست.

عوامل یاد شده باید نسخه‌ای از دستورالعمل‌ها، روش‌ها یا راهنماهای جایگزین را به دفتر نظام فنی اجرایی ارسال کنند.

ابراهیم عزیزی



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## فهرست مطالب

صفحه	عنوان
<b>فصل اول - نمودارها و نقشه‌های متداول در فرآوری مواد معدنی</b>	
۳	۱-۱- آشنایی.....
۳	۲-۱- راهنمای نقشه یا نمودار.....
۳	۳-۱- روش هماهنگ‌سازی.....
۳	۴-۱- معیارهای طراحی.....
۴	۵-۱- نمودارها و نقشه‌های فرآوری مواد معدنی.....
۴	۱-۵-۱- نمودار بلوکی.....
۴	۲-۵-۱- نمودار جریان جرمی.....
۴	۳-۵-۱- نمودار جریان فرآیند.....
۵	۴-۵-۱- برگه‌های اطلاعاتی (دفترچه‌ی محاسبات) فرآیند.....
۵	۵-۵-۱- نمودارهای مداری.....
۵	۶-۵-۱- نمودارهای سامانه و لوله‌کشی.....
۵	۷-۵-۱- نمودارهای لوله‌کشی و ابزار دقیق.....
۶	۸-۵-۱- نمودار جریان مکانیکی.....
۶	۹-۵-۱- نمودار موقعیت تجهیزات.....
۶	۱۰-۵-۱- نقشه‌های چیدمان لوله‌ها.....
۷	۱۱-۵-۱- نقشه‌های لوله‌کشی ایزومتریک.....
۷	۱۲-۵-۱- نقشه‌های نصب.....
<b>فصل دوم - سامانه‌ی شماره‌گذاری تجهیزات و مدارک</b>	
۹	۱-۲- شماره‌ی مشخصه.....
۹	۲-۲- شماره‌گذاری تجهیزات.....
۹	۱-۲-۲- ناحیه‌ی اصلی.....
۹	۲-۲-۲- ناحیه‌ی فرعی.....
۹	۳-۲-۲- فهرست رده‌ی اصلی تجهیزات اصلی.....
۹	۴-۲-۲- فهرست رده‌ی فرعی تجهیزات اصلی.....
۱۱	۵-۲-۲- فهرست تجهیزات فرعی.....
۱۵	۶-۲-۲- شماره‌ی سریال تجهیز.....
۱۵	۳-۲- شماره‌گذاری مدارک.....
۱۵	۱-۳-۲- شاخص پروژه (طرح).....
۱۵	۲-۳-۲- شاخص تولید کننده‌ی مدرک.....
۱۵	۳-۳-۲- شاخص نوع مدرک.....

۱۶	..... شماره‌ی ناحیه‌ی اصلی ۴-۳-۲
۱۶	..... شماره‌ی ناحیه‌ی فرعی ۵-۳-۲
۱۶	..... شاخص رده‌ی اصلی تجهیز اصلی ۶-۳-۲
۱۶	..... شاخص رده‌ی فرعی تجهیز اصلی ۷-۳-۲
۱۷	..... شاخص تجهیز فرعی ۸-۳-۲
۱۷	..... شماره‌ی سریال تجهیز ۹-۳-۲
۱۷	..... زمین ۱۰-۳-۲
۱۸	..... شماره‌ی کاربری مدرک ۱۱-۳-۲
۲۳	..... شماره‌ی سریال کاربری مدرک ۱۲-۳-۲
۲۳	..... نقشه‌ها ۱۳-۳-۲
۲۴	..... راهنما یا دستورالعمل استفاده از تجهیزات ۱۴-۳-۲
۲۴	..... سامانه‌ی کدگذاری بازنگری مدارک ۴-۲

### فصل سوم - علایم استاندارد واحدهای عملیاتی

۲۷	..... سنگ خردکن‌ها
۲۷	..... سنگ‌شکن‌ها
۳۰	..... آسیاها
۳۳	..... تجهیزات دانه‌بندی
۴۱	..... جداکننده‌های مغناطیسی
۴۵	..... جداکننده‌های الکترواستاتیک
۴۵	..... جداکننده‌های ثقلی
۵۴	..... ماشین‌های فلوتاسیون
۵۵	..... ته‌نشینی
۵۷	..... فیلتراسیون
۵۹	..... پمپ‌ها
۶۰	..... مخازن و آماده‌سازها
۶۰	..... خشک‌کن‌ها
۶۱	..... خوراک دهنده‌ها
۶۲	..... فروشویی
۶۴	..... محصول خروجی
۶۴	..... جمع‌کننده‌ها
۶۶	..... عمومی
۷۰	..... شستشو
۷۱	..... مراجع

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- 1- legend
  - 2- Co-ordination procedure
  - 3-Design Criteria
  - 4-Process Units Design Criteria

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	8	-2-5-1
	9	-3-5-1

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- 1-Mechanical Design Criteria
  - 2- Electrical Design Criteria
  - 3- Instrumentation Design Criteria
  - 4-Concrete & structural steel works
  - 5-Piping design criteria
  - 6-Process Diagrams and Drawing
  - 7-Block Diagrams
  - 8-Mass Flow Diagram
  - 9-Process Flow Diagram

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1- Process Data Sheets  
2-Circuit Diagrams  
3-System and Piping Diagrams  
4-Piping and Instrument Diagrams

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- 1-inter locks
  - 2-Mechanical Flow Diagrams
  - 3-Equipment Location Diagrams
  - 4-Pipe Arrangement Drawings
  - 5-Piping Isometrics

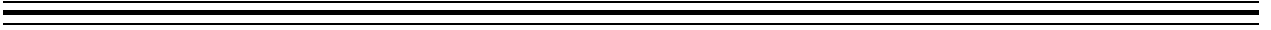


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		(Area)
GENERAL		0
MINE		1
CRUSHING		2
STOCKPILE		3
CONCENTRATOR	( )	4
TAILINGS FACILITIES		5
GENERAL SERVICES		6
LABORATORY, ADMINISTRATION BUILDING, CLINIC, CANTEEN		7
WATER SUPPLY, WASTE WATER TREATMENT, PUMP STATION & RESERVOIR		8
POWER SUPPLY & DISTRIBUTION		9

-2-2

		(Area)
GENERAL		00
MINE AREA		10
CRUSHING AREA		20
CRUSHING PLANT		21
CONVEYING SYSTEM	( )	22
STOCKPILE AREA		30
RECLAIM FEEDER		31
CONVEYING RECLAIM SYSTEM		33
CONCENTRATOR AREA	( )	40
GRINDING		41
FLOTATION		42
LIME & REAGENT		43
CONCENTRATE DEWATERING		44
TAILINGS AREA		50
THICKENING & WATER RECLAIM		51
RECLAIM PUMPS		56
GENERAL SERVICES		60
AIR SYSTEM COMPRESSED		61
VENTILATION SYSTEM		62
MAIN PIPING CULVERT	( )	65
LABORATORY, ADMINISTRATION BUILDING, CLINIC, CANTEEN		70
WATER SUPPLY, WASTE WATER TREATMENT, PUMP STATION & RESERVOIR		80
WATER SYSTEM		84
PLANT POWER SUPPLY & DISTRIBUTION		90 - 99

