

煤矿安全

SAFETY IN COAL MINES

ISSN 1003-496X
CN 21-1232/TD

8
2017

Vol. 48 No. 8

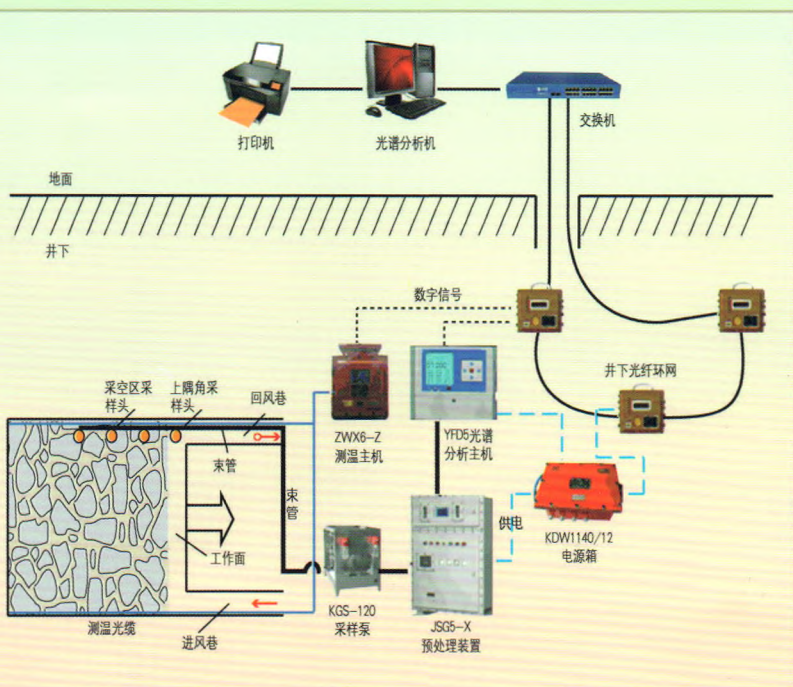
煤科集团沈阳研究院有限公司

主办

1970年创刊·月刊

井下自然发火综合监测系统

井下自然发火综合监测系统采用光谱气体分析和光纤测温技术,解决了气体长距离传输气样变化的难题,乙烯监测精度可达 10^{-7} 。主体设备为本质安全型,配套设备完善,可结合历史数据综合分析,预警准确、安全性好、可靠性高,可与防灭火装备联动,实现了管控一体化和自动化,体现了“预防为主”的自燃火灾防控原则,已成功应用于神华、陕煤、龙煤等多家大中型煤炭企业。



系统参数

光纤测温参数	测温距离/km: 8	
	测温精度/ $^{\circ}\text{C}$: ± 1	
	测温分辨率/m: ± 1	
	测温通道数/路: 6	
分析气体种类	测量范围	允许误差
甲烷/%	0~1.0	± 0.06
	1.0~100.0	真值的 $\pm 6\%$
一氧化碳浓度/ 10^{-6}	0~100	± 4
	100~500	真值的 $\pm 5\%$
二氧化碳浓度/%	500~10000	真值的 $\pm 10\%$
	0~0.50	± 0.02
氧气浓度/%	0.50~20.0	$\pm (0.05 + \text{真值的} 5\%)$
	0~25.0	$\pm 3\% \text{ F.S}$
乙烯浓度/ 10^{-6}	0~2.0	± 0.5
	2.0~100.0	$\pm (0.5 + \text{真值的} 10\%)$

ISSN 1003-496X



9 771003 496176

万方数据



煤科集团沈阳研究院有限公司
CCTEG SHENYANG RESEARCH INSTITUTE

地址: 辽宁省抚顺经济开发区滨河路11号

联系人: 肖先生 联系电话: 13304938017 传真: 024-56613536

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 56613526
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 8月20日
定 价 20.00元
北京联络处 (010)64464228

