

全国中文核心期刊
中国科技核心期刊
RCCSE 中国核心学术期刊

■中国学术期刊综合评价数据库统计源期刊 ■中国知网 中国学术期刊网络出版总库全文收录
■中国科技期刊精品数据库收录 ■美国《化学文摘》《乌利希期刊指南》收录 ■俄罗斯《文摘杂志》收录

煤矿安全

SAFETY IN COAL MINES

ISSN 1003-496X
CN 21-1232/TD

6

2018

Vol. 49 No. 6

煤科集团沈阳研究院有限公司

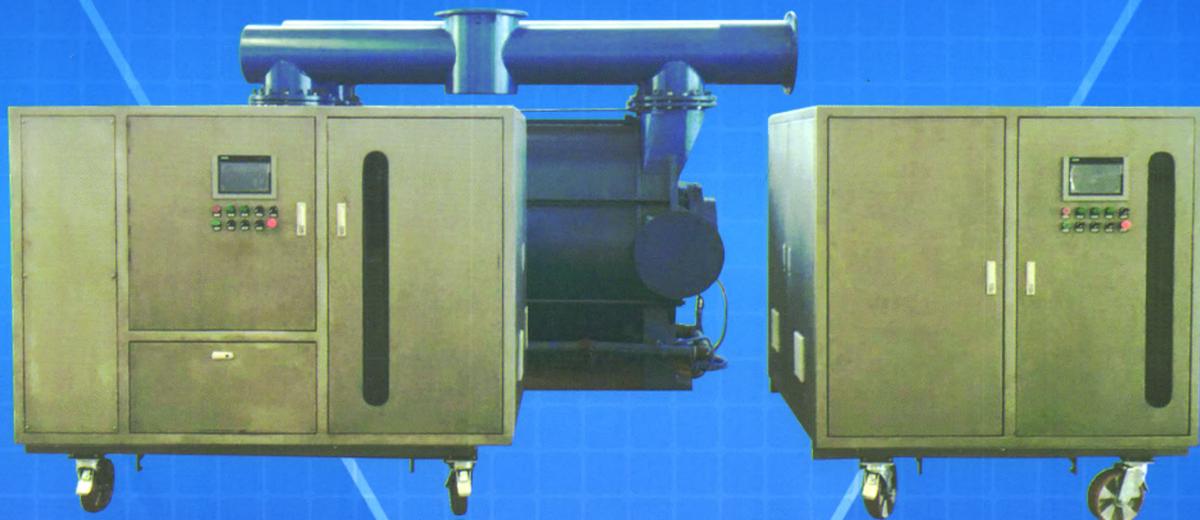
主办

1970年创刊·月刊



QK1837920

矿用移动式真空泵 除垢装置 阻垢装置



煤矿垢害治理综合服务商
提供煤矿水垢治理整体解决方案

(详见封二)

ISSN 1003-496X



06>



9 771003 496183

万方数据



煤科集团沈阳研究院有限公司
CCTEG SHENYANG RESEARCH INSTITUTE
机电安全装备研究分院

主管单位

煤科集团沈阳研究院有限公司

主办单位

煤科集团沈阳研究院有限公司

主 编 罗海珠
副 主 编 梁绍权
编辑部主任 王福厚
广告发行主管 刘明智

出版单位 《煤矿安全》编辑部
地 址 辽宁省抚顺市经济开发区
滨河路11号
邮政编码 113122
电 话 (024)56616988 56616987
56616981 56616881
电子信箱 mkaq@163.com
mkaqgg@163.com(广告)
网 址 www.mkaqzz.com
发行范围 公开发行
发行单位 《煤矿安全》编辑部
或全国各地邮局
邮发代号 8-293
印刷单位 煤炭科学研究总院抚顺分院
胶版印刷厂

中国标准连续出版物号 ISSN 1003-496X
CN 21-1232/TD
企业法人营业执照注册号 210400000026129
商标注册证 第1144537号