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		(Code)
CLASSIFIER		<b>CL</b>
COLLECTOR		<b>CO</b>
CRUSHER		<b>CR</b>
CONDITIONING SYSTEM	/	<b>CT</b>
CONVEYOR BELT		<b>CV</b>
DRYER		<b>DR</b>
ELECTRIC SEPARATOR		<b>ES</b>
FEEDER		<b>FD</b>
FLOTATION CELLS		<b>FL</b>
FILTER	( )	<b>FT</b>
GRAVITY SEPARATION EQUIPMENT		<b>GS</b>
LEACHING		<b>LE</b>
MILL		<b>ML</b>
MAGNETIC SEPARATOR		<b>MS</b>
OUTPUT		<b>OP</b>
ROCK BREAKER		<b>RB</b>
POCK BREAKER		<b>RB</b>
SCREEN		<b>SC</b>
SORTING		<b>SR</b>
THICKENER		<b>TH</b>

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		(Code)
FLOTATION AIR BLOWER	( )	<b>AB</b>
AIR COMPRESSOR		<b>AC</b>
AIR DRYER		<b>AD</b>
AGITATING & MIXING		<b>AG</b>
AUTO FIELD MOTOR STARTER PANEL		<b>AM</b>

-4-2

		(Code)
COMPRESSED AIR PIPE		<b>AP</b>
ACCESSORIES TO MAIN EQUIPMENT		<b>AS</b>
BALL BIN		<b>BB</b>
BULK BAG SPLITTER		<b>BU</b>
BLOWER PIPE		<b>BR</b>
BELT SCALE		<b>BS</b>
CATHODIC PROTECTION		<b>CA</b>
CIRCUIT BREAKER		<b>CB</b>
CABLE DUCT		<b>CD</b>
COOLING EQUIPMENT		<b>CE</b>
CHUTES (TRANSFER, DISCHARGE, FEED & COLLECTOR BOX)	( )	<b>CH</b>
COOLING WATER SYSTEM		<b>CM</b>
CONTROL SYSTEM		<b>CN</b>
CLEAN UP PUMP		<b>CP</b>
PLANT CONTROL SYSTEM		<b>CS</b>
COOLING FAN		<b>CU</b>
DC POWER SUPPLY		<b>DC</b>
DUST FILTER		<b>DF</b>
EMERGENCY DIESEL-GENERATOR		<b>DG</b>
DISTRIBUTION PANEL, LOW VOLTAGE		<b>DP</b>
DRUM TIPPER		<b>DT</b>
EXCITER		<b>EX</b>
VENTILATION FAN		<b>FA</b>
FIRE DETECTION SYSTEM		<b>FD</b>
FIRE FIGHTING & PROTECTION SYSTEM		<b>FF</b>
FIRE ALARM SYSTEM		<b>FI</b>
FIRE WATER PIPE		<b>FP</b>
FLOCCULATION PREPARATION SYSTEM		<b>FS</b>
GENERATOR		<b>GE</b>
SEAL WATER PIPE		<b>GP</b>
HOIST & CRANES		<b>HC</b>



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		(Code)
HEATING EQUIPMENT		<b>HE</b>
HVAC (HEATING, VENTILATION, AND AIR-CONDITIONING)		<b>HV</b>
HYDRAULIC/PNEUMATIC SYSTEM	/	<b>HY</b>
INTERCOM		<b>IC</b>
INSTRUMENTATION PANEL		<b>IP</b>
JUNCTION BOX		<b>JB</b>
HYDRAULIC JACKING SYSTEM	[ ]	<b>JS</b>
LIGHTNING ARRESTER		<b>LA</b>
LIGHTING CONTACTOR PANEL		<b>LC</b>
LINER HANDLER		<b>LH</b>
LIME PREPARATION SYSTEM		<b>LI</b>
LIQUID RHEOSTAT		<b>LR</b>
SILO		<b>LS</b>
LUBRICATION/HYDRAULIC SYSTEM		<b>LU</b>
MULTI STREAM ANALYSER		<b>MA</b>
MOTOR CONTROL CENTER		<b>MC</b>
METAL DETECTOR	[ ]	<b>MD</b>
MANIFOLD	[ ]	<b>MF</b>
MANUAL MOTOR STARTER	[ ]	<b>MM</b>
MOTOR		<b>MO</b>
MAGNET SEPARATOR		<b>MS</b>
NEUTRAL EARTH RESISTOR		<b>NR</b>
PAGING SYSTEM		<b>PA</b>
PIPING		<b>PI</b>
LUBRICATION/HYDRAULIC PUMP		<b>PL</b>
POWER METER		<b>PM</b>
POWER SUPPLY		<b>PO</b>
POWER LINE, 20 KV	20	<b>PW</b>
PUMP BOX		<b>PX</b>
PARTICLE SIZE ANALYSER		<b>PZ</b>
REAGENT PREPARATION SYSTEM		<b>RG</b>
RUBBER HOSES FOR SLURRY PIPING		<b>RH</b>
RUBBER LINING		<b>RL</b>

-4-2

		(Code)
ROTARY VALVE		<b>RV</b>
SAMPLER		<b>SA</b>
SEWAGE SYSTEM		<b>SE</b>
SWITCH GEAR, 20 KV	20	<b>SH</b>
SWITCH GEAR, 6.9 KV	6/9	<b>SM</b>
SLURRY PIPE		<b>SP</b>
SAMPLER PUMP		<b>SR</b>
SUBSTATION 230 / 20 kV	20 / 230	<b>SS</b>
TELEPHONE		<b>TE</b>
POWER TRANSFORMER		<b>TR</b>
UPS (UNINTERRUPTABLE POWER SUPPLY)		<b>UP</b>
VALVES		<b>VA</b>
VARIABLE SPEED CONTROLLER		<b>VC</b>
VARIABLE SPEED DRIVE		<b>VP</b>
WASTE WATER TREATMENT PACKAGE		<b>WA</b>
WATER BOILER		<b>WB</b>
DUST COLLECTING SYSTEM		<b>WC</b>
WATER FILTER		<b>WF</b>
PRESSURIZED WATER PIPE		<b>WP</b>
WATER TANK		<b>WT</b>

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		(Code)
PROJECT GENERAL		A
BILL OF MATERIAL		B
CALCULATION REPORT		C
DRAWING		D
EQUIPMENT GENERAL		E
PROCESS MATTERS		F

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		(Code)
(COLLECTION) PICTURES		<b>G</b>
(COLLECTION) CATALOGUES		<b>H</b>
INSPECTION, CONTROL AND/OR CONFORMITY CERTIFICATE		<b>I</b>
LIST OF DOCUMENTS, USERS etc.		<b>L</b>
MAINTENANCE, START UP MANUALS		<b>M</b>
PACKING LIST		<b>P</b>
QUALITY ASSURANCE DOCUMENT (QCTM, LOC, IRE etc.)		<b>Q</b>
STANDARDS AND RULES		<b>R</b>
SPECIFICATION, DATA SHEET AND PROCEDURE		<b>S</b>
THIRD PARTY DOCUMENTATION		<b>T</b>
ACTIVITY PLANNING DOCUMENT		<b>V</b>
FORM (ARCHIVE ORGANISATION)		<b>X</b>