目 次

试验·研究

- 采动力学特征下含瓦斯煤渗流实验研究 范鹏宏,聂百胜(1)
卸压瓦斯抽采遮挡层存在性及其作用 杨景芬,徐宏杰,黄华州(5)
功率声波激励下无烟煤孔隙变化及裂隙发育研究 田洪波,蒋曙光,李 玥,张卫清,秦 桐,王豫皖(9)
高压氮气致裂增透实验系统的研发及应用 高 杰,王海锋,仇海生(13)
煤矿开采对地表反向滑坡稳定性影响的模拟 孙学阳,李鹏强,李 聪,郭景方,杨 旭,何拓平(16)
基于ABAQUS的煤岩动态拉伸力学特性研究 钱 杰,韩 靖,胡 鸣(20)
岩石峰后蠕变试验及其在沿空留巷底鼓研究中的应用 于宝种(23)
残煤复采综放工作面液压支架选型研究 张凯娟,杜迎慧(28)
煤矿岩巷顶管施工沿途阻力研究 王 雷,张 黎,王新铭,王冠雄(32)

技术·创新

- 煤矿典型易燃极近距离煤层群自然发火防治技术 白金燕(36)
高瓦斯极近距离煤层群复合采空区自然发火动态闭环防控技术 刘志忠(39)
综放开采压架原因分析及防治技术 刘 平(42)
大断面破碎泥岩巷道让抗封闭综合支护技术 孙敬涛(45)
园子沟煤矿立井混合改绞施工技术 李俊生,许兴亮,胡红利,赵 瑶(49)
富水泥化巷道渐变破坏机理与局部失稳控制技术 赵启峰,石建军,郑思达,孙元田,刘媛媛(52)
新型树脂锚杆巷帮支护技术及其应用 王 军(56)

设计·开发

- 瓦斯抽采钻孔施工的导引捕尘装置 皮希宇(59)
本安电源设计中的瞬态能量抑制 张 岩(63)
矿井顶板离层脱落危险性监测与预报系统 刘艺平(65)
矿井火灾事故预警系统 解学才,梁跃强,林 辰,李雷雷(69)
瓦斯输送管路阻火式超压放散装置设计 黄克海(73)
隔爆安全间隙的确定与生产影响因素分析 周伟锋(76)
矿用本安救援及安全生产巡检物联手表 张 黎(80)
CD3(A)型皮托管流量计在瓦斯气体输送管道中的应用 万 勇(83)
矿用本安型抗干扰电源缓启动电路设计 高 昊(87)
通用型防止打钻瓦斯及粉尘超限装置 王胜利(91)
高转速跨输送带螺旋钻机及其关键技术 张 锐(94)
一种基于呼吸泄压装置的大容量锂电池电源隔爆外壳 张 勇(98)
基于Jena推理机制的采煤工作面本体模型推理 刘 婷,潘理虎,陈立潮,张英俊(102)
煤矿井下异地快速断电的实现 张金豪(106)

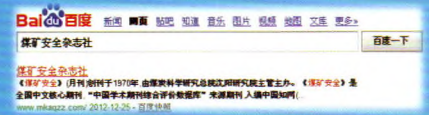
应用·实践

- 水力冲孔造穴瓦斯抽采强化机制及其在寺家庄矿的应用 石建文,韩 柯,范毅伟,张 锐,王 亮(109)
安家岭露天矿火区圈定 邓传军,刘 洋,王庆国,梁 潘,时 迁(113)
综采工作面极近距离跨空巷回采技术 王宪勇(116)
高转速螺旋钻进技术在松软煤层中的应用 赵建国,杨虎伟(121)
液态二氧化碳直注灭火技术在珙泉煤矿的应用 王 森,许 健(125)

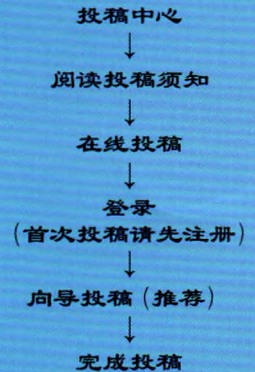


《煤矿安全》杂志唯一投稿平台:

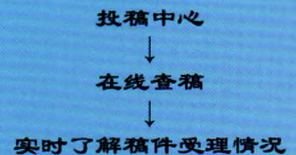
www.mkaqzz.com



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。

分析·探讨

采空区内煤柱稳定性影响因素分析与评价方法 孙庆先(128)

基于 COMSOL Multiphysics 的超长钻孔瓦斯抽采数值模拟研究

蔡培培, 赵耀江, 郭金岩(132)

基于流固耦合的水力冲孔影响因素研究 张 娇, 王筱冬(136)

煤矿专业化瓦斯治理服务模式的探索及应用 马正恒(140)

基于斯伦贝谢比与裂缝指数的煤体结构定量判识

倪小威, 敖旋峰, 梁 霄, 艾 林, 徐观佑, 刘迪仁(144)

煤与瓦斯突出冲击波模型优化计算分析 高佳星, 王俊峰, 刘 硕(147)

金竹山矿区地质构造特征及其对瓦斯分布的控制作用 毛党龙, 刘 敏, 武 静(151)

鹤岗煤田瓦斯突出构造控制规律及区划研究 柯善斌(155)

采空区自然“三带”划分方法改进 孙维丽, 曲 宝, 李东发, 赵亚明(159)

深孔预裂爆破断顶对综放工作面初采期瓦斯治理效果的实测分析 侯永鹏, 康天合(162)

尾巷风量对“J”型通风工作面漏风及瓦斯分布的影响 高建良, 李炫焯(166)

煤低温氧化实验测试分析技术应用现状与展望 杜 斌, 梁运涛, 王连聪, 徐 叶(170)

新庄矿防灭火技术与装备管理模式分析与评价 譙永刚(174)

不同处置方式煤表面化学结构的傅里叶红外光谱分析 王海燕(177)

主要通风机运行工况点合理性评价 许 芹, 杨胜强, 刘 辉(182)

中国冲击地压的时空分布特征 杜学领, 姜耀东, 王 涛(186)

厚煤层巷道冲击矿压的强矿震诱发机制与防治

冯龙飞, 窦林名, 武光辉, 王正义, 康 凯, 焦 彪(190)

基于内外承载结构的高应力软岩巷道支护方案优化 孙 珞(194)

煤矿冲击地压风险分析与控制技术 庞绪峰, 于秀娟, 胡笑涵, 陈建光, 彭奕欢(197)

含断层覆岩采动裂隙演化规律 贺征勳, 刘 勇, 康向涛, 刘昌祥, 何松霖, 钟德洋(201)

白皎煤矿 2410 底板道高构造应力软岩巷道支护 秦江涛, 吴再生, 邓国萍(204)

巷道断面对东胜矿区侏罗纪 4# 煤层掘进巷道稳定性的影响

庞振忠, 张新国, 李 飞, 刘占新(207)

基于 3DEC 的多节理岩体岩梁失稳机理研究 刘 丹(211)

厚松散层下深部开采地表沉陷的复合介质模型 袁 勋, 杨双锁(215)

矩形断面巷道合理宽高比的探讨 陈 彬, 张向阳(219)

迎采掘进巷道合理煤柱宽度确定 康继忠, 孙 毅, 杨建雄, 神文龙, 赵 强(223)

大倾角工作面顶板结构特征及支架阻力确定 丘富旺, 杨东旭(227)

露天煤矿粉尘环境影响及其扩散规律研究综述 卢 浩, 雷少刚(231)

煤矿机电设备安全要点分析 吴兆宏(235)

监察·管理

基于 SEM 矿工组织支持感与不安全行为关系研究

张叶馨, 栗继祖, 冯国瑞, 刘效广, 王天日(238)

