



INDUSTRIAL SOLUTION SYSTEMS



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纳图电气集团股份有限公司
NATUS ELECTRIC GROUP CO.,LTD.

地址：中国江苏省常州市天宁区劳动东路369号
Address : No.369 Laodong East Road,Tianning District,Changzhou,Jiangsu Province,China
电话 / Telephone : 400-928-1888
邮箱 / E-mail : sales@natus-cn.com
网址 / Web : www.natus-cn.com
www.natus.de

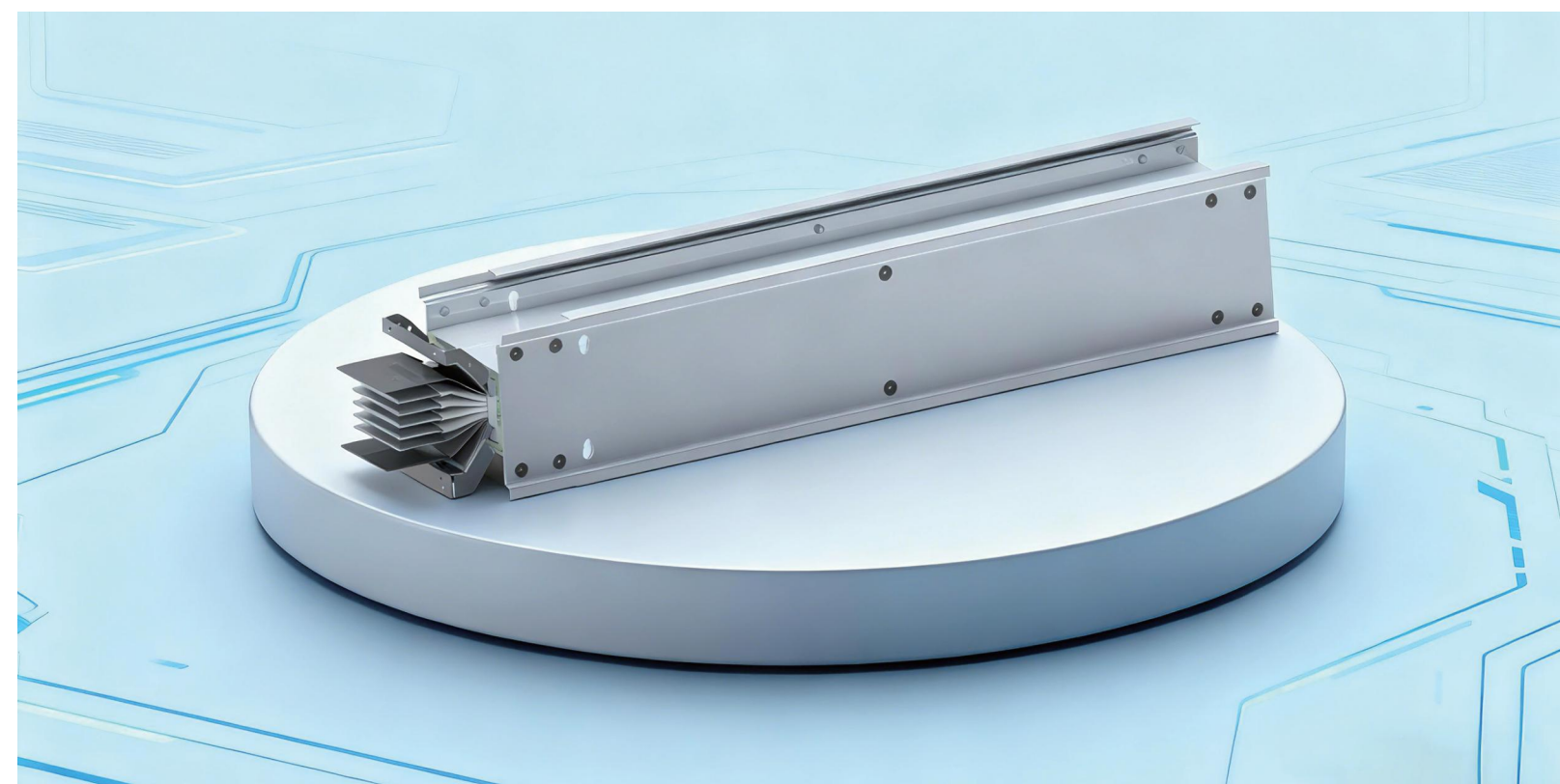
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INDUSTRIAL SOLUTION SYSTEMS

P-LINE h

耐火母线槽
P-LINE h Fire-Resistant Busduct



纳图电气集团股份有限公司
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集团业务 Group Business

集团专注于中低压电力行业的系统集成、EPC工程总包服务及核心产品的研发、生产与销售。在电力设备领域，我们深耕智能电气成套产品、高端电力元器件、先进电能质量治理产品、智能控制仪表与控制系统。基于人工智能与大数据分析的技术积累，我们提供变电站与输电线路的气象灾害预防设备与安全运行综合解决方案。在新技术领域，我们聚焦小区域低空气象高精度预测技术，为低空经济发展提供综合性的产品与服务。



The Group specializes in system integration, EPC turnkey services, and the R&D, production, and sales of core products within the medium and low-voltage power industry. In the field of power equipment, we have deep expertise in intelligent electrical switchgear system, high-end power components, advanced power quality management products, intelligent control instruments, and control systems. Leveraging accumulated expertise in artificial intelligence and big data analytics, we provide comprehensive solutions for meteorological disaster prevention equipment and the safe operation of substations and transmission lines. In the domain of new technologies, we focus on small-area, low-altitude meteorological high-precision prediction technology, offering integrated products and services to support the development of the low-altitude economy.

集团理念 Group Vision

纳图电气集团源自德国，立足中国，服务全球。自1956年成立以来，集团以德国技术为基础，深度融合中国智慧与全球视野，依托强大的中国研发与制造团队，精准响应全球市场需求，为各行业客户提供智慧电力的专业解决方案。集团坚持以客户为中心，致力于创新产品、可靠技术与精益制造，携手全球用户共同构建更智能、高效、可持续的电力能源未来。



Natus Electric Group originates from Germany, is firmly rooted in China, and serves the global market. Since its establishment in 1956, the Group has built upon German technology, deeply integrating Chinese expertise and a global perspective. Supported by a robust Chinese R&D and manufacturing team, we precisely respond to global market demands, delivering professional intelligent power solutions for clients across various industries. Adhering to a customer-centric approach, the Group is committed to innovative products, reliable technology, and lean manufacturing, working hand-in-hand with global users to build a smarter, more efficient, and sustainable future for the power and energy sector.