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AUTOMATION		<b>A</b>
STEEL WORKS		<b>B</b>
CIVIL WORKS		<b>C</b>
SHIPPING		<b>D</b>
ELECTRICAL WORKS		<b>E</b>
FIRE FIGHTING AND DETECTION		<b>F</b>
GENERAL		<b>G</b>
HYDRAULICS AND LUBRICATION		<b>H</b>
INSPECTION & TEST		<b>I</b>
PAINTING	( )	<b>K</b>
WORKS MECHANICAL		<b>M</b>
PROGRAM AND PLANNING		<b>N</b>
UTILITIES AND PIPING	( )	<b>P</b>
OPERATION CONSUMABLES		<b>R</b>
INSTRUMENTATION		<b>S</b>
INTERCOMMUNICATION SYSTEM		<b>T</b>
WAREHOUSE		<b>W</b>
PROCESS		<b>Z</b>
GENERAL & EQUIPMENT LAYOUT		<b>Q</b>
OUTLINE DOCUMENT	( )	<b>U</b>
HVAC (HEATING, VENTILATION AND AIR CONDITIONING)		<b>V</b>
ORGANISATION OF DOCUMENT AND ARCHIVES		<b>X</b>

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Network schedule for Scope of Work		<b>010</b>
<b>PLANT &amp; PROCESS PACKAGE TECHNICAL DOCUMENTATION</b>		
Equipment List		<b>020</b>
Flow Sheet with Process and Utility Balance		<b>030</b>
Process and Instrument Diagram (P & ID for process and utility distribution)		<b>040</b>
General Arrangement or Layout Drawings		<b>050</b>
Foundation Drawing, Load Data of Plant Package	( )	<b>060</b>
Piping Arrangement Drawings Water/Air (Isometrics)	( )	<b>070</b>
Piping Arrangement Drawings Slurry (Isometrics)	( )	<b>071</b>
Piping Arrangement Drawings Reagent (Isometrics)	( )	<b>072</b>
Line List of all Piping Systems		<b>080</b>
Piping Specification		<b>090</b>
Outline Drawings for Overhead Crane/ Hoist		<b>094</b>
Outline Drawing for Chutes, Boxes, Bins, Tanks, Launderers, Distributors etc.		<b>095</b>
Outline Drawing for Service Platforms		<b>096</b>
Outline Drawing for Conveyors		<b>097</b>
Outline Drawing for Building		<b>099</b>
Steel Structure and Plate Work General Drawing		<b>100</b>
Steel Structure and Plate Work Detail Drawings with Stress Calculations		<b>110</b>
Design Criteria		<b>111</b>
Process & Utility Calculations such as Mass Balance, Equipment Sizing, Hydraulic Calculations, Solids Handling Equipment, Power Calculations and Reagent Consumption Calculations		<b>112</b>











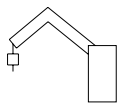

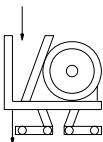
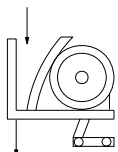


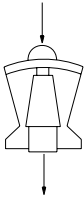

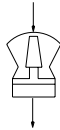
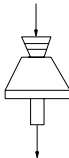




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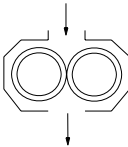
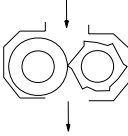
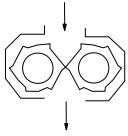
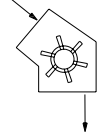
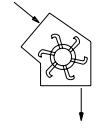

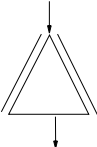


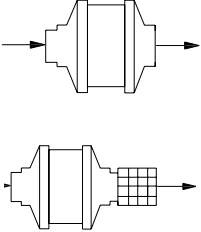
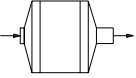
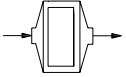
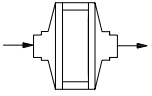
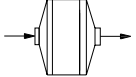
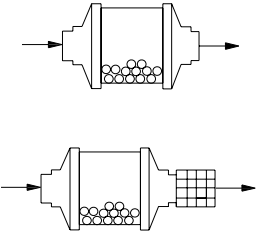


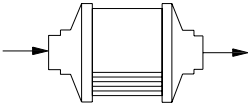
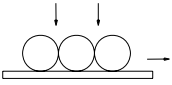
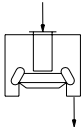
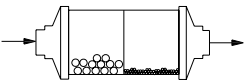
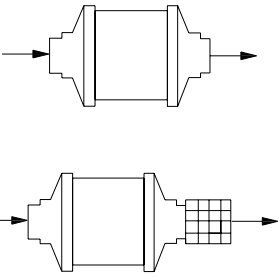
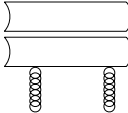
		=	[LL] +	[-LL]		
				2	1	
			<b>Rock Breaker</b>			<b>RB-OO</b>
4			Rock Breaker	-	-	RB-OO
			[ ]			
			<b>Crushers</b>			<b>CR-OO</b>
5			Single Toggle Jaw Crusher			CR-JS
5			Double Toggle Jaw Crusher			CR-JD
		37 (Blake)		3		(Dodge)
5			Universal Jaw Crusher			CR-JU
					[ ]	

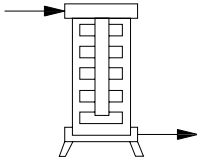
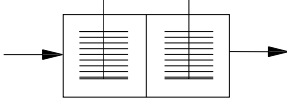
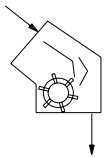
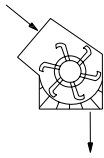
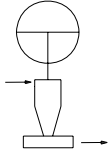
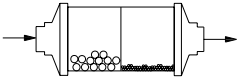
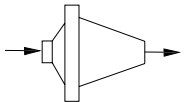
			2	1		
2		Supported Spindle Gyratory Crusher				CR-GS
	( )					
5		Suspended Spindle Gyratory Crusher				CR-GP
5		Fixed Spindle Gyratory Crusher				CR-GF
11		Standard Cone Crusher				CR-CS
	3					
11		Short-head Cone Crusher				CR-CH
	2					
11		Gyradisc Cone Crusher				CR-CG

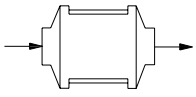
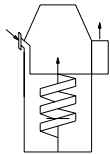
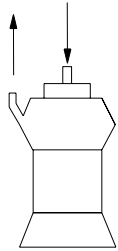
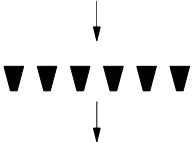
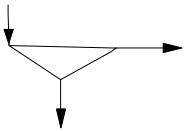
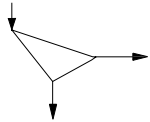


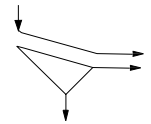
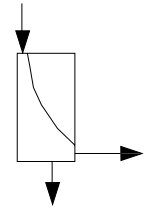
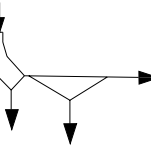
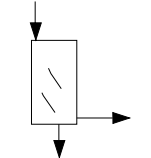
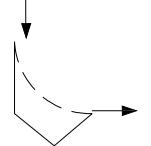
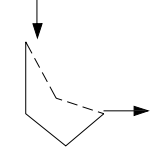
			2	1		
2		Roll Crusher				CR-RR
8		Single-roll Sledging Crusher				CR-RS
8		Double-roll Sledging Crusher				CR-RD
( )						
11		Impact Crusher	-			CR-IO
30						
5		Hammer Crusher	-			CR-HO
11		Pebble Crusher	-			CR-PO
2		VSI – Rock to Rock (Barmac Type)	-	( )		CR-VO