出版日期 6月20日
定 价 20.00元

北京联络处 (010)64464228



“煤传媒”微信公众号
万方数据



《煤矿安全》微信公众号

目 次

试验·研究

- 基于 Matlab 的煤与瓦斯突出过程气压可视化研究 许江,罗小航,张起林,彭守建,耿加波(1)
- 突出煤层沿空掘巷有效保护范围考察 王金宝(5)
- 基于瓦斯放散特性单因素的煤与瓦斯突出模拟实验研究 张开加,仇海生(8)
- 高地温条件下的煤自燃预报指标优选实验研究 唐洪,郭军,刘荫,郝健池(11)
- 龄期对膏体充填材料力学特性的影响 王星宇,张新国,李飞帆(16)
- 煤矿膨胀性泥岩钻孔缩径主控因素敏感性研究 侯吉峰,刘浩(20)
- 基于综合探查的陷落柱发育特征研究 刘再斌(24)
- 软岩煤巷联合支护力学特性实验研究 王文才,张伟,张培,尚东,邓连军,陈阳(29)
- 工作面沿正断层走向推进断层煤柱应力演化规律研究 丁楠,李小裕,蒋力帅(33)
- 基于物理模拟的断层区煤岩体破损空间演化规律 赵长红,吕兆海,来兴平,雷照源,闫瑞兵,岳晓军,崔峰(37)

技术·创新

- 综采工作面上隅角气垛快速充填技术 郑军(41)
- 碎软煤层井下多点定向长钻孔水力压裂技术 李延军(45)
- 集束型枝状定向钻孔群一孔两消瓦斯抽采技术与应用 张迪,李泉新,方俊(49)
- 易自燃煤层工作面末采回撤期间防火技术 崔杰(54)
- 超长工作面过联络巷期间自燃防治技术 赵凯(58)
- 单侧受采动影响的软岩巷道围岩控制技术 王子君,柴璐(62)
- 强变形构造煤等静压原煤柱状煤样制作方法 任建刚,翁红波,宋志敏,李冰,吕闰生(66)
- 高应力强动压煤巷“卸压-耦合”支护技术研究 佐江宏(70)
- 马头门井壁断裂修复治理技术 赵仁乐,刘启顺,李廷春,陈佃浩(74)

设计·开发

- 碎软煤层多层深孔钻进技术与装备 冯达晖(78)
- 基于 PLC 的煤层注水监控系统 程玉龙,徐家明,张喜萍,谭一川(81)
- 高并发煤矿安全监控数据采集系统的设计 周海坤(85)
- 综采工作面照度对人的视觉识别性影响 景国勋,宋乃敏,周霏(88)
- 矿用孔-巷瞬变电磁系统在煤矿的试验应用 闫文超,李博凡,王继矿,李萍,田小超(92)
- 基于 STM32 的顶板压力无线数据采集仪 张强(95)
- 基于 ANSYS 的煤矿立井抢险排水管道安全性评价分析 赵福隆,郑晓雯,郭智堡,杨良,傅豪,樊航(99)
- 煤矿巷道双臂探放水钻机 阚志涛,郭迪,张幼振,邵俊杰,李旺年(102)
- 全方位调节式履带钻机在寺河煤矿的应用 刘智,徐鹏博,李旺年,陈翔,杨江波(105)
- 平煤神马集团煤矿自动化生产系统安全防护研究 盛璐(108)
- 防爆动力电池对纯电动防爆车辆续航里程的影响分析 于建华(112)
- 人员定位与绞车联动闭锁控制系统 田国正,吴畏,唐丽均(115)

应用·实践

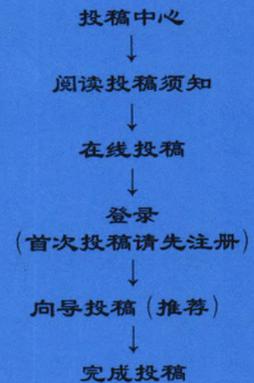
- 利用穿层瓦斯抽采钻孔探测煤层小褶曲工程实践 关金锋,马静驰,丁志伟,崔洪庆,李长兴(118)

《煤矿安全》杂志唯一投稿平台:

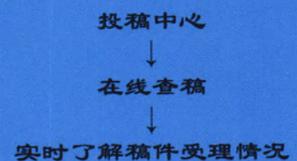
www.mkaqzz.com



投稿流程:



查稿流程:



注: 投稿请用IE浏览器

本刊声明:

- ☆ 本刊所有来稿自投稿之日起3个月内未收到“稿件采用通知书”, 作者可另行处理, 在此之前请勿一稿多投。
- ☆ 根据编辑加工原则, 本刊可能会对采用的稿件进行必要的删改, 不同意删改的, 请在投稿时声明。
- ☆ 本刊有出电子版、网络版、与网站技术交流和与各数据库合作的权利, 作者著作权使用费(包括上述几种方式), 并与本刊稿酬一次性付清。如作者不同意将文章以上述形式收录, 请在来稿时声明。

