

中国水泥发展中心物化检测所
——水泥专业检测机构
CEMENT DEVELOPMENT CENTER PHYSICAL & CHEMICAL TEST OFFICE
——PROFESSIONAL CEMENT TEST ORGANIZATION



天津水泥工业设计研究院有限公司

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1 基本情况

BRIEF INTRODUCTION

中国水泥发展中心物化检测所挂靠于中材国际天津公司，属第三方检验机构，迄今已有60余年的检测工作史。1993年5月通过国家计量认证（CMA）。目前拥有员工31人，其中高级工程师13人，工程师10人，工程师以上人员占总人数的74.2%。本所主要起草制订了《水泥原料易磨性试验方法》、《水泥生料易烧性试验方法》、《水泥回转窑热平衡测定方法》、《水泥回转窑热平衡、热效率、综合能耗计算方法》和《水泥单位产品能源消耗限额》等国家检测标准。主要业务包括：水泥原燃料的物化检测；水泥原燃料的工艺性能试验；水泥生产线热工标定等三大类工作。

该所每年都为上百家水泥企业提供检测数据，这些检测数据为水泥厂的从无到有提供了可靠的原料保证和产品质量保证，而且也是水泥设备选型的唯一依据；同时这些检测数据也为水泥生产线的技术改造提供了不可或缺的基础依据。

China Cement Development Center (CCDC) Physical & Chemical Test Office, an affiliate to Sinoma International Engineering (Tianjin) Co., Ltd, is an independent Test organization with over 60 years history in physical and chemical Test. In May of 1993, it is approved by China Measurement Authentication (CMA). Presently, it has 31 employees including 13 senior engineers and 10 engineers, taking 74.2% of total employees. CCDC Physical & Chemical Test Office did draft and establish China Test Standards such as “Test Method for Grindability of Cement Raw Materials”, “Test Method for Burnability of Cement Raw Meal”, “Methods for the Measuring of Heat Balance of Cement Rotary Kiln”, “Methods for the Calculation of Heat Balance Heat Efficiency and Comprehensive Energy Consumption of Cement Rotary Kiln”, and “The Norm of Energy Consumption per unit Product of Cement”. The main business of CCDC Physical & Chemical Test Office includes physical & chemical test of raw material and fuel of cement production, process performance test of raw material and fuel of cement production, and thermal calibration to cement production line. CCDC Physical & Chemical Test Office provides test and analysis for hundreds of cement producer. Such information is the reliable guarantees to raw material and fuel and product quality. Besides, it's the only basis of selection of cement specialized equipment. Such test information provides indispensable basis of technical modification of cement production line.



2 水泥原燃料的物化检测

Physical & Chemical Test Of Raw Material And Fuel Of Cement Production

- 化学成分分析:
 - >10元素: L.O.I、SiO₂、Al₂O₃、Fe₂O₃、CaO、MgO、K₂O、Na₂O、SO₃、Cl⁻
 - >重金属元素: 钒(V)、镉(Cd)、钴(Co)、镍(Ni)、铊(Tl)、铜(Cu)、铅(Pb)、铬(Cr)、硒(Se)、钡(Ba)、铍(Be)
 - >其他检测: TiO₂、MnO、P₂O₅、F⁻、f-SiO₂、f-CaO、附着水、结晶水、
- 煤质检测:
 - >煤的工业分析、全硫
- 物性检测:
 - >塑性指数、密度、细度、比表面积、白度、颗粒级配、含水率
- 矿物测定:
 - >综合热分析、XRD分析、岩相鉴定
- Chemical Analysis
 - > 10 Components: L.O.I, SiO₂, Al₂O₃, Fe₂O₃, CaO, MgO, K₂O, Na₂O, SO₃, Cl⁻
 - > Heavy Metal: Vanadium (V), Cadmium (Cd), Cobalt (Co), Nickel (Ni), Thallium(Tl), Copper(Cu), Lead(Pb), Chromium (Cr), Selenium (Se), Barium (Ba), Beryllium(Be)
 - > other: TiO₂, MnO, P₂O₅, F⁻, f-SiO₂, f-CaO, adhesive water, crystal water,
- Coal Analysis
 - > Industrial analysis, total sulphur
- Physical Analysis
 - > plasticity index, density, fineness, specific surface area, whiteness, particle size distribution, moisture
- Mineral Analysis
 - > comprehensive thermal analysis, XRD analysis, lithology identification