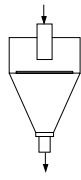
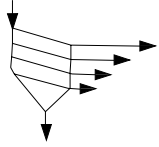
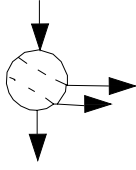
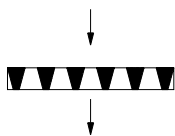
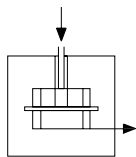
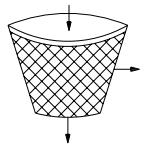
			2	1		
		<b>Mills</b>				<b>OO-ML</b>
2		Autogenous (AG) Mill	-			ML-AG
9		Hadsel Autogenous Mill				ML-AH
9		Hardinge Autogenous Mill				ML-AR
	20		85	70		35
5		Aerofall Autogenous Mill				ML-AA
2		Semi-Autogenous (SAG) Mill	-			ML-SA
		( 20 10 )				
2		Ball Mill	-			ML-BA
		( 50 30 )				

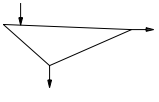
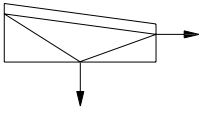
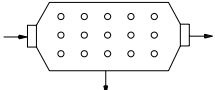
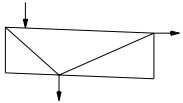
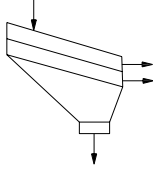
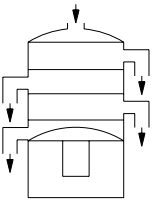
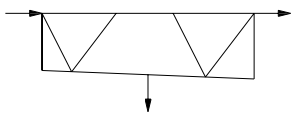
			2	1		
2		Rod Mill	-			ML-RO
	2 0/5	40 20				
5		Roller Mill	-			ML-RL
	( 4 )				3 2	
5		Raymond Mill				ML-RR
		500 300				
2		Tube Mill	-			ML-TO
2		Pebble Mill	-			ML-PO
		Vibrating Mill	-	( )		ML-VO
					90	

			2	1		
2		Agitated Mill	-			ML-AO
	1					
2		Attrition Mill	-			ML-AT
7		Impact Mill	-			ML-IO
7		Hammer Mill	-			ML-HO
4		Jet Pulverizer Mill	-			ML-JP
2		Compartmented Ball Mill	-			ML-CO
11		Conical Ball Mill	-			ML-CB
	60					30

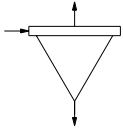
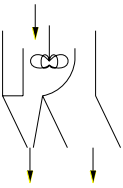
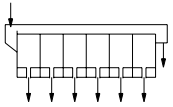
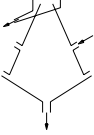
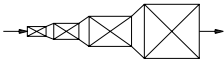
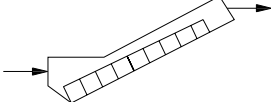
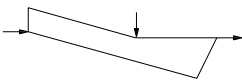
			2	1		
4		Rubber Roller Mill (SRR)	-			ML-SR
	2/4					
4		Stirred Mill (VERTIMILL®)	-	( )		ML-VM
5		Tower Mill	-			ML-TM
	Grain Size Distribution Equipment					SD-OO
11		Grizzly	( )			SD-GO
3		Flat Screen				SD-FO
3		Inclined Screen				SD-IO

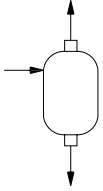
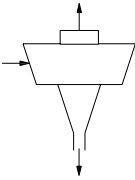
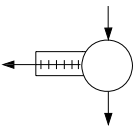
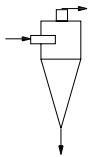
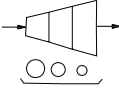
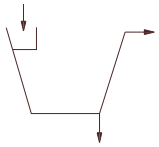
			2	1		
3		Double Deck Screen				SD-DD
3		DSM Screen				SD-DS
3		Drain/Wash Screen				SD-DW
3		Bartles - CTS Screen				SD-BA
3		Sieve Bend				SD-BE
3		Curve screen				SD-CO

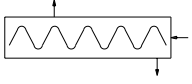
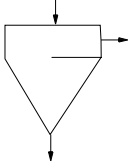
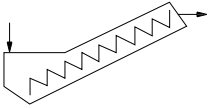
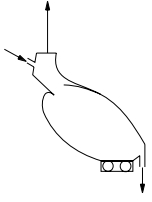
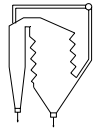
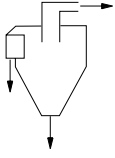
			2	1		
2		Hukki Screen				SD-HU
3		Mogensen Screen (Sizer)				SD-MO
3		Trommel Screen				SD-TR
11		Vibrating Grizzly Screen				SD-GV
11		Rotating Screen				SD-RO
5		Hydro Screen				SD-HY

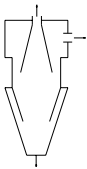
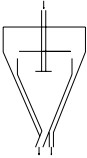
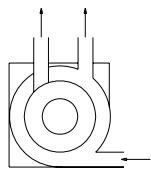
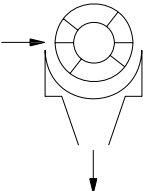
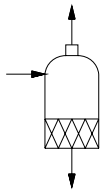
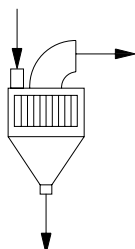
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3		Canal Screen				SD-CA
3		Shaking Screen				SD-SH
	800 60	12		( )		
3		Drum Screen				SD-DR
3		Reciprocating Screen				SD-RE
5		Vibrating Screen				SD-VO
11		Gyrotory Screen				SD-GY
11		Resonance Screen				SD-RS

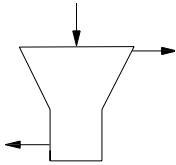
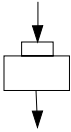
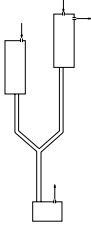
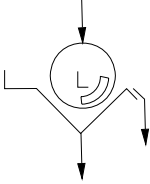
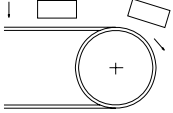


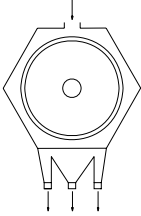
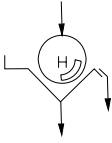
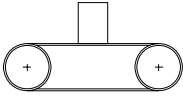
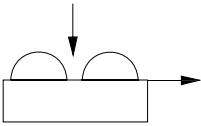
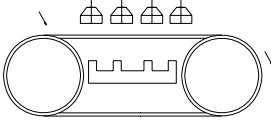
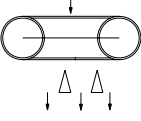
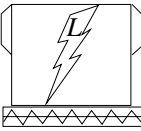
			2	1		
		<b>Classifier</b>				<b>CL-OO</b>
5		Cone Classifier				CL-CO
5		Stokes Classifier				CL-SO
11		Fahrenwald Classifier				CL-FO
11		Rheax Classifier				CL-RH
11		Spitzkasten Classifier				CL-SP
9		Rake Classifier				CL-RO
11		Spiral Classifier				CL-SO