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产品概述

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纳图电气集团基于全球电气技术前沿发展趋势，深度融合市场需求与技术研发，成功开发出NATUS新型低压密集型耐火母线系统。该产品采用新型耐火隔热复合材料以及智能配电管理等前沿科技，历经十余年的技术积淀和两年集中攻关，在院士团队带领的科研力量支撑下取得重要技术成果，其综合性能指标实现显著提升。

该系统在产品认证与技术专利方面具备显著优势，不仅全面通过国家强制性CCC认证和专业的电气性能检测，更以严格的消防耐火测试验证了其卓越性能，目前已获得10余项国家技术专利。其创新性的耐火设计可保证在1150℃极端火灾环境下持续供电195分钟（180分钟+15分钟），高效实现了常规供电与耐火功能的有机统一，此项技术创新在多个技术领域取得了重要进展。

在技术规格方面，NATUS新型低压密集型耐火母线系统系统展现出优异的产品特性。其最高防护等级达到IP66，可适配交流50-60Hz的三相三线、三相四线及三相五线制配电系统，额定工作电压覆盖690V至1000V范围，绝缘电压同为1000V，工作电流范围达400-5500A。该系统独有的可视化智能监测功能进一步提升了运行可靠性，而其紧凑的结构设计则在确保优异电气性能的同时，显著提升了空间利用率。

凭借出色的耐火性能、可靠的电力传输能力以及智能化管理特点，NATUS新型低压密集型耐火母线系统已成为商业综合体、工业厂房、数据中心以及轨道交通等对供电安全有严格要求的高端应用场景的优选方案。产品在设计上兼顾了安装便捷性和维护便利性，为用户提供了安全可靠、性能卓越的综合性配电解决方案。

NATUS Electric Group, guided by global trends in electrical technology, has successfully developed the NATUS New-type Low-voltage Dense-type Fire-resistant Busbar System through deep integration of market demands and technological innovation. The product adopts new-type fire-resistant and heat-insulating composite materials, intelligent power distribution management, and other cutting-edge technologies. After over a decade of technological accumulation and two years of intensive research, supported by a scientific team led by academicians, it has achieved significant technological breakthroughs, with its comprehensive performance metrics significantly enhanced.

This system boasts significant advantages in product certification and technical patents. It has not only fully passed the mandatory CCC certification and professional electrical performance testing but also demonstrated its exceptional performance through rigorous fire resistance testing. To date, it has secured over 10 national technical patents. Its innovative fire-resistant design ensures continuous power supply for 195 minutes (180 minutes + 15 minutes) under extreme fire conditions of 1150°C, efficiently integrating conventional power supply with fire-resistant functionality. This technological innovation has achieved significant progress across multiple technical fields.

In terms of technical specifications, the NATUS New-type Low-voltage Dense-type Fire-resistant Busbar System demonstrates outstanding product characteristics. It achieves a maximum protection rating of IP66 and is compatible with AC 50-60Hz three-phase three-wire, three-phase four-wire, and three-phase five-wire distribution systems. Its rated operating voltage ranges from 690V to 1000V, with an insulation voltage of 1000V, and a working current range of 400-5500A. The system's unique visual intelligent monitoring function further enhances operational reliability, while its compact structural design significantly improves space utilization while ensuring outstanding electrical performance.

With its outstanding fire resistance, reliable power transmission capabilities, and intelligent management features, the NATUS New-type Low-voltage Dense-type Fire-resistant Busbar System has become the preferred solution for high-end applications demanding stringent power supply safety, such as commercial complexes, industrial plants, data centers, and rail transit systems. Designed for both installation convenience and maintenance ease, the product delivers a comprehensive power distribution solution that is safe, reliable, and delivers exceptional performance.

四大亮点

FOUR MAJOR HIGHLIGHTS

全新的理论思想 Brand-new Theoretical Concept	全新的基础材料 Brand-new Basic Materials
革命性引入梯度热动力学、热传导学等学科理论，创新产品结构设计和材料研发为新产品的全面突破奠定先定决条件； It revolutionarily introduces disciplinary theories such as gradient thermodynamics and heat transfer science, while innovations in product structural design and material R&D lay the fundamental and decisive foundation for the comprehensive breakthroughs of the new product;	自主研发的新型耐火隔热复合材料，实现耐火与隔热的最佳结合； The independently developed new-type fire-resistant and heat-insulating composite material achieves the optimal combination of fire resistance and heat insulation;
全新的结构设计 Brand-new structural design	全新的技术运用 Brand-new technology application
自主创新的新型梯度复合结构，科学简洁、安全可靠； Independently innovated new-type gradient composite structure,scientifically concise, safe and reliable;	创造性采用梯度化制备工艺、复合加工技术、高效导热管技术等前沿科技，全方位提升产品性能； It creatively adopts cutting-edge technologies such as gradient preparation process, composite processing technology, and high-efficiency heat conduction tube technology, comprehensively enhancing the product performance;

