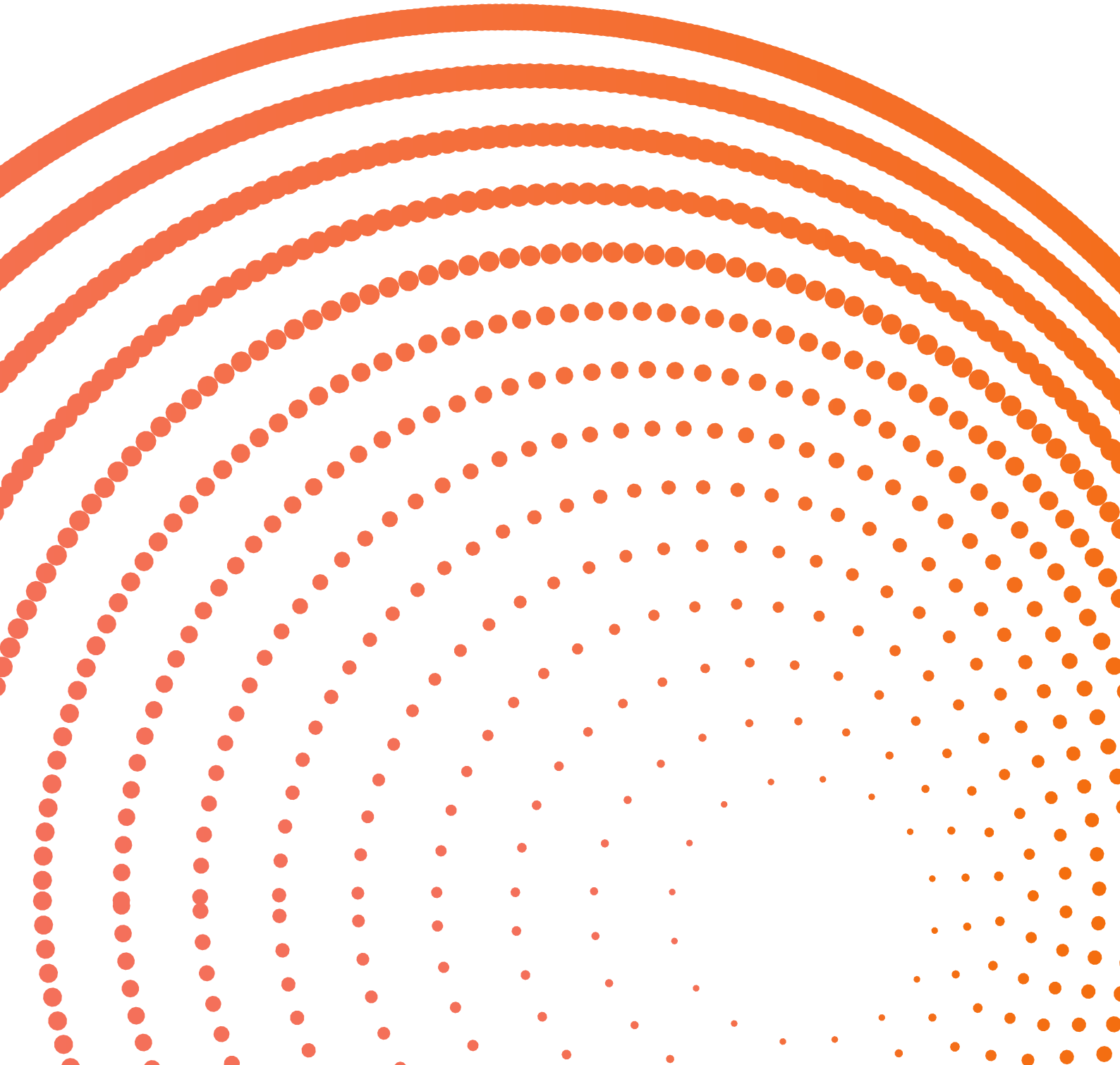
Ball Milling Technical Specifications

MOLYCOP

Cast Balls

Milling



Chemistry (Weight %)

Product Code	Cr		Mn		Si		C		Mo	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
MCCR 10	9	11	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 12	11	13	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 15	14	16	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 18	17	19	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 21	20	22	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 24	23	25	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 27	26	28	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
MCCR 30	29	31	0.3	1.5	0.3	1.3	2.0	3.5	0.00	0.15
S Max (0.1)					P Max (0.1)					

Diameter	Mass	
(mm)	Min. (kg)	Max. (kg)
12.5	0.007	0.011
15	0.013	0.015
17	0.019	0.022
20	0.030	0.036
25	0.059	0.071
30	0.101	0.123
40	0.240	0.291
50	0.469	0.568
60	0.811	0.982
65	1.016	1.236
70	1.288	1.559
80	1.923	2.238
90	2.738	3.314

Hardness, HRc

Ball Diameter (mm)	Min	Max
12.5 - 90	58	69

Technical Services

Pulp Chemistry Surveys
- Monitor plant response to the grinding media choice
- Measure pH, Eh, dissolved oxygen, conductivity and temperature profiles
- Quarterly or bi-annual review to provide metallurgical feedback.

Alloy Scoping Tests
- Assist to select the optimal chrome specific to the ore type
- Our laboratories can perform grindability and flotation tests
- Ore mineralogy, hardness, abrasiveness, and other plant conditions considered.

Reagent Optimization
- Molycop Chemicals team can review current reagent regime
- Laboratory tests to investigate optimal addition rates
- Reagent recommendations specific to optimal grinding media selected.

The above is intended as a guide only. Individual ball hardness readings may fall outside the range listed above.

Product Specifications

Chemistry
Chemistries must comply with the nominated technical specification provided by the supplier. Typically, chemistries should comply with the table on the previous page.

Weight
Ball weights are typically within the minimum and maximum ranges on the previous page.

Hardness
Hardness shall comply with the suppliers' technical specification. Typically, hardness shall fall into the ranges on the previous page.

Ovality
Ovality should comply with the suppliers' technical specification. Typically ovality shall comply with the maximums on the previous page.

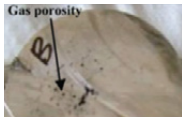
Shrinkage And Porosity

a. Centre shrinkage cavities not greater than 10% of the radius of the ball are permissible. Shrinkage cavities within the body of the ball are not permissible. Photos following provide typical examples:

b. Porosity is not permissible.
The following photos show typical examples:


Cavity complies with Certificate of Conformance (COF) testing requirements.


Cavity does not comply with COF testing requirements.



Porosity does not comply with COF testing requirements.

Surface Defects and Irregularities

a. Surface defects should comply with the suppliers' specifications. The following photos provide typical acceptance and non-compliance examples:


Acceptable surface irregularities.


Unacceptable surface irregularities.

Packaging Options

Bulk
Balls can be transported in bulk open top trucks, open top rail cars, or in standard 20ft containers.

Bags
Balls can be supplied in polypropylene bags which have secure bag straps to reduce time and effort in loading and unloading. While bags are treated to resist UV rays, bags should be protected from direct sunlight to maximize shelf life.

Drums
Recycled drums can also be supplied. Drums are more efficient for some modes of transportation and can also be delivered on wooden pallets.

Quality Assurance
Every batch produced is inspected to measure chemistry, hardness, packaging, etc. Only after approval will each batch be allowed to ship to the site. These reports are readily available and show our commitment to the customer to provide the highest standard of quality that is associated with Molycop.

If you're interested in exploring Molycop's products and services, we're here to help.

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