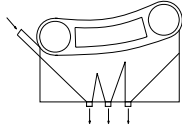
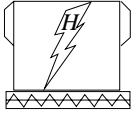
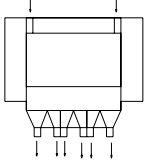
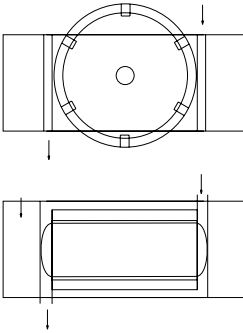
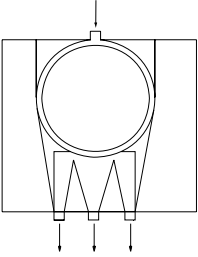
			2	1		
3		Hydrosillator				CL-HS
3		Settling Cone Classifier				CL-TO
3		Bowl Classifier				CL-BO
2		Hydrocyclone				CL-HY
					:1 :2	
3		Hydrosizer				CL-HZ
5		Hydro Classifier				CL-HR

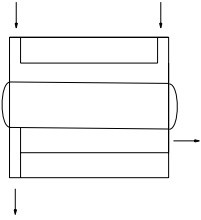
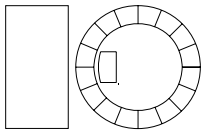
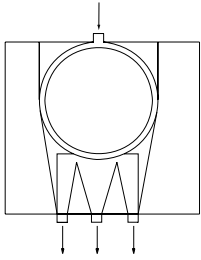
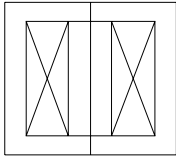
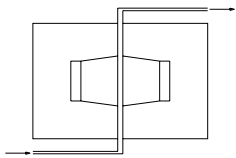
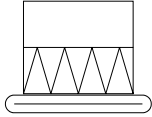
			2	1		
3		Centrifuge Classifier				CL-CF
3		Hukki Classifier				CL-HU
2		Screw Classifier				CL-SC
11		Birtley Classifier	( )			CL-BY
11		Alpine Classifier	( ) ( ) ( )			CL-AL
				( )		
2		Dry (Air) Cyclone				CL-DC

			2	1		
11		Saint Jacques Cyclone				CL-SJ
11		Wizzer				CL-WO
11		Microplex				CL-MP
	60 8					
2		Dynamic Classifier	-			CL-DY
9		Electrostatic Precipitator	-			CL-EP
3		Dynamic Separator	-			CL-DS

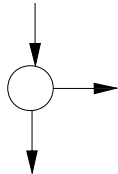
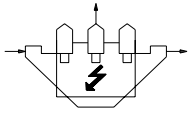
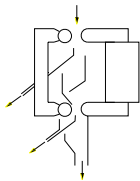
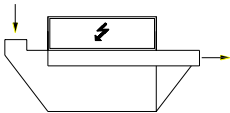
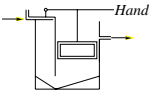
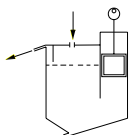
			2	1		
3		Willoughby Box	-			CL-WB
3		Distributor				CL-DI
11		Elutriator	-	-		CL-EL
		<b>Magnetic Separators</b>				<b>MS-OO</b>
5		Low Intensity Dry Magnetic Separator (LIMS)	-			MS-LD
5		Low Intensity Dry Magnetic Separator with Suspended Magnets )LIMS(				MS-LS

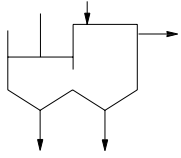
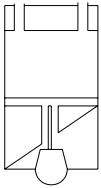
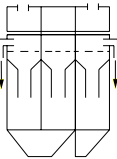
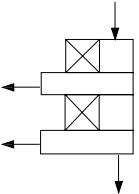
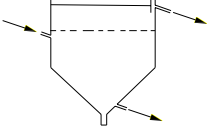
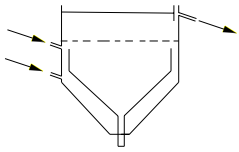
			2	1		
5		Low Intensity Dry Magnetic Separator with Drum Separator (LIMS)				MS-LM
5		High Intensity Dry Magnetic Separator (HIMS)	-			MS-HD
15		High Intensity Dry Magnetic Separator with Cross-belt Separator (HIMS)				MS-HS
2		High Intensity Dry Magnetic Separator with Induced Roll Separator (HIMS)				MS-HI
15		High Intensity Dry Magnetic Separator with Disc Separator (HIMS)	( )			MS-HK
15		High Intensity Dry Magnetic Separator - Permroll (HIMS)	( )			MS-HP
2		Low Intensity Wet Magnetic Separator (LIMS)	-			MS-LW

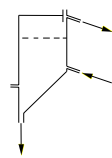
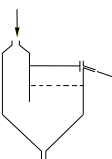
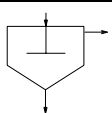
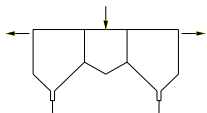
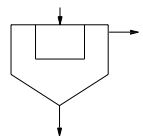
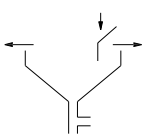
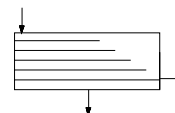
			2	1		
2		Low Intensity Dry Magnetic Separator – Crockett (LIMS)	( )			MS-LC
2		High Intensity Wet Magnetic Separator )HIMS(	-			MS-HW
9		High Intensity Wet Magnetic Separator – Gill Separator )HIMS(				MS-HG
9		High Intensity Wet Magnetic Separator – Jones Separator )HIMS(				MS-HJ
15		High Intensity Wet Magnetic Separator – Carpco )HIMS(				MS-HC

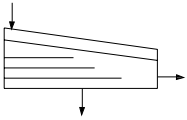
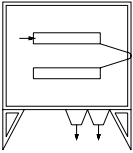
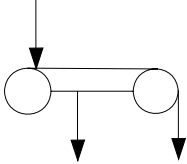
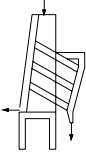
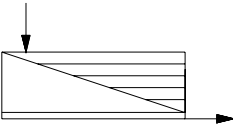
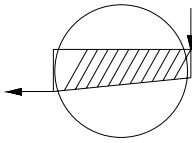
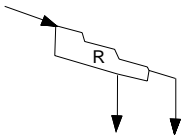
			2	1		
15		High Intensity Wet Magnetic Separator – Krupp sol Separator )HIMS(				MS-HR
15		High Intensity Wet Magnetic Separator – Eriez Separator )HIMS(				MS-HE
	1/2					
15		High Intensity Wet Magnetic Separator – Boxmag Separator )HIMS(				MS-HB
5		High Intensity Wet Magnetic Separator – Non-continuous Separator )HIMS(				MS-HN
5		High Intensity Wet Magnetic Separator – Continuous Separator (Sala - Carousel) )HIMS(	- ) (			MS-HA
5		High Gradient Magnetic Separator )HIMS(	-			MS-HH

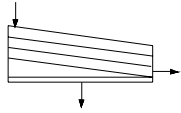
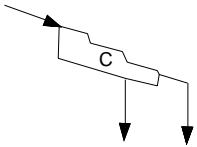
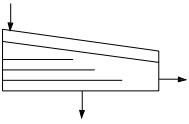
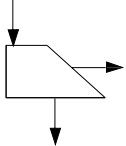
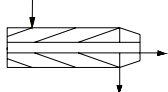
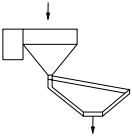
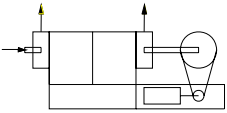