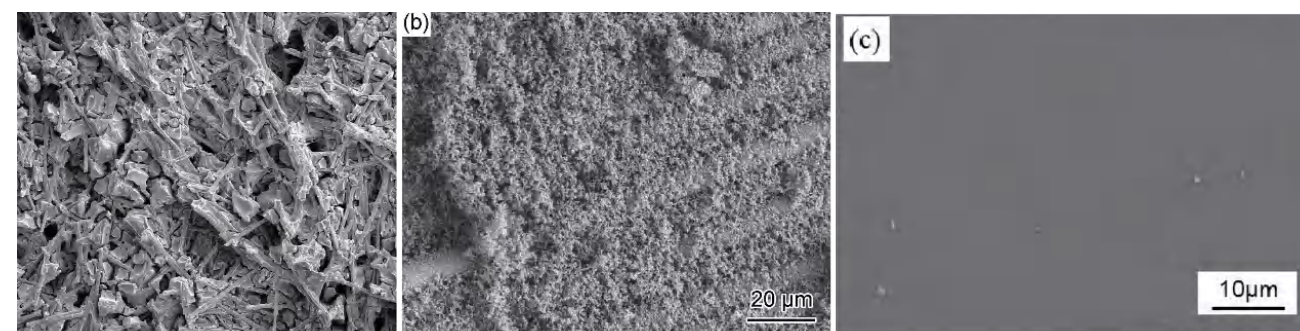
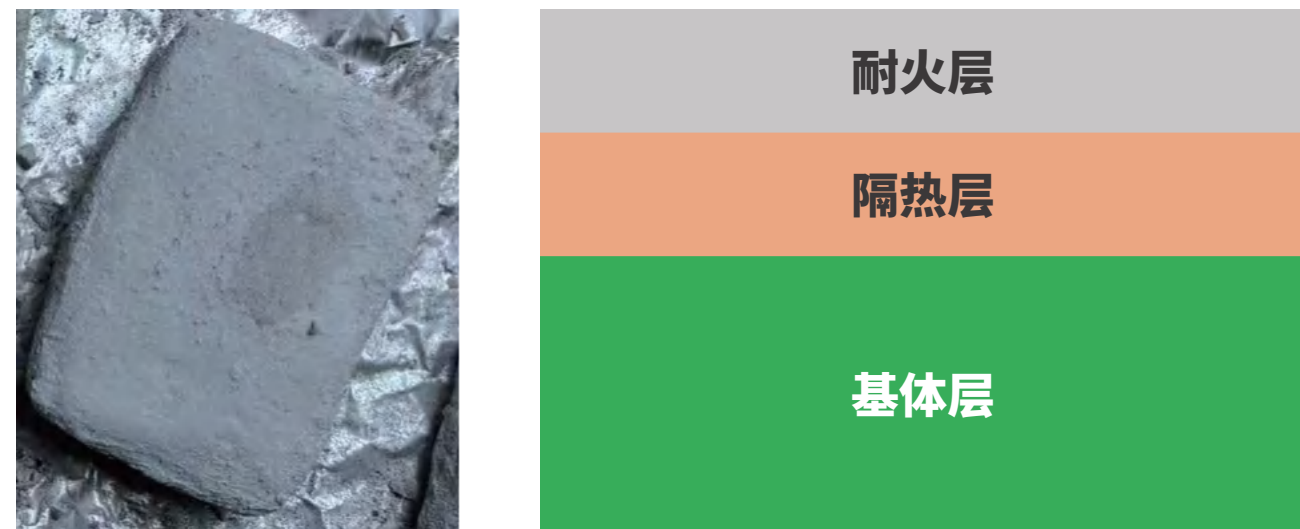


新型的复合结构设计

NEW-TYPE COMPOSITE STRUCTURE DESIGN

全新的一种耐高温、隔热性能优异、体积小、环保的新型耐火材料，以无机材料为骨料，增加隔热层，实现三明治梯度化结构，确保优异的耐火及隔热性能；

A new type of refractory material with high temperature resistance, excellent thermal insulation performance, small size and environmental friendliness. It uses inorganic materials as aggregates and adds a thermal insulation layer to achieve a sandwich gradient structure, ensuring excellent fire resistance and thermal insulation performance;



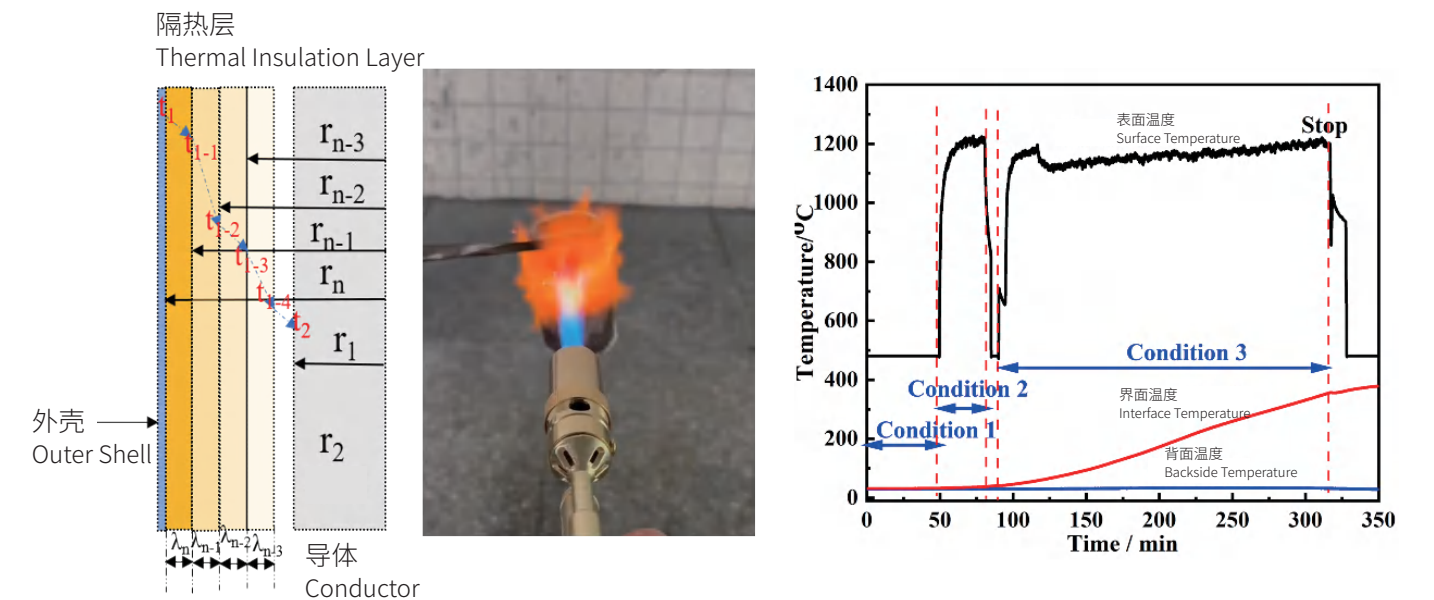
基体层
Matrix Layer
↑
新型三明治梯度化耐火材料
New-Type Sandwich Gradient Refractory Material