SF₆示踪气体漏风测试技术在白皎煤矿的应用 饶 孜(122)

浅地表大范围漏风测试研究与应用 赵 斌, 钱 旭(126)

孤岛综放工作面沿空掘巷窄煤柱留设宽度优化设计 姚 博, 康天合, 尹 博(130)

基于拱-梁耦合结构的深井含煤复合顶板支护研究

分析·探讨

基于煤田测井复合参数的煤层瓦斯含量超前预测探讨 李圣林, 卜 军(143)

深部低透煤层水力割缝卸压增透技术研究现状及发展趋势 杨慧明(147)

基于 Klinkenberg 效应的水力冲孔有效半径数值解算方法 杨 帅, 刘晓斐, 张 冲, 刘泉霖, 巩昌之(152)

基于可压缩流体理论的常村煤矿瓦斯抽采系统优化 魏士平(156)

易自然煤层上隅角抽采瓦斯方法的选取 郭建行(160)

惰性气体-细水雾抑制瓦斯爆炸对比分析 郭成成, 王 飞, 刘红威, 刘全保(164)

煤矿掘进暴露巷道瓦斯涌出量大数据计算方法 张小兵, 周 勇(168)

矿井巷道扬尘发展过程及影响因素分析 闫晶晶, 王 飞, 刘红威, 刘全保(171)

衰老矿井通风系统模拟优化研究 牛福龙(175)

浅埋薄基岩自燃煤层火源位置探测数值计算及应用 王俊峰, 安 帮, 周 斌(179)

锚杆长度对承压环力学影响与经济效益分析 周 建, 经来旺, 张朋朋, 叶金胜(184)

压水试验定量评价单孔注浆效果影响因素分析 杨志斌, 董书宁(187)

基于损伤危险指数的巷道围岩损伤评价数值模拟 任仲久(195)

基于上轴下煤压覆关系的煤轴协调开采技术方案优选研究 周 勇(199)

沿空回采巷道蝶叶型非对称底鼓机理 靳俊晓, 申金超, 刘元祥, 许先富(204)

厚松散层矿区综放开采地表移动变形规律 汤 铸, 李树清, 黄寿卿, 万芳芳(210)

基于摩尔-库伦定则的卸压带范围预测 郭敬远, 魏国营(213)

基于 MMAS-BP 神经网络的粉煤灰膏体管道输送水力坡度预测

何荣军, 杜运芬, 吴再生(217)

金家渠煤矿首采工作面煤岩结构失稳分析与协同控制技术

吕北海, 赵长红, 赵文华, 吴少学, 冯耀东, 岳晓军, 崔 峰(221)

工作面开采煤壁超前支承压应力演化规律分析与计算 崔立军, 王国瑞(225)

哈尔滨露天矿北端帮保护台阶开采安全评价 李 强, 李文明, 张 丁(229)

顶板离层诱发黏结界面损伤对锚杆锚固系统的影响 尤小明(233)

特大断面厚煤顶切眼分断面开掘期间围岩响应及控制 孙福玉(237)

监察·管理

基于博弈论组合赋权 TOPSIS 模型对煤矿安全现状的综合评价 田水承, 张德桃, 杨兴波, 孔维静(242)

基于改进突变级数法的瓦斯爆炸危险性评价 罗振敏, 李 逸, 安亚飞, 李海涛, 傅 文(246)

煤炭企业外埠员工情绪变化对安全生产的影响及管理对策 张雨良(251)

煤矿企业安全教育“云闭环”体系探索与实践 林 旭(254)

SAFETY in COAL MINES

Monthly(Started in 1970)

June 2018

Vol.49, No.6(Total 527)

Competent Authority

CCTEG Shenyang Research Institute

Sponsor

CCTEG Shenyang Research Institute

Chief Editor LUO Haizhu

Deputy Chief Editor LIANG Shaoquan

Editorial Director WANG Fuhou

Advertisement & Distribution LIU Mingzhi

Publisher Editorial Office of
《SAFETY in COAL MINES》

Address No.11 of Binhe Road, Fushun
Economic Developing-area, Liaoning, China

Post code 113122

Tel 86-24-56616988 56616987
56616981 56616881

E-Mail mkaq@163.com
mkaqgg@163.com(advertisement)