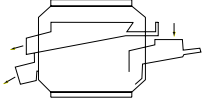
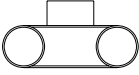
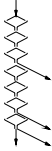
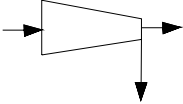
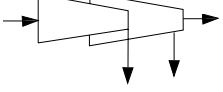
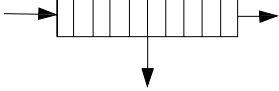
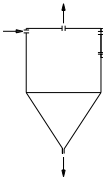
			2	1		
		<b>Electrostatic Separators</b>				<b>ES-OO</b>
11		Roll Electrostatic Separator				ES-RO
5		Plate Electrostatic Separator				ES-PO
9		Induced Separator	-			ES-IO
9		High Tension Separator	-			ES-HT
		<b>Gravity Separation Equipment</b>				<b>GS-OO</b>
6		Hand Jig				GS-JH
14		Harz Jig				GS-JZ

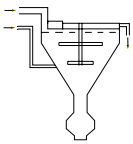
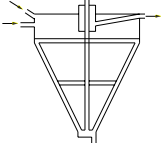
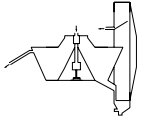
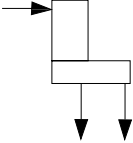
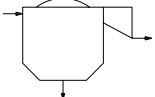
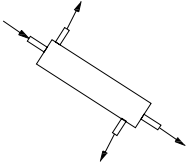
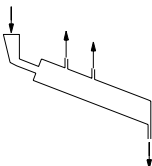
			2	1		
11		Denver Jig				GS-JD
14		Bendelari Jig				GS-JB
11		Batac Jig				GS-JT
11		Baum Jig				GS-JU
9		Pan-American Placer Jig				GS-JP
9		Russian Jig				GS-JR

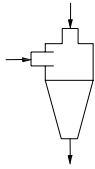

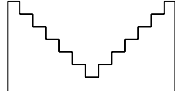
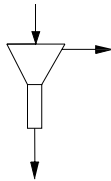
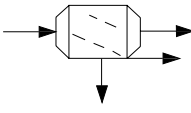
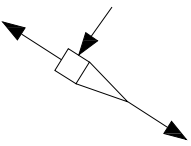
			2	1		
9		Yuba Jig				GS-JY
9		Richards Jig				GS-JR
14		Feldspar Jig				GS-JF
14		Radial (IHC) Jig				GS-JI
14		Hancock Jig	) (			GS-JC
14		Penumatic Jig	-			GS-JN
14		Wilfley Table	-			GS-TW

			2	1		
14		Slime Table	-			GS-TS
0/005 0/1						
3		Bartles - Mozley Slime Table	-	-		GS-TB
100						
3		Bartles - Crossbelt Concentrator	-			GS-TC
50						
14		Buckman Table	-			GS-TK
3	3 2		50		5	
14		Deister Table	-			GS-TD
14		Revolving Round Table	-			GS-TR
3		Rand Leases Plane Table	-			GS-TL

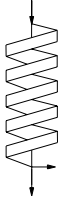
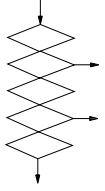
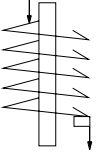
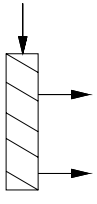
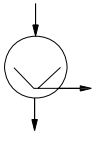
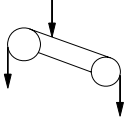
			2	1		
14		Campbell Bumping Table	-			GS-TM
3		Corduroy Table	-			GS-TY
74						
11		Shaking Table	-			GS-TH
150						
11		Air (Pneumatic) Table	-			GS-TA
3		Shaking Grease Table				GS-TG
11		Vibrating Grease Table				GS-TV
120 * 90						
11		Multi-gravity Separator (MGS)	-		( )	GS-MG
100						

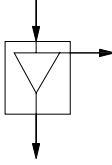
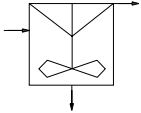
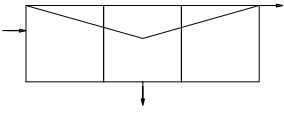
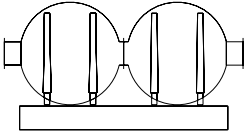
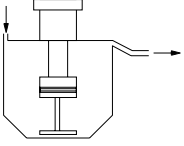
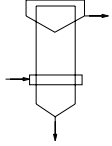
			2	1		
11		Drum Separator	-			GS-DS
7		Bartless belt Separator				GS-BB
PVC						
3		Reichert Cone	-			GS-RC
6	600 100				:1 :2	
3		Blanket	-	( )		GS-BO
3		Pinched Sluice	-	-		GS-PS
3		Palong or Sluice	-	-		GS-PA
2 1 80 40						
14		Cone Heavy Media Separator	-			GS-HM
(HMS)						

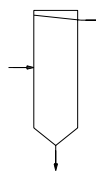
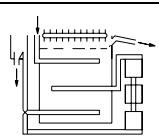
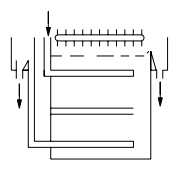
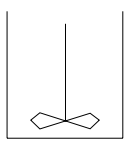
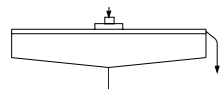
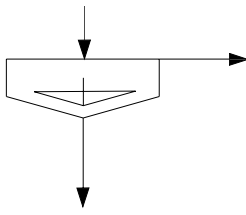
			2	1		
14		Chance Cone Heavy Media Separator				GS-CC
14		Wemco Cone Heavy Media Separator				GS-WC
14		Norwalt Heavy Media Separator				GS-NH
3		Vorsyl Heavy Media Separator				GS-VH
5		Cylindrical Media Separator	-			GS-DO
1		Dyna Whirlpool Heavy Media Separator	-			GS-DW
13		Tri - Flo	-			GS-TF
				0/5		

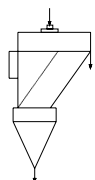
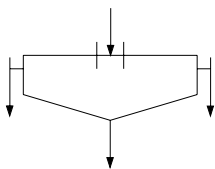
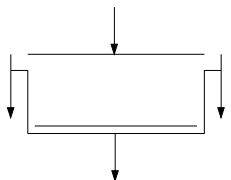
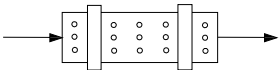
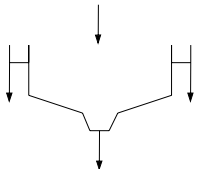
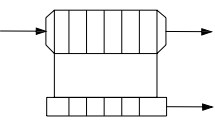
			2	1		
2		Dense Medium Cyclone	-			GS-DC
120						
14		Water-only Cyclone	-			GS-WO
5						
2		Knelson Heavy Media Separator	-			GS-KO
(HMS)						
3		HMS Cone	-	HMS		GS-HO
(HMS)						
3		HMS Drum or Trough	-	HMS		GS-HD
(HMS)						
3		HMS Cyclone	-	HMS		GS-HH