隔热层
Thermal Insulation Layer
↑
结构示意图
Structural Schematic Diagram

耐火层
Fire-Resistant Layer
↑
微观结构
Microscopic Structure

理论分析及验证

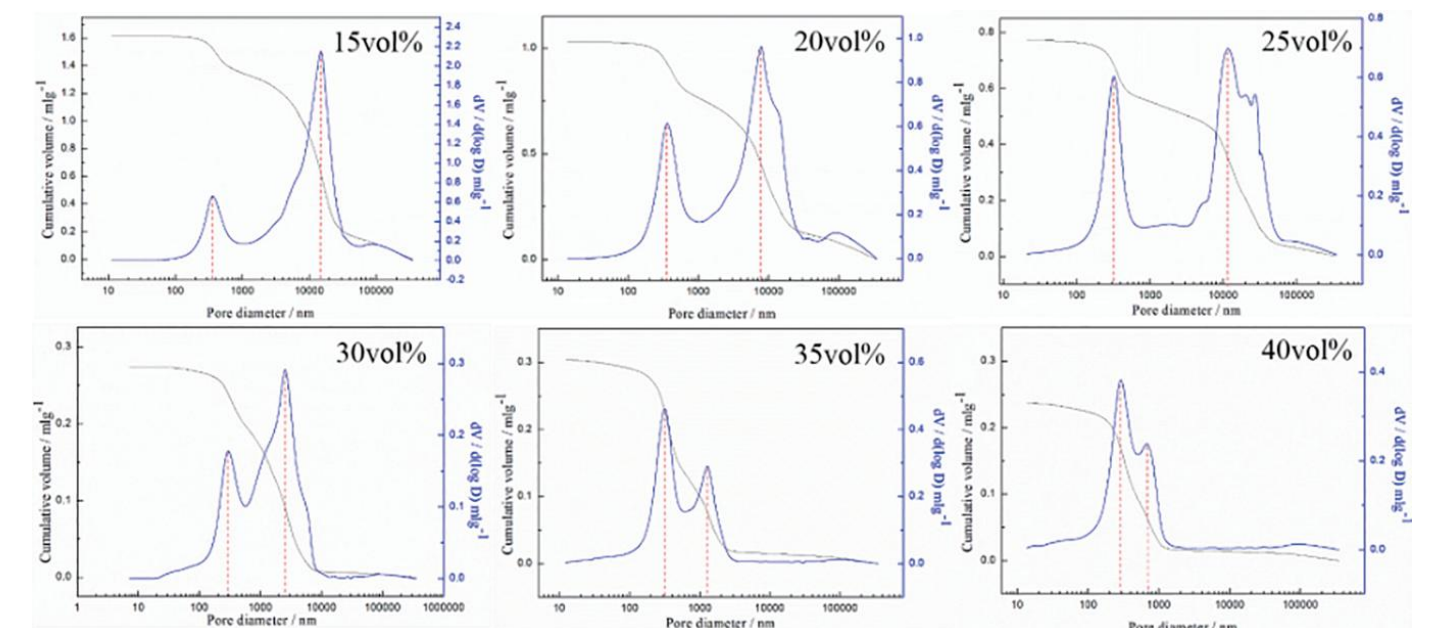
THEORETICAL ANALYSIS AND VERIFICATION



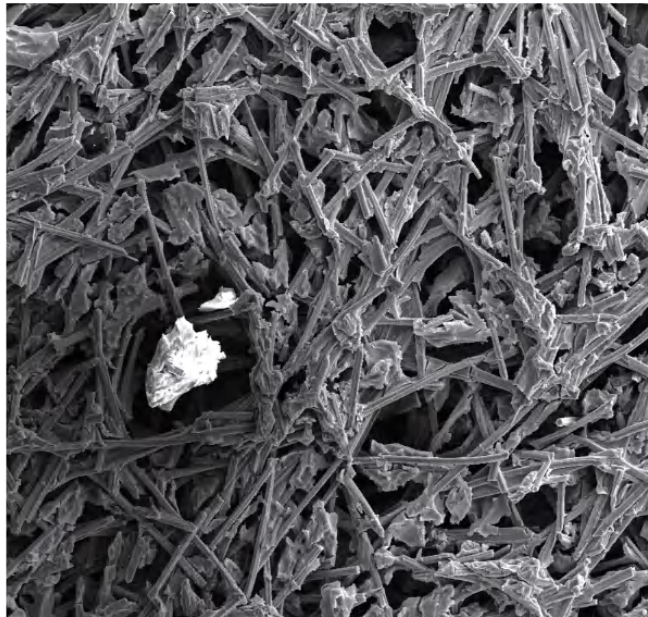
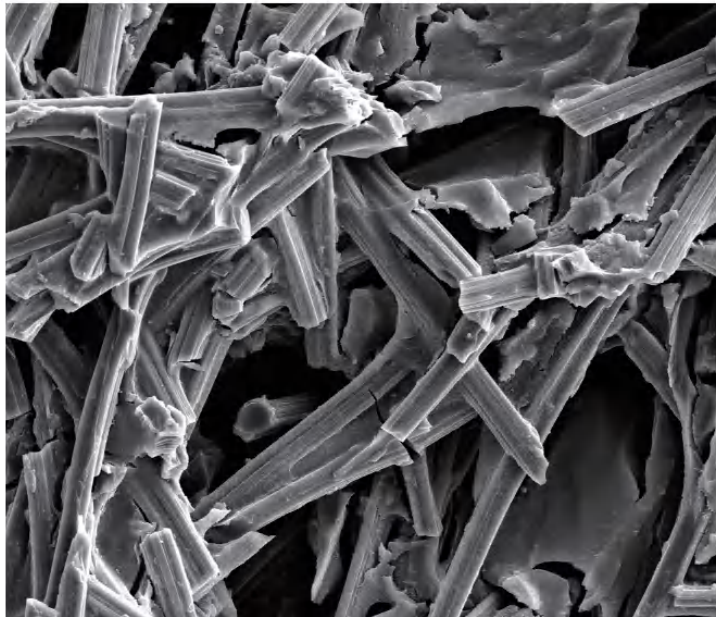
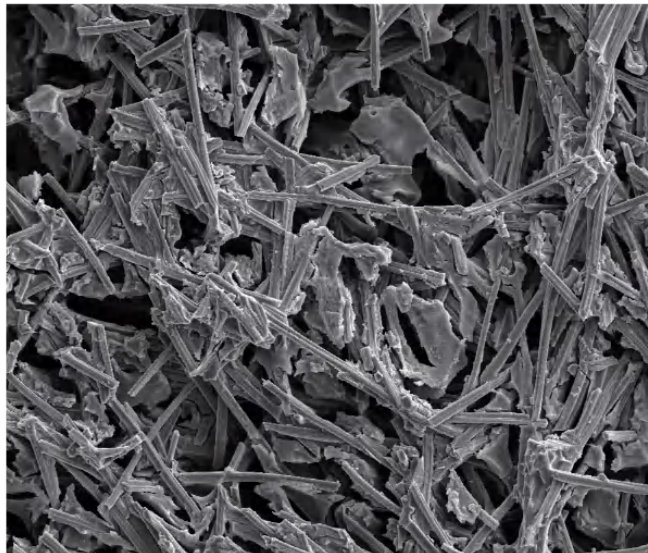
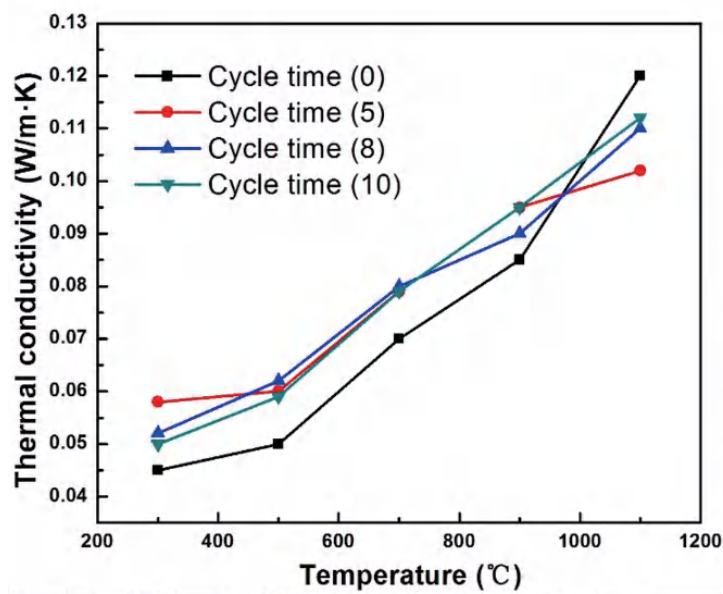
实验验证：通过超过180min火焰烧蚀，表面温度最高达到约1400°C，背面温度仅为40°C左右，表现出优异的耐火-隔热性能；