Website www.mkaqzz.com

Issuer Public Offering

Subscribe(to) Editorial Office of 《SAFETY in
COAL MINES》 or Local Post Offices

Postal Distribution Code 8-293

Printed by Offset Printing Factory of
Fushun Branch of CCRI

China Standard Serial
Numbering ISSN 1003-496X
CN 21-1232/TD

Business License No. 21040000026129

Trademark Registered
Certificate No.1144537

Publishing Date June 20

Price 20 yuan

Beijing Liaison Office 86-10-64464228

CONTENTS

Test·Research

- Study on Gas Pressure Visualization During Coal and Gas Outburst Based on Matlab
XU Jiang,LUO Xiaohang,ZHANG Chaolin,PENG Shoujian,GENG Jiabo(1)
- Investigation of Effective Protection Area of Gob-side Entry Driving in Outburst Coal Seam
WANG Jinbao(5)
- Coal and Gas Outburst Simulation Experiment Based on Single Factor of Gas Emission Characteristics
ZHANG Kaijia,QIU Haisheng(8)
- Experimental Study on Index Optimization of Coal Spontaneous Combustion Prediction Under High Temperature
TANG Hong,GUO Jun,LIU Yin,HAO Jianchi(11)
- Influence of Age on Mechanical Properties of Paste Filling Material
WANG Xingyu,ZHANG Xinguo,LI Feifan(16)
- Sensitivity Study on Main Controlling Factors of Borehole Shrinkage for Expansive Mudstone in Coal Mine
HOU Jifeng,LIU Hao(20)
- Study on Karst Collapse Column Characteristics Based on Comprehensive Exploration
LIU Zaibin(24)
- Experimental Study on Mechanical Properties of Combined Support in Roadway Within Soft Rock
WANG Wencai,ZHANG Wei,ZHANG Pei,SHANG Dong,DENG Lianjun,CHEN Yang(29)
- Research on Laws of Fault Coal Pillar Abutment Pressure Evolution When Working Face Moves Along the Normal Fault
DING Nan,LI Xiaoyu,JIANG Lishuai(33)
- Spatial Evolution Laws of Coal and Rock Breakage in Fault Zone Based on Physical Simulation
ZHAO Changhong,LYU Zhaohai,LAI Xingpin,LEI Zhaoyuan,YAN Ruibing,YUE Xiaojun,CUI Feng(37)

Technology·Innovation

- Technology of Airbags Quickly Filling in Upper Corner of Fully Mechanized Mining Face
ZHENG Jun(41)
- Long Multi-point Underground Directional Drilling Hydraulic Fracturing Technology for Low-permeability Weak Coalbed
LI Yanjun(45)
- Technology of Gas Extraction for Two Places Outburst Elimination with One Hole by Cluster-type Multi-branch Directional Hole Group and Application
ZHANG Di,LI Quanxin,FANG Jun(49)
- Fire Prevention and Control Technology During the End Mining and Withdrawing Period for Self-igniting Coal Seam Working Face
CUI Jie(54)
- Technology of Fire Prevention and Control During Super-long Working Face Passing Through Crossheading
ZHAO Kai(58)
- Surrounding Rock Control Technology for Soft Rock Roadway Under Unilateral Mining Influence
WANG Zijun,CHAI Lu(62)
- Method of Making Raw Coal Isostatic Pressing Columnar Coal Samples for Heavily Tectonically Deformed Coal
REN Jianguang,WENG Hongbo,SONG Zhimin,LI Bing,LYU Runsheng(66)
- Research on "Pressure Relief and Coupling" Support Technology of High Stress Dynamic Pressure Coal Roadway
ZUO Jianghong(70)
- Repair and Control Technology for Shaft Lining Fracture of Horsehead
ZHAO Renle,LIU Qishun,LI Tingchun,CHEN Dianhao(74)