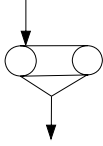
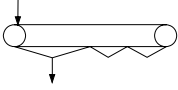
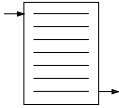
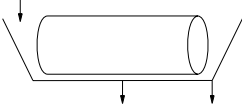
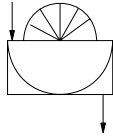
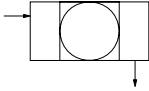
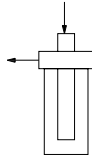


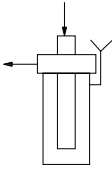
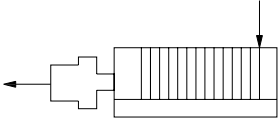
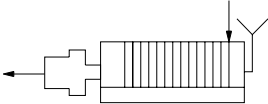
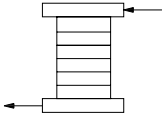
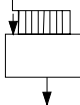
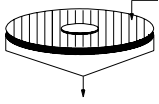
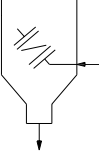
			2	1		
11		Humphreys Spiral	-			GS-SH
	3 0/075					
14		Richard Spiral	-			GS-SR
2		VXS Spiral	-			GS-SV
3		GEC Duplex Concentrator	-	GEC		GS-GD
3		Johnson Barrel	-			GS-JB
	( 5 2/5) 0/75 3/6					
3		Vanner or Endless Belt	-	-		GS-EB

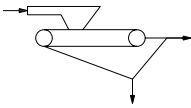
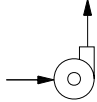
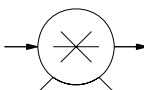
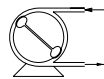
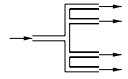
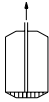
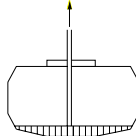
			2	1		
3		Centrifugal Concentrator	-	-		GS-CE
	50					
		<b>Flotation Machines</b>				<b>FL-OO</b>
2		Mechanical Flotation Cell with Agitator	-	-		FL-MC
	( ) ( )					
2		Triple Flotation Bank	-			FL-BR
	( ) ( )					
4		Double Cylindrical Flotation Bank	-			FL-BC
	( ) ( )					
5		Wemco Fagergren Cell	-			FL-WF
	( ) ( )					
11		Column Flotation	-			FL-CF

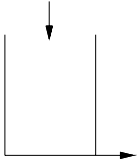
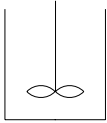

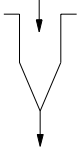
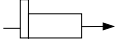


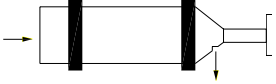
			2	1		
	( ) ( )					
11		Jemsson Flotation Cell	-			FL-JC
11		Aero Flotation	-	-		FL-AF
	50 ( )					
11		Electro Flotation	-	-		FL-EF
					40 20	
		<b>Thickening</b>				<b>TH-OO</b>
2		Agitator	-	-		TH-AG
11		Conventional Rake Thickener				TH-CR
	(1:12 )			1		
3		High-Rate Thickener				TH-HR
	3-10			7/40		

			2	1		
5		Lamella Thickener	-			TH-LO
55						
2		Paste Thickener	-			TH-PO
( 3 )						
2		Decanter	-	-		TH-DN
2		Scrubber	-	-		TH-SR
2		Clarifier	-	-		TH-CL
<b>Filtration</b>						
10		Air Filter	-			FT-AO

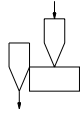
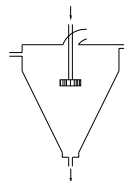
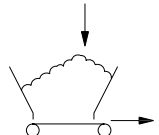
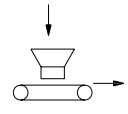
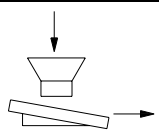
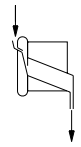
			2	1		
3		Belt Vacuum Filter				FT-BV
2		Belt Vacuum Filter - Washer				
2		Leaf Vacuum Filter				FT-LV
5		Drum Vacuum Filter				FT-DV
11		Disc Vacuum Filter				FT-UV
					30	
18		Plane Vacuum Filter				FT-PV
2		Cartridge Filter	( )	-		FT-CO

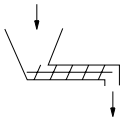
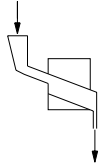
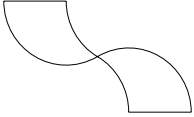
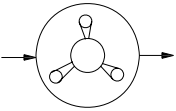
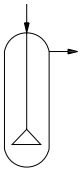
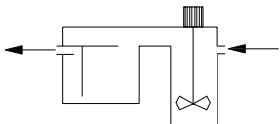
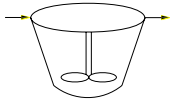
			2	1		
2		Cartridge Filter - Washer		-		FT-CW
2		Pressure (Press) Filter				FT-PR
2		Pressure (Press) Filter - Washer				FT-PW
2		Pressure (Press) Filter with sump				FT-PS
3		Pressure (Press) Filter with compressed chamber				FT-PC
5		Pan Filter	-	( )		FT-PO
5		Bag Filter	-			FT-BF
	( )					

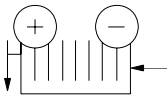
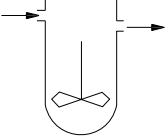
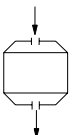
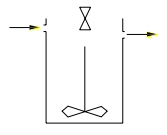
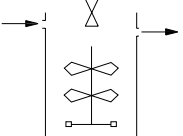
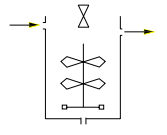
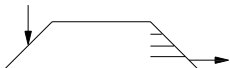
			2	1		
5		Belt Filter	-			FT-BO
		<b>Pumps</b>				<b>PU-OO</b>
11		Centrifugal Pump	-			PU-CF
18		Positive Displacement Pump	-			PU-PD
4		Bradel Pump	-			PU-BR
4		Metering Pump	-			PU-MT
5		Clean-up Pump	-			PU-CU
5		Sump Pump	-			PU-SU
		<b>Tanks and</b>				<b>CT-OO</b>

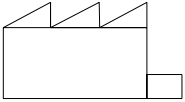
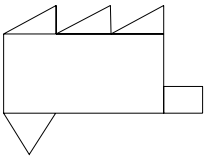
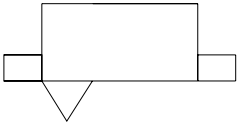
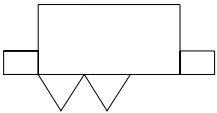
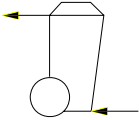
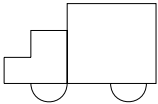
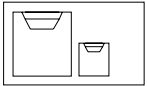
			2	1		
		<b>Conditioners</b>				
5		Tank	-	-		CT-TO
11		Conditioner Tank	-			CT-CO
2		Hutch	-			CT-HO
15		Pachuca Tank	-			CT-PA
		14	3/5			
		<b>Dryers</b>				<b>DR-OO</b>
3		Dryer	-	-		DR-DO
11		Conveyor Dryer	-	( )		DR-CD
5		Flash Dryer	-			DR-FD
11		Rotary Dryer	-			DR-RD