Experimental Verification: After undergoing more than 180 minutes of flame ablation, the surface temperature reached a maximum of approximately 1400°C, while the backside temperature was only around 40°C, demonstrating excellent fire resistance and thermal insulation performance;

深入、扎实的基础研究 / IN-DEPTH AND SOLID BASIC RESEARCH



不同固相含量对孔径分布的影响
The Effect of Different Solid Phase Contents on Pore Size Distribution



热循环对热导率的影响规律

The Effect of Thermal Cycling on Thermal Conductivity

P-LINE h为一种新型的耐火材料,由无机材料为基体,通过一定比例浇筑在常温常压下干燥成型,在表面喷镀气隔热层及耐火层形成具有三明治梯度化结构的耐火材料,具有优异的耐火及隔热性能;

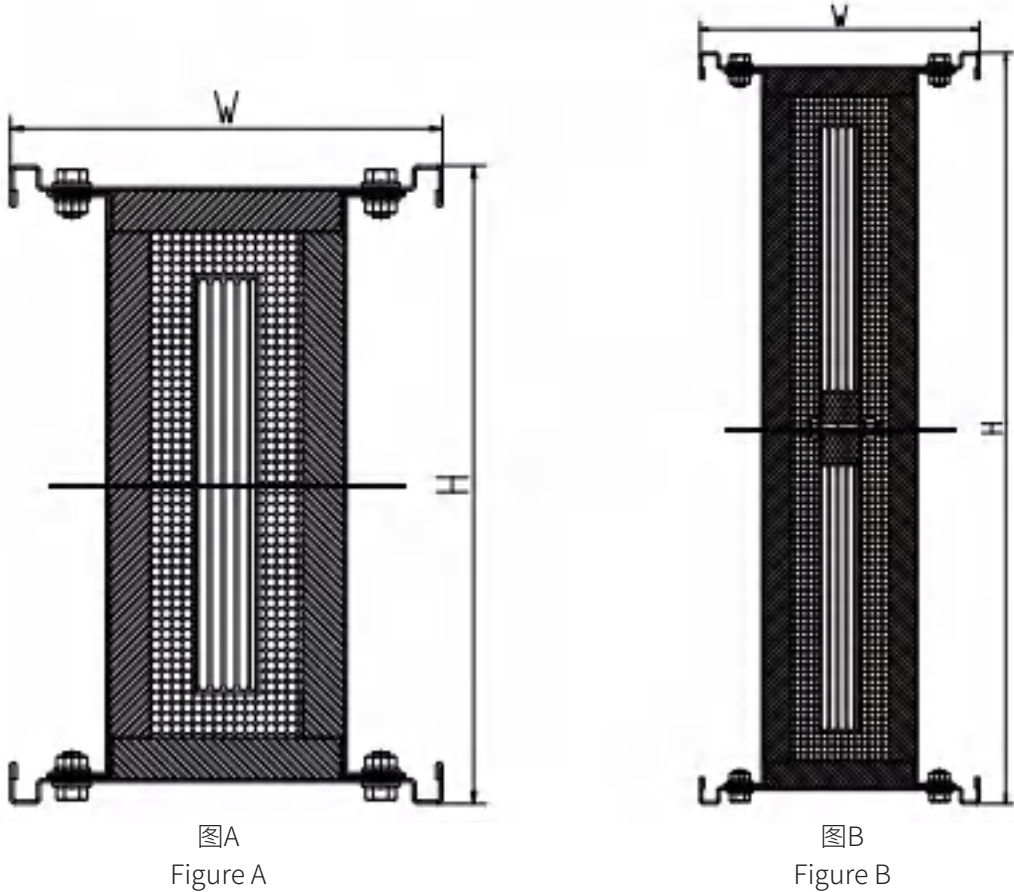
P-LINE h is a new type of refractory material. Based on inorganic materials as the matrix, it is cast in a certain proportion, dried and formed at room temperature and pressure, and then sprayed with a gas insulation layer and a refractory layer on the surface to form a refractory material with a sandwich gradient structure, which has excellent fire resistance and thermal insulation performance;

额定电流 Rated Current	A	630	800	1000	1250	1600	2000	2500	3200	4000
电流代号 Current Code		06	08	10	12	16	20	25	32	40
符合标准 Compliance with Standards		GB/T7251.1-6 IEC60439.1-6 GA/T537-2005								
额定工作电压 Rated Operating Voltage	V	400V/690V/1000V								
额定绝缘电压 Rated Insulation Voltage	V	1000V								
频率 Frequency	Hz	50								
外壳防护等级 Enclosure Protection Rating	IP	IP54~IP66								
额定短时耐受电流 (Icw) Rated Short-Time Withstand Current (Icw)	kA	50	50	50	50	80	100	100	100	100
额定短路峰值电流 (Ipk) Rated Short-Circuit Peak Current (Ipk)	kA	105	105	105	105	176	176	176	176	176
海拔高度 Altitude	m	3000及以下 3000 and below								
绝缘电阻 Insulation Resistance	m Ω	大于等于500 500 and above								
导体材料 Conductor Material		铜排镀锡 (或镀银) Tin-plated (or silver-plated) copper busbar								
电气间隙及爬电距离 Electrical Clearance and Creepage Distance	mm	符合GB/T7251.1-6 IEC60439.1-6 GA/T537-2005 Complies with GB/T7251.1-6, IEC60439.1-6, and GA/T537-2005								
耐受温度 Withstand Temperature		1150°C								
耐火时间 Fire Resistance Duration		1800min+15min								
外壳表面处理及颜色 Enclosure Surface Treatment and Color		表面静电喷塑, 标准色标:RAL7035,或根据客户要求定制 Electrostatic powder coating on the surface; standard color code: RAL7035, or customized according to customer requirements								
电阻/米 (50Hz 20°C) Resistance per Meter	m Ω /m	0.0358	0.0317	0.0283	0.0254	0.0226	0.0198	0.0162	0.0115	0.0092
电抗/米 (50Hz 20°C) Reactance per Meter	m Ω /m	0.0109	0.0092	0.0082	0.0082	0.0136	0.0101	0.0074	0.0046	0.0043
阻抗/米 (50Hz 20°C) Impedance per Meter	m Ω /m	0.0368	0.0331	0.0289	0.0259	0.0235	0.0203	0.0169	0.0143	0.0113