基于矿工不安全行为的煤矿安全预测评价模型 李 爽, 刘海洋, 杨 勇(242)

冲突管理对煤矿应急管理作用机制研究 张雅萍, 栗继祖, 冯国瑞, 康立勳(246)

基于 HFACS-MI 改进模型的煤矿重特大事故人因分析

柳茹林, 程卫民, 于岩斌, 高 天(250)

煤炭企业虚拟化安全保护分析 盛 璐(254)

万方数据

SAFETY in COAL MINES

Monthly(Started in 1970)

August 2017

Vol.48, No.8(Total 517)

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 56613526

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. 210400000026129

**Trademark Registered
Certificate** No.1144537

Publishing Date August 20

Price 20 yuan

Beijing Liaison Office 86-10-64464228

万方数据

CONTENTS

Test·Research

- Seepage Experimental Study on Coal Containing Gas Under Mining-induced Mechanical Characteristics
FAN Penghong, NIE Baisheng(1)
- Existence of Barrier Layer of Pressure Relief Gas Extraction and Its Role
YANG Jingfen, XU Hongjie, HUANG Huazhou(5)
- Study on Anthracite Pores Variation and Fractures Development Under Acoustic Power Excitation
TIAN Hongbo, JIANG Shuguang, LI Yue, ZHANG Weiqing, QIN Tong, WANG Yuwan(9)
- Development and Application of Testing System of High Pressure Nitrogen Blasting Experiment for Increasing Permeability
GAO Jie, WANG Haifeng, QIU Haisheng(13)
- Simulation of the Influence of Coal Mining on Reverse Landslide Stability of Earth's Surface
SUN Xueyang, LI Pengqiang, LI Cong, WU Jingfang, YANG Xu, HE Tuoping(16)
- Study on Dynamic Mechanical Properties of Coal and Rock Based on ABAQUS Simulation
QIAN Jie, HAN Jing, HU Ming(20)
- Experimental Study on Floor Heave in Stable Stage of Gob-side Entry Retaining
YU Baozhong(23)
- Study on Hydraulic Support Selection for Residual Coal Repeated Mining in Fully Mechanized Caving Face
ZHANG Kaijun, DU Yinghui(28)
- Research on On-way Resistance of Pipe-jacking Construction in Rock Roadway of Coal Mine
WANG Lei, ZHANG Li, WANG Xinming, WANG Guanxiong(32)

Technology·Innovation

- Fire Prevention and Control Technology for Spontaneous Combustion in Typical Easy Self-ignition and Very Short Distance Coal Seams of Coal Mine
BAI Jinyan(36)
- Dynamic Closed Loop Control Technology for Spontaneous Combustion in Composite Goaf of Extremely Close Distance Coal Seam Group with High Gas
LIU Zhizhong(39)
- Causes Analysis and Prevention Technology for Pressurizing Support in Fully Mechanized Caving Mining
LIU Ping(42)
- Yield-resistance Stress Closed Support Technology of Fractured Mudstone Roadway with Large Section
SUN Jingtao(45)
- A Mixing Temporary Re-equipment Construction Technology for Vertical Shaft in Yuanzigou Coalmine
LI Junsheng, XU Xingliang, HU Hongli, ZHAO Yao(49)
- Support Failure Mechanism and Local Instability Control Technology of Rich Water Mudding Roadway
ZHAO Qifeng, SHI Jianjun, ZHENG Sida, SUN Yuantian, LIU Yuanyuan(52)
- Support Technology for Coal Walls of Roadways by New Resin Boltings and Its Application
WANG Jun(56)