Design·Development

- Multi-layer Deep Hole Drilling Technology and Equipment for Broken Soft Coal Seam
FENG Dahui(78)
- Coal Seam Water Injection Monitoring System Based on PLC Technology
CHENG Yulong,XU Jiaming,ZHANG Xiping,TAN Yichuan(81)
- Design of Data Acquisition System for High Concurrent Coal Mine Safety Monitoring
ZHOU Haikun(85)
- Influence of Illumination on Human Visual Identification in Fully-mechanized Working Face
JING Guoxun,SONG Naimin,ZHOU Fei(88)
- Application of Mine-used Hole and Roadway Transient Electromagnetic System in Coal Mine
YAN Wenchao,LI Bofan,WANG Jikuang,LI Ping,TIAN Xiaochao(92)
- Wireless Data Acquisition Instrument for Roof Pressure Based on STM32
ZHANG Qiang(95)
- Safety Evaluation Analysis of Rescue and Drainage Pipelines for Coal Mine Shaft Based on ANSYS
ZHAO Fulong,ZHENG Xiaowen,GUO Zhibao,YANG Liang,FU Hao,FAN Hang(99)
- Drilling Rig with Twin Boom for Water Exploration and Drainage in Coal Mine Roadway
KAN Zhitao,WU Di,ZHANG Youzhen,SHAO Junjie,LI Wangnian(102)
- Application of Omni-directional Adjustable Crawler Drilling Rig in No.2 Mine of Sihe Coal Mine
LIU Zhi,XU Pengbo,LI Wangnian,CHEN Xiang,YANG Jiangbo(105)
- Research on Safety Protection of Coal Mine Automatic Production System in China Pingmei Shenma Group
SHENG Lu(108)
- Influence Analysis of Explosion-proof Power Battery on Driving Range of Pure Electric Explosion-proof Vehicle
YU Jianhua(112)
- Personnel Positioning and Winch Linkage Lock-up Control System
TIAN Guozheng,WU Wei,TANG Lijun(115)

Application·Practice

- Engineering Practice of Using Through-layered Gas Drainage Drilling Hole to Detect Small Folds in Coal Seam
GUAN Jinfeng,MA Jingchi,DING Zhiwei,CUI Hongqing,LI Changxing(118)

Application of SF₆ Tracer Gas Leakage Test Technology in Baijiao Coal Mine **RAO Zi**(122)
 Research and Application of Large Range Air Leakage Test in Shallow Surface **ZHAO Bin,QIAN Xu**(126)
 Width Optimization of Narrow Coal Pillar of Gob-side Entry Driving in Isolated Fully Mechanized Caving Face **YAO Bo,KANG Tianhe,YIN Bo**(130)
 Study on Support of Coal-bearing Composite Roof in Deep Well Based on Arch-beam Coupling Structure **WEI Guoshuai,WANG Kai,ZHANG Xiaoqiang,ZHANG Jiafei,WANG Chao**(135)
 Research and Application of Coal Wall Support Technology for Gob-side Entry Driving **WANG Changping**(139)

Analysis·Discussion

Discussion on Advance Prediction of Gas Content in Coal Seam Based on Compound Parameters of Coalfield Logging **LI Shenglin,PU Jun**(143)
 Research Status and Development Tendency of Hydraulic Cutting Technology for Pressure Relief and Permeability Increasing of Deep Coal Seam **YANG Huiming**(147)
 Numerical Solution of Effective Radius of Hydraulic Punching Based on Klinkenberg Effect **YANG Shuai,LIU Xiaofei,ZHANG Chong,LIU Quanlin,GONG Changzhi**(152)
 Optimization of Gas Extraction System Based on Compressible Fluid Theory in Changcun Coal Mine **WEI Shiping**(156)
 Selection on Gas Extraction Methods in Upper Corner of Spontaneous Combustion Coal Seam **GUO Jianhang**(160)
 Comparative Analysis of Gas Explosion Suppression by Water Mist of Inert Gas **GUO Chengcheng,WANG Fei,LIU Hongwei,LIU Quanbao**(164)
 Big Data Calculation Method for Gas Emission Quantity in Coal Mine Exposure Roadway **ZHANG Xiaobing,ZHOU Yong**(168)
 Development Process and Influencing Factors Analysis of Dust in Mine Roadway **YAN Jingjing,WANG Fei,LIU Hongwei,LIU Quanbao**(171)
 Study on Simulation and Optimization of Ventilation System in Aging Mine **NIU Fulong**(175)
 Numerical Calculation of Fire Location of Shallow Buried Thin Bedrock Spontaneous Combustion Coal Seam and Application **WANG Junfeng,AN Bang,ZHOU Bin**(179)
 Mechanical Effect of Bolt Length on Pressure-bearing Ring and Economic Benefit Analysis **ZHOU Jian,JING Laiwang,ZHANG Pengpeng,YE Jinsheng**(184)
 Influence Factors Analysis of Quantitative Evaluation of Single Borehole Grouting Effect by Water Pressure Test **YANG Zhibin,DONG Shuning**(187)
 Numerical Simulation of Roadway Surrounding Rock Damage Evaluation Based on Damage Risk Indexes **REN Zhongjiu**(195)
 Optimization Research on Coordinated Mining Technology Scheme of Coal and Uranium Based on Overburden Relationship of Upper Uranium and Lower Coal **ZHOU Yong**(199)
 Mechanism of Butterfly-failure Asymmetric Floor Heave in Mining Roadway Along a Goaf **JIN Junxiao,SHEN Jinchao,LIU Yuanxiang,XU Xianfu**(204)
 Research on Surface Movement Law for Fully-mechanized Top Coal Caving Under Thick Unconsolidated Layers **TANG Zhu,LI Shuqing,HUANG Shouqing,WAN Fangfang**(210)
 Prediction of Range of Pressure Relief Zone Based on Mohr-coulomb Rule **GUO Jingyuan,WEI Guoying**(213)
 Prediction of Hydraulic Gradient of Fly Ash Paste Pipeline Transportation Based on MMAS-BP Neural Network **HE Rongjun,DU Yunhang,WU Zaisheng**(217)
 Coal-rock Structure Instability Analysis and Collaborative Control Technology in the First Mining Face of Jinjiaqu Coal Mine **LYU Zhaohai,ZHAO Changhong,ZHAO Wenhua,WU Shaoyue,FENG Yaodong,YUE Xiaojun,CUI Feng**(221)
 Analysis and Calculation of Evolution Law of Advance Support Stress on Coal Wall in Front of the Working Face **CUI Lijun,WANG Guorui**(225)
 Safety Evaluation of Protective Bench in Northern End Slope of Haerwusu Open-pit Coal Mine **LI Qiang,LI Wenming,ZHANG Ding**(229)
 Influence of Bonding Interface Damage Induced by Roof Separation Layer on Anchorage System of Anchor Bolt **YOU Xiaoming**(233)
 Response and Control of Surrounding Rock During Subsection Driving of Extra-large Section and Thick Coal Roof Open-off Cut **SUN Fuyu**(237)