额定电流 Rated Current	A		630	800	1000	1250	1600	2000	2500	3200	4000
每米电压降 Voltage Drop per Meter			环境温度平均35℃,满载, 负荷分布系数 Average ambient temperature of 35°C, full load, load distribution coefficient								
功率因数COS ϕ Power Factor (COS ϕ)	1	V/m	0.083	0.095	0.098	0.106	0.095	0.092	0.085	0.089	0.082
	0.9	V/m	0.089	0.101	0.109	0.109	0.103	0.104	0.093	0.091	0.096
	0.8	V/m	0.086	0.099	0.107	0.118	0.101	0.103	0.096	0.092	0.097
	0.7	V/m	0.084	0.098	0.102	0.102	0.105	0.113	0.102	0.101	0.099
	0.6	V/m	0.087	0.097	0.103	0.109	0.112	0.116	0.109	0.108	0.101
每米电压降 Voltage Drop per Meter			环境温度平均35℃,满载, 负荷分布系数 Average ambient temperature of 35°C, full load, load distribution coefficient								
功率因数COS ϕ Power Factor (COS ϕ)	1	V/m	0.098	0.091	0.095	0.086	0.081	0.078	0.074	0.075	0.077
	0.9	V/m	0.105	0.101	0.106	0.096	0.089	0.088	0.089	0.089	0.077
	0.8	V/m	0.103	0.098	0.104	0.095	0.088	0.087	0.089	0.086	0.073
	0.7	V/m	0.098	0.093	0.099	0.091	0.084	0.083	0.087	0.081	0.068
	0.6	V/m	0.092	0.091	0.094	0.086	0.081	0.081	0.083	0.075	0.061
故障时接地电阻 Grounding Resistance During Fault	m Ω/m		0.156	0.154	0.145	0.122	0.101	0.096	0.083	0.048	0.041

产品规格尺寸（母线槽）

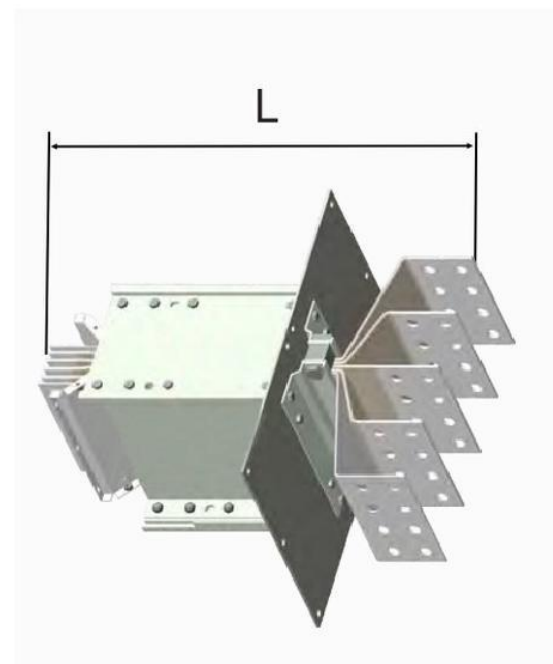
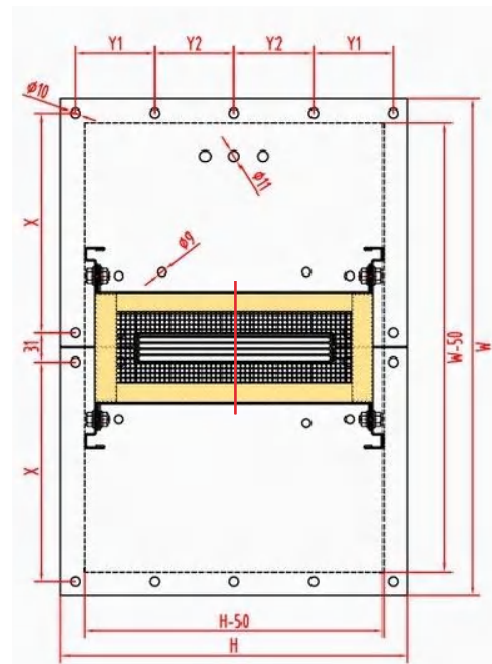
PRODUCT SPECIFICATION DIMENSIONS（BUSBAR TRUNKING）



额定电流代号 Rated Current Code	W宽度（mm） W (Width)	H宽度（mm） H (Width)	重量（kg/m） 3P4W Weight	重量（kg/m） 3P5W(50%PE) Weight	图形 Diagram
06	210	175	43.17	44.67	A
08	210	190	51.60	53.77	A
10	210	215	60.91	63.72	A
12	210	245	68.03	71.30	A
16	210	280	82.77	87.32	A
20	210	330	96.69	102.34	A
25	210	380	111.95	118.73	A
32	210	430	135.84	145.44	A
40	210	546	160.06	171.37	B

产品规格尺寸（铜母线）

PRODUCT SPECIFICATION DIMENSIONS (COPPER BUSBAR)