Design·Development

- Guided Dust Catcher Equipment for Gas Extraction in Drilling Construction
PI Xiyu(59)
- Transient Energy Suppression in Design of Intrinsic Safe Power Source
ZHANG Yan(63)
- Risk Monitoring and Forecasting System for Mine Roof Separation and Falling
LIU Yiping(65)
- Early Warning System for Mine Fire Accidents
XIE Xuecai, LIANG Yueqiang, LIN Chen, LI Leilei(69)
- Design of Fire Retardance Overpressure Relief Device for Gas Pipeline
HUANG Kehai(73)
- Determination of Explosion-proof Safety Gap and Analysis of Production Influencing Factors
ZHOU Weifeng(76)
- Mine-used Intrinsic Safety Rescue and Internet of Things Watch for Safety Inspection
ZHANG Li(80)
- Application of CD3 (A) Pitot Flowmeter in Gas Pipeline Transportation
WAN Yong(83)
- Design for Soft Start Circuit of Mine-used Intrinsic Type Anti-interference Power
GAO Hao(87)
- Universal Equipment of Preventing Gas and Dust Overrun in Drilling
WANG Shengli(91)
- High Rotation Speed and Crossing Conveyor Auger Drill and Its Key Technologies
ZHANG Rui(94)
- A Kind of Flameproof Enclosure for Large Capacity Lithium-ion Battery Power Supply Based on Respiratory Pressure Relief
ZHANG Yong(98)
- Reasoning of Ontology Modeling for Mining Face Based on Jena Reasoning Mechanism
LIU Ting, PAN Lihu, CHEN Lichao, ZHANG Yingjun(102)
- Realization of Fast Power Off in Another Place in Coal Mine
ZHANG Jinhao(106)

Application·Practice

- Gas Drainage Reinforcement Mechanism of Hydraulic Flushing and Its Application in Sijiazhuang Coal Mine
SHI Jianwen, HAN Ke, FAN Yiwei, ZHANG Rui, WANG Liang(109)
- Fire Zone Detection for Anjialing Open Pit Mine
DENG Chuanjun, LIU Yang, WANG Qingguo, LIANG Pan, SHI Qian(113)
- Extreme Distance Crossing Abandoned Roadway Mining Technology of Fully Mechanized Mining Face
WANG Xianyong(116)
- Application of High Speed Spiral Drilling Technology in Soft Coal Seam
ZHAO Jianguo, YANG Huwei(121)
- Application of Liquid CO₂ Fire-extinguishing Technique in Gongquan Coal Mine
WANG Miao, XU Jian(125)

Analysis·Discussion

- Influence Factors Analysis of Residual Pillar in Goaf and Its Evaluation Methods
SUN Qingxian(128)

Numerical Simulation Study on Gas Drainage in Extra Long Borehole Based on COMSOL Multiphysics
CAI Peipei,ZHAO Yaojiang,GUO Jinyan(132)

Study on Influencing Factors of Hydraulic Punching Based on Flow-solid Coupling Theory
ZHANG Jiao,WANG Xiaodong(136)

Discussion and Application of Specialized Service Model for Coal Mine Gas Control
MA Zhengheng(140)

Quantitative Identification of Coal Structure Based on Schlumberger Ratio and Crack Index
NI Xiaowei,AO Xuanfeng,LIANG Xiao,AI Lin,XU Guanyou,LIU Diren(144)

Optimization Analysis of Coal and Gas Outburst Shock Wave Model
GAO Jiaying,WANG Junfeng,LIU Shuo(147)

Geological Structural Features of Jinzhushan Coalfield and Its Effect on Methane Distribution
MAO Danglong,LIU Min,WU Jing(151)

Study on Control Law and Division of Gas Outburst Structure in Hegang Coalfield
KE Shanbin(155)

Improvement of "Three-zones" Division Method for Spontaneous Combustion in Goaf
SUN Weili,QU Bao,LI Dongfa,ZHAO Yaming(159)

Field Measurement and Analysis of Gas Control by Roof Fracture Using Deep Hole Pre-splitting Blasting of Fully Mechanized Top Coal Caving Face at Initial Mining Period
HOU Yongpeng,KANG Tianhe(162)

Effect of Air Volume in Tail Gateway on Air Leakage and Gas Distribution in "J" Type Ventilation Working Face
GAO Jianliang,LI Xuanye(166)