化学成分分析台 Chemical Analysis Worktable



X射线衍射仪 X-Ray Diffractometer



综合热分析仪 Comprehensive Thermal Analysis Instrument



原子吸收室 Atomic Absorption Spectrometry Instrument

3 水泥原燃料的工艺性能试验

Process Performance Test of Raw Material and Fuel of Cement Production

- 原燃料试验：
 - > 燃煤的可磨性（哈德格罗夫法）、煤的燃尽特性试验、原料磨蚀性、原料邦德功指数测定
- 生料试验：
 - > 生料（原料混合料）邦德功指数测定、生料（原料混合料）辊式磨易磨性及磨蚀性、生料易烧性、生料挥发性
- 水泥试验：
 - > 水泥辊式磨易磨性及磨蚀性、水泥抗压及抗折强度、水泥比表面积、水泥密度、流动性、标准稠度用水量、凝结时间、安定性等
- Test of Raw Material and Fuel:
 - > Grindability of coal (Hard Grove Index), coal burnout property test, abrasiveness of raw material, Bond Index test of raw material
- Test of Raw Meal:
 - > Bond Index test of raw meal (blended raw material), VRM grindability and abrasiveness test of raw meal (blended raw material), burnability and volatility test of raw meal
- Test of Cement:
 - > VRM grindability and abrasiveness test of cement, compressive strength test and fracture resistance test of cement, cement specific surface area, cement density, Fluidity of cement, water requirement of normal consistency, setting time and stability.



磨蚀机 Abrasiveness Test Mill



邦德磨 Bond Test Mill



哈氏测定仪 Chemical Analysis Worktable



压力机 Press Machine



煤燃尽试验装置 Coal Burnout Test Instrument



显微镜 Hard Grove Instrument Microscope



水泥辊式磨 Test Cement VRM



生料辊式磨 Test Raw VRM

4 水泥生产线热工标定

Thermal Calibration To Cement Production Line

● 熟料烧成系统

- > 窑头：出窑、出冷却机熟料温度、冷却机鼓风量、冷却机废气流量和含尘浓度、冷却机和窑头罩表面温度、一次风机风量、入窑二次风温度，熟料产量，回转窑用煤量；
- > 窑中：三次风管和回转窑表面温度、三次风风量；
- > 窑尾：各级旋风筒出口、分解炉出口、窑尾烟室的温度、压力、气体成分，预热器系统出口风量、含尘浓度，各级下料分解率，生料喂料量，分解炉用煤量；
- > 烧成系统电耗统计及计算。

● 余热发电系统

- > 窑头AQC炉：窑头AQC炉进口及出口风量、含尘浓度；
- > 窑尾SP炉：窑尾SP炉进口及出口风量、气体成分、含尘浓度。

● 原料磨系统

- > 入磨热风风量、含尘浓度、气体成分，出磨风量、气体成分，出旋风筒（或选粉机）风量、含尘浓度、气体成分。
- > 入磨原料级配、水分、温度，生料成品温度、水分及80 μ m、200 μ m细度；
- > 原料磨、选粉机及管道表面温度
- > 原料磨系统电耗统计及计算。

● 煤磨系统

- > 入磨热风风量、含尘浓度，出磨风量，出收尘器风量、

● Clinker Burning System

- > Cooler: clinker temperature at kiln outlet and cooler outlet, gas volume of cooler, exhaust gas volume and dust content of cooler, cooler and kiln hood surface temperature, primary air volume, secondary air temperature, clinker output, coal consumption;
- > Kiln: surface temperature of tertiary air duct and rotary kiln, air volume of tertiary air;

含尘浓度。

- > 入磨原煤级配、水分、温度，煤粉成品温度、水分及80 μ m细度；
- > 煤磨、选粉机及管道表面温度；
- > 煤磨系统电耗统计及计算。

● 水泥磨系统

- > 入磨热风风量、含尘浓度，出磨风量，出收尘器风量、含尘浓度；
- > 入辊压机、入磨物料级配、水分、温度，水泥成品温度、45 μ m细度、比表面积；
- > 水泥磨、选粉机及管道表面温度；
- > 水泥磨系统电耗统计及计算。

● 物料烘干系统

- > 入烘干机热风风量、含尘浓度、气体成分，出烘干机风量、气体成分、含湿量，出收尘器风量、含尘浓度、气体成分、含湿量；
- > 入烘干机物料水分、温度，出烘干机物料水分、温度；
- > 烘干机及管道表面温度；
- > 烘干机系统电耗统计及计算。