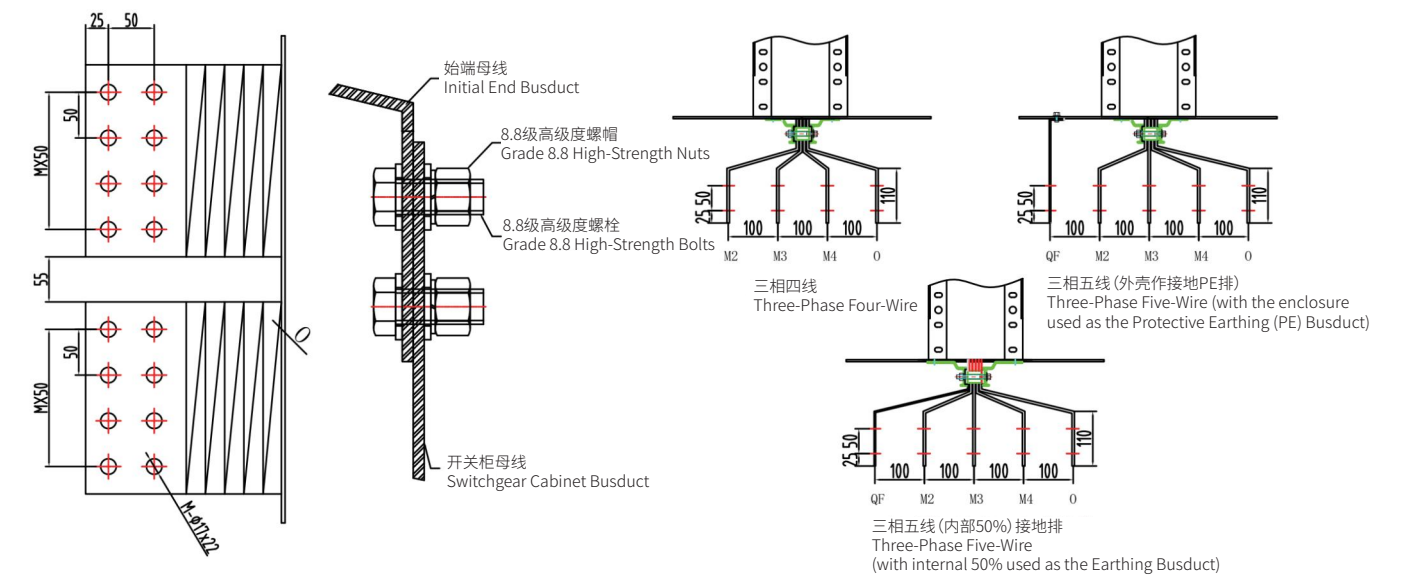
铜母线(始端部分)(上图)

Copper Busduct (Initial End Part) (See the figure above)

额定电流		参考尺寸					
Rated Current	Reference Dimensions						
A	W(mm)		H(mm)	X(mm)		Y1(mm)	Y2(mm)
-	4P	5P	-	4P	5P		
400	420	520	200	180	230	85	
500	420	520	210	180	230	90	-
630	420	520	220	180	230	95	-
800	420	520	240	180	230	105	
1000	420	520	260	180	230	115	
1250	420	520	285	180	230	127	-
1600	420	520	320	180	230	145	-
2000	420	520	360	180	230	165	
2500	420	520	410	180	230	190	-
3200	420	520	460	180	230	215	-
4000	420	520	615	180	230	117	117
5000	420	520	735	180	230	141	141
5500	420	520	715	180	230	137	137

产品始端尺

PRODUCT INITIAL END DIMENSIONS



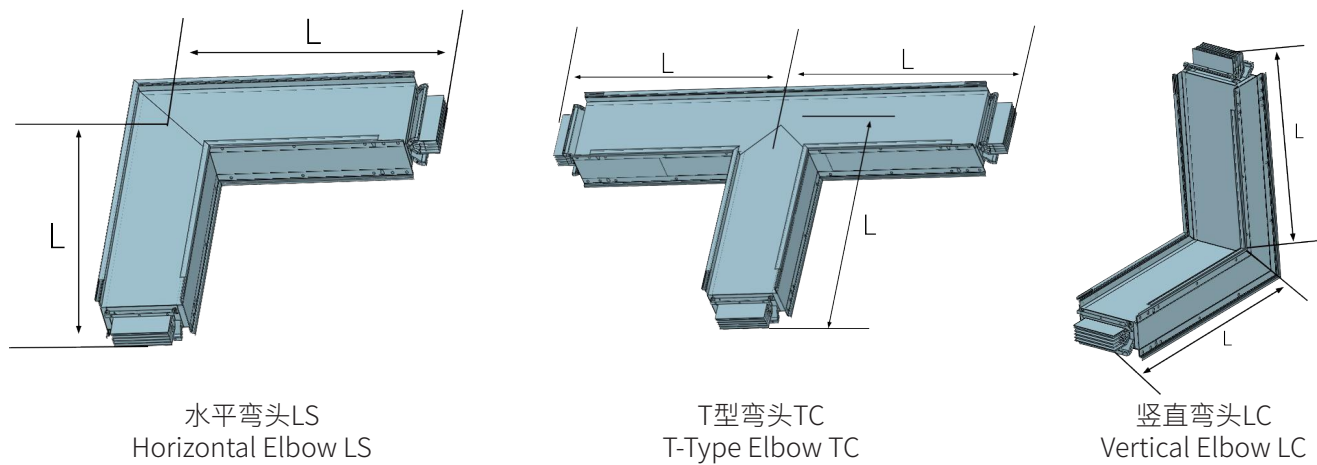
始端铜排数量

Quantity of Initial End Copper Busduct

额定电流 Rated Current		参考尺寸 Reference Dimensions	
A	N	M	
400	单层 / Single Layer	2	
500	单层 / Single Layer	2	
630	单层 / Single Layer	4	
800	单层 / Single Layer	4	
1000	单层 / Single Layer	4	
1250	单层 / Single Layer	4	
1600	单层 / Single Layer	6	
2000	单层 / Single Layer	8	
2500	单层 / Single Layer	10	
3200	单层 / Single Layer	12	
4000	双层 / Double Layer	16	
5000	双层 / Double Layer	20	
5500	双层 / Double Layer	20	