Application Situation and Prospect of Testing and Analyzing Technology of Coal Low Temperature Oxidation Process Experiment
DU Bin,LIANG Yuntao,WANG Liancong,XU Ye(170)

Analysis and Evaluation for Management Model of Fire Prevention Technology and Equipment in Xinzhuang Coal Mine
QIAO Yonggang(174)

Fourier Transform Infrared Spectroscopy Analysis for Surface Chemical Structure of Coal Under Different Pretreatment Methods
WANG Haiyan(177)

Evaluation on Reasonability of Operating Points of Main Ventilator
XU Qin,YANG Shengqiang,LIU Hui(182)

Temporal and Spatial Distribution of Rock Burst in China
DU Xueling,JIANG Yaodong,WANG Tao(186)

Mechanism and Prevention of Rock Burst Induced by Strong Mine Earthquake in Thick Coal Seam
FENG Longfei,DOU Linming,WU Guanghui,WANG Zhengyi,KANG Kai,JIAO Biao(190)

Optimization of Support Schemes for High Stress Soft Rock Roadway Based on Internal and External Load-bearing Structure
SUN Luo(194)

Research on Risk Analysis and Control Technology of Rock Burst in Coal Mine
PANG Xufeng,YU Xiujuan,HU Xiaohan,CHEN Jianguang,PENG Yihuan(197)

Evolution Laws of Mining Fissures of Overlying Strata Containing Fault
HE Zhengxun,LIU Yong,KANG Xiangtao,LIU Changxiang,HE Songlin,ZHONG Deyang(201)

High Tectonic Stress Soft Rock Tunnel Supporting in 2410 Floor Roadway of Baijiao Coal Mine
QIN Jiangtao,WU Zaisheng,DENG Guoping(204)

Influence of Tunnel Cross-section on Stability of Jurassic 4# Coal Seam Excavation Roadway in Dongsheng Mine
PANG Zhenzhong,ZHANG Xinguo,LI Fei,LIU Zhanxin(207)

Study on Rock-beam Instability Mechanism of Multi-jointed Rock Mass Based on 3DEC
LIU Dan(211)

Composite Medium Model of Ground Subsidence Due to Deep Mining Under Thick Unconsolidated Formation
YUAN Xun,YANG Shuangshuo(215)

Discussion on Reasonable Width-to-height Ratio of Rectangular Section Roadway
CHEN Bin,ZHANG Xiangyang(219)

Determining Reasonable Pillar Width of Roadway Driven Heading for Adjacent Advancing Coal Face
KANG Jizhong,SUN Yi,YANG Jianxiong,SHEN Wenlong,ZHAO Qiang(223)

Roof Structure Characteristics and Support Resistance Determination of Working Face with Large Dip Angle
QIU Fuwang,YANG Dongxu(227)

Research Overview of Effect of Dust on Environment and Its Diffusion Laws in Open-pit Coal Mine
LU Jie,LEI Shaogang(231)

Analysis on Safety Requirements of Coal Mine Equipment
WU Zhaohong(235)

Supervision-Management

Research on Relationship Between Miners' Perceived Organizational Support and Unsafe Behavior Based on SEM
ZHANG Yexin,LI Jizu,FENG Guorui,LIU Xiaoguang,WANG Tianri(238)

Model of Coal Safety Prediction and Evaluation Based on Miners' Unsafe Behavior
LI Shuang,LIU Haiyang,YANG Yong(242)

Study on Mechanism of Conflict Management on Emergency Management Level of Mine
ZHANG Yaping,LI Jizu,FENG Guorui,KANG Lixun(246)

Human Factors Analysis of Coal Mine Major Accidents Based on Improved HFACS-MI Model
LIU Rulin,CHENG Weimin,YU Yanbin,GAO Tian(250)

Analysis of Safety Protection for Coal Enterprises
SHENG Lu(254)



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



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