Supervision·Management

Comprehensive Evaluation of Coal Mine Safety Status Based on TOPSIS Model of Game Theory Combination **TIAN Shuicheng,ZHANG Detao,YANG Xingbo,KONG Weijing**(242)
 Risk Assessment of Gas Explosion Based on Improved Catastrophe Progression Method **LUO Zhenmin,LI Kui,AN Yafei,LI Haitao,FU Wen**(246)
 Influence of Emotional Change of Out-of-town Employees of Coal Enterprises on Safety Production and Management Countermeasures **ZHANG Yuliang**(251)
 Exploration and Practice of Safety Education "Cloud Closure" System in Coal Mine Enterprises **LIN Xu**(254)

万方数据



煤科集团沈阳研究院
有限公司

系列产品

- ◆ 紧急避险系统
- ◆ 煤矿安全生产监控系统及人员定位系统
- ◆ 煤矿瓦斯抽放配套装备
- ◆ 矿井通风防灭火装备
- ◆ 煤矿瓦斯基础参数测定仪器
- ◆ 矿山救护装备
- ◆ 低压供电系统配套装备
- ◆ 矿用钻机及配套装置
- ◆ 露天矿卡车调度系统及边坡监测装备
- ◆ 模拟仿真训练系列

立足服务

保障安全

依靠创新

共同发展

WWW.SYCCRI.COM

辽宁 抚顺 经济开发区滨河路11号
T 024-56616909 F 024-56616800

辽宁 沈阳 东滨河路108号
T 024-24117298 F 024-24117568



GLTECH

光力科技

股票代码：300480

煤矿用激光甲烷传感器

煤矿用激光甲烷传感器采用激光吸收光谱技术，是具备测量精确、标校周期长、不受水汽和其它交叉气体干扰的高性能环境甲烷监测仪表，用于煤矿井下或其它需要监测环境甲烷浓度的场所。

性能特征

- ◎ 采用高分辨率激光吸收光谱技术，消除气体交叉干扰，降低甲烷监测误报。
- ◎ 具备温度自适应和补偿功能，测量结果不受环境温度影响。
- ◎ 具备压力补偿功能，测量结果不受环境压力变化的影响。
- ◎ 支持频率、RS485和CAN三种信号传输方式。



WWW.GLTECH.CN

TEL : 0371-6785 8887 E-MAIL : info@gltech.cn CSH : 400-0057-577

ADD : 郑州高新技术产业开发区长椿路十号

ISSN 1003-496X

CN 21-1232/TD

万方数据

订阅处：《煤矿安全》编辑部或全国各地邮局（邮发代号：8-293）
地址：辽宁省抚顺经济开发区滨河路11号 邮编：113122 单价：20.00元