铜母线（弯头尺寸）

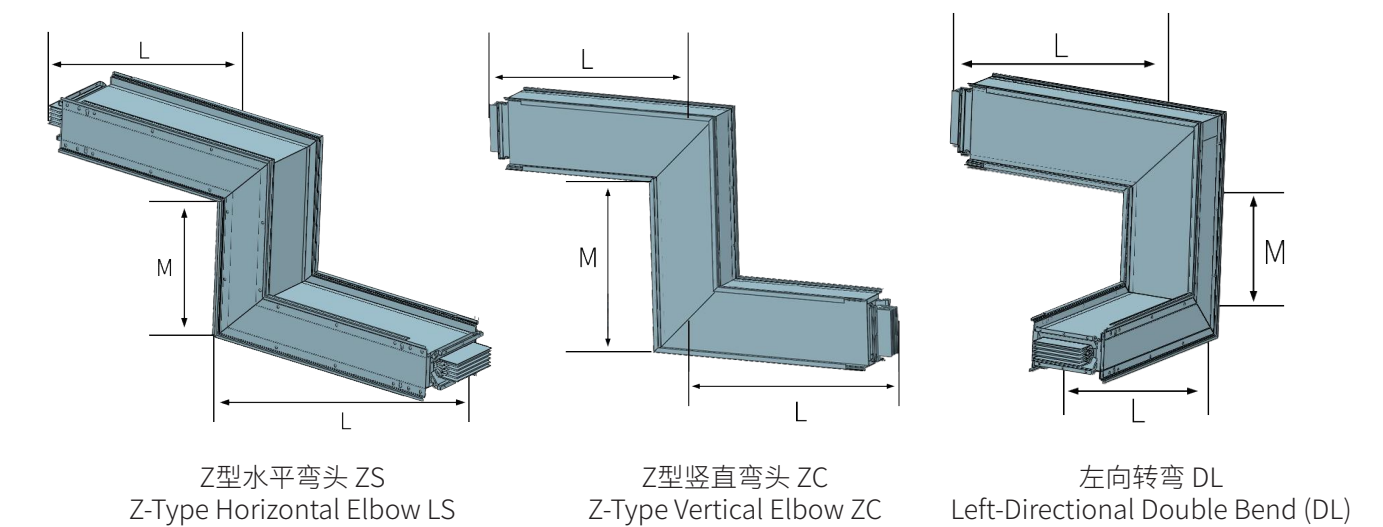
COPPER BUSBAR (ELBOW DIMENSIONS)



额定电流 Rated Current		L最小尺寸 L Minimum Dimension		L最大尺寸 L Maximum Dimension
A	水平弯头LS(mm) Horizontal Elbow LS	T型弯头TC(mm) T-Type Elbow TC	竖直弯头LC(mm) Vertical Elbow LC	弯头单臂Lmax(mm) Single-Arm Elbow L max
400	390	400	400	1200
500	390	400	400	1200
630	390	400	400	1200
800	390	400	400	1200
1000	390	410	410	1200
1250	390	420	420	1200
1600	390	440	440	1200
2000	390	470	470	1200
2500	390	490	490	1200
3200	390	520	520	1200
4000	390	600	600	1200
5000	390	650	650	1200
5500	390	640	640	1200

铜母线（弯头尺寸）

COPPER BUSBAR (ELBOW DIMENSIONS)



额定电流 Rated Current	中间段最小尺寸 Middle Section Minimum Dimension			起始段最小尺寸 Initial Section Minimum Dimension	
	ZS	ZC	DR/DL	D/LS	D/LC
A					
400	200	150	280	490	480
500	200	150	280	490	480
630	200	150	280	490	480
800	200	150	280	490	490
1000	200	150	290	490	500
1250	200	150	300	490	510
1600	200	150	320	490	530
2000	200	150	350	490	550
2500	200	150	370	490	575
3200	200	150	400	490	600
4000	200	150	480	490	650
5000	200	150	530	490	700
5500	200	150	520	490	675



发电厂
Power Plants



供水/建材
Water Supply /
Building Materials



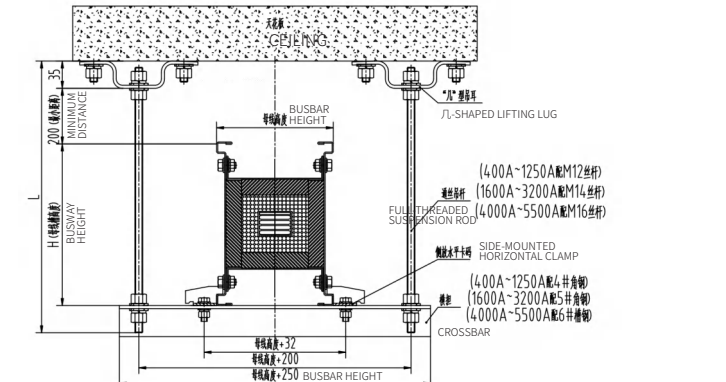
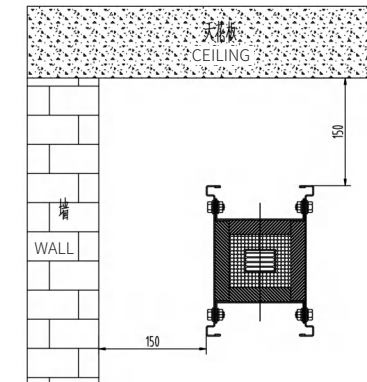
石油石化
Petroleum and
Petrochemicals



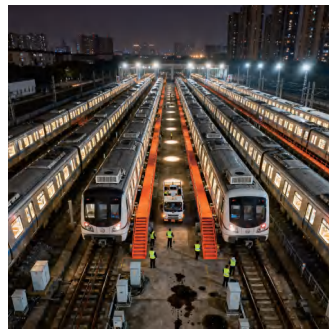
政府工程
Government Projects

水平安装

Horizontal Installation



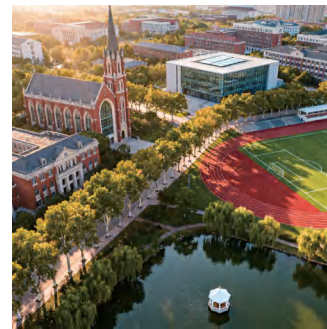
邮电/通信/广播电视
Post and Telecommunications /
Communications /
Radio and Television



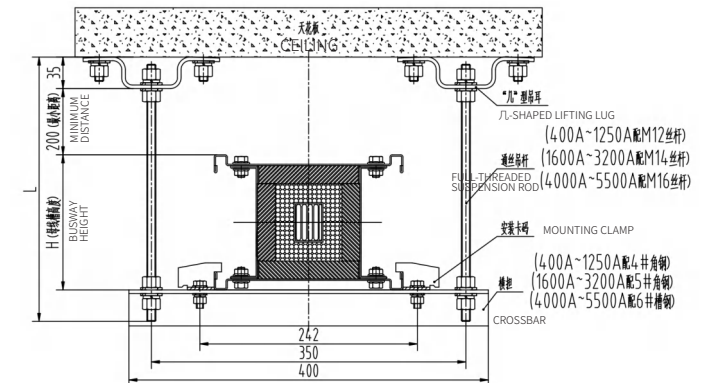
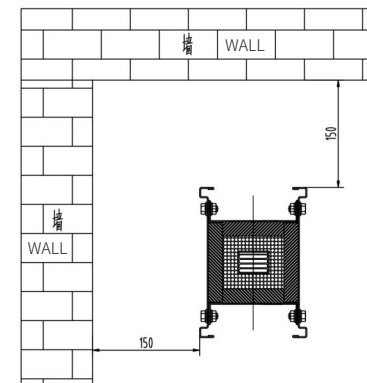
民航/轨道交通
Civil Aviation