● 水泥企业环保检测

- > 各收尘器粉尘排放浓度；
- > 窑尾烟囱NO_x、SO₂排放浓度；
- > 厂界噪声及设备、建筑物附近噪声。

- > Preheater: temperature, pressure and gas composition of outlet of each cyclone, outlet of calciner and gas inlet chamber, gas volume and dust content of preheater system outlet, degree of calcining of each stage of preheater, raw meal feed, coal consumption of calciner;
- > Statistics and calculation of power consumption of clinker burning system;

● Waste Heat Recovery System

- > Cooler AQC Boiler: gas volume and dust content of AQC boiler inlet and outlet

- > Preheater SP Boiler: gas volume, gas composition and dust content of SP boiler inlet and outlet

● Raw Grinding System

- > Volume, dust content, gas composition of hot gas feed to raw mill, gas volume and gas composition of raw mill outlet, volume, dust content, gas composition of cyclone (separator) outlet

- > Raw mill feed gradation, moisture, temperature, temperature, moisture and fineness at 80 μ m, 200 μ m of raw meal

- > surface temperature of raw mill, separator and ducts

- > statistics and calculation of power consumption of raw grinding system;

● Coal Grinding System

- > Volume and dust content of hot gas feed to raw mill, gas volume and gas composition of coal mill outlet, volume and dust content of bag filter (EP) outlet

- > Coal mill feed gradation, moisture, temperature, temperature, moisture and fineness at 80 μ m, 200 μ m of pulverized coal

- > surface temperature of coal mill, separator and ducts;

- > statistics and calculation of power consumption of coal grinding system;

● Cement Grinding System

- > Volume and dust content of hot gas feed to raw mill, gas volume and gas composition of coal mill outlet, volume and dust content of bag filter (EP) outlet

- > Roller press and cement mill feed gradation, moisture, temperature, temperature, moisture and fineness at 45 μ m of cement

- > surface temperature of cement mill, separator and ducts

- > statistics and calculation of power consumption of cement grinding system;

● Material Drying System

- > Volume, dust content, gas composition of hot gas feed to dryer, gas volume, moisture and gas composition of dryer outlet, volume, dust content, gas composition, temperature and moisture of bag filter (EP) outlet

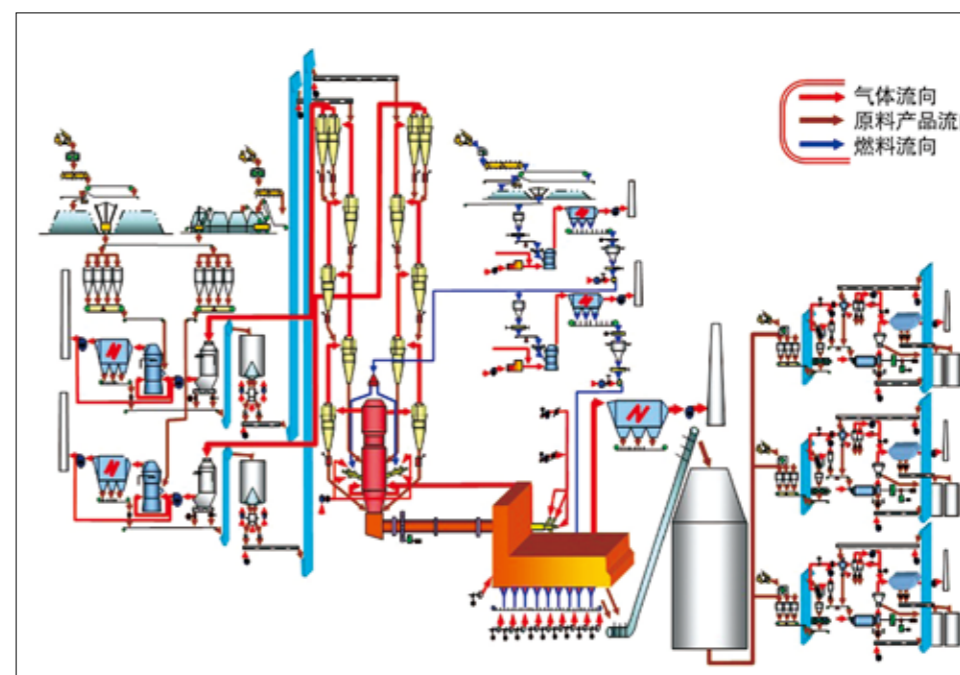
- > Dryer feed moisture, temperature, and temperature, moisture at dryer outlet

- > surface temperature of dryer and ducts

- > statistics and calculation of power consumption of dryer

● Environmental Measurement

- > Dust emission of each bag filter (EP) outlet
- > NO_x, SO₂ emission of preheater stack
- > Noise of plant boundary and noise closed to building and equipment





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