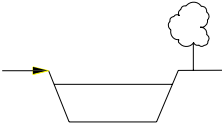

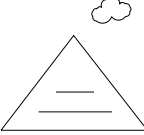


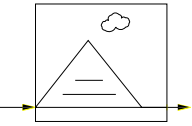
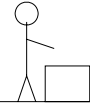


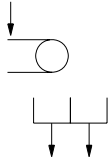
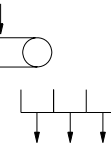
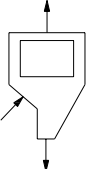
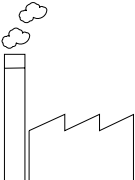
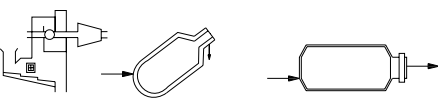
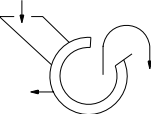
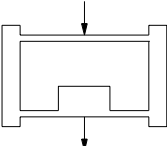
			2	1		
11		Fluid Bed Dryer	-			DR-FB
11		Spray Dryer	-			DR-SD
	400 2					
		<b>Feeders</b>				<b>FD-OO</b>
11		Chain Feeder	-			FD-CF
4		Apron Feeder	-			FD-AF
4		Vibrating Feeder	-			FD-VF
9		Drum Feeder	-			FD-DF

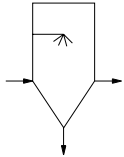
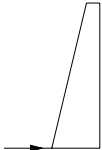
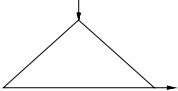
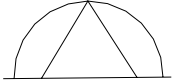
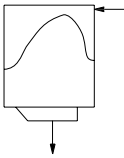
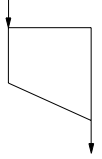
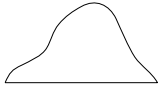
			2	1		
2		Screw Feeder	-			FD-SF
7		Spout Feeder	-			FD-TF
18		Double Scoop Feeder	-			FD-DS
		<b>Leaching</b>				<b>LE-OO</b>
5		Leaching Tank	-	-		LE-TO
2		Adsorption/Desorption Column	-	-	/	LE-AD
2		Mixer - Settler	-	-	/	LE-MS
2		Autoclave	-	-		LE-AC

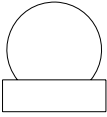
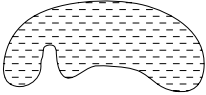
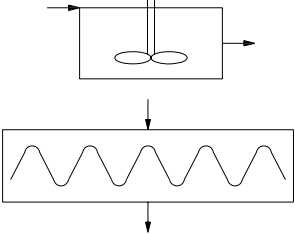
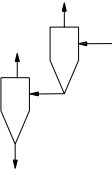
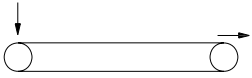
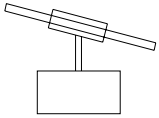
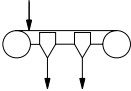
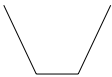
			2	1		
2		Electrolysis Cell	-	-		LE-EC
2		Cementation	-	-		LE-CE
2		Evaporator	-	-		LE-EV
2		Reactor with Addition	-	-		LE-RA
2		Bioreactor with Addition	-	-		LE-BA
2		Bioreactor (Addition & Gas)	-	-	( )	LE-BG
2		Heap Leaching	-	-		LE-HP

			2	1		
		<b>Output</b>				<b>OP-OO</b>
2		1-Output Plant	-	-		OP-PO
2		2-Output Plant	-	-		OP-PO
2		2-Output Splitter	-	-		OP-SO
2		3-Output Splitter	-	-		OP-SO
		<b>Collectors</b>				<b>CL-OO</b>
2		Collection	-	-		CL-CO
		Transport	-	-		CL-TR
2		Collection Point	-	-		CL-CP


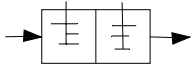
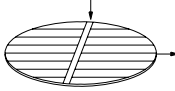
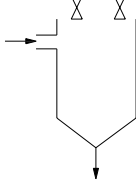
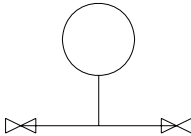
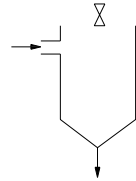
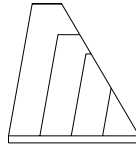
			2	1		
2		Land Fill	-	-		CL-LF
2		Recycling	-	-		CL-RY
2		Composting	-	-		CL-CC
	(Humus                      (Dissimilation                      Assimilation                      )					
2		Compositing BRS	-	-		CL-CB
2		Composting	-	-		CL-CM
2		2-Output Compositing	-	-		CL-CU
2		Sorting	-	-		CL-ST

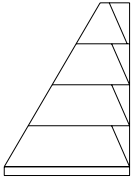
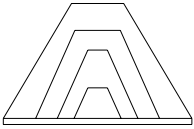
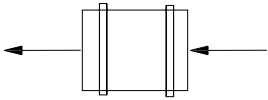
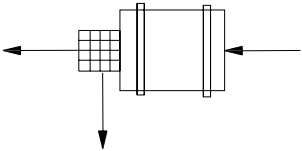
			2	1		
2		Eddy Current Separator	-	-		CL-EC
2		3-Output Eddy Current Separator	-	-		CL-EU
18		Air Classifier	-	-		CL-AC
		<b>General</b>				<b>GE-OO</b>
2		Incineration				GE-IN
5 2		Furnace	-	-		GE-FO
5		Converter Furnace	-			GE-CF
5		Anode Furnace	-			GE-AF

			2	1		
18		Spray Tower	-	-		GE-ST
5		Stack	-	-		GE-SK
3		Stockpile	-	-		GE-SP
3		Covered Stockpile	-	-		GE-CS
5		Silo	-	-		GE-SO
5		Ore Bin, Bunker	-	-		GE-OB
5		Storage	-	-		GE-SG

			2	1		
5		Stock	-	-		GE-SO
5		Waste Dump				GE-WD
5		Mixer	-	-		GE-MO
9		Cyclosizer	-	-		GE-CY
10		Belt Conveyor	-	-		GE-CV
5		Rope way	-	-		GE-RW
3		Handpicking Belt	-	-		GE-HB
		Fixed Chute	-			GE-CH



			2	1		
		Wheeled Chute	-			GE-CH
3		Attritor	-	-		GE-AT
5		Heap	-	-		GE-HP
2		Sump Regulator	-	-		GE-SR
2		Double Regulator	-	-		GE-DR
2		Sump – Distributor – Regulator	-	-	-	GE-SD
11		Downstream Tailings Dam	-	-		GE-TD
	( )					

			2	1		
11		Upstream Tailings Dam	-	-		GE-TU
	)					(
11		Centerline Tailings Dam	-	-	( )	GE-TC
		<b>Washing</b>				<b>SR-OO</b>
3		Washing Barrel	-	-		SR-WB
3		Washing Barrel with Trommel	-	( )		SR-WT

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|                        | .(1381)                | .17 |
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**Islamic Republic of Iran**  
**Vice Presidency for Strategic Planning and Supervision**

# **Standard Symbols for Mineral Processing Flowsheets**

**No. 508**

Office of Deputy for Strategic Supervision  
Bureau of Technical Execution System

<http://tec.mporg.ir>

Ministry of Industries and Mines  
Deputy office of Mining Affairs and Mineral Industries  
Office for Mining Exploitation and Supervision

<http://www.mim.gov.ir>

**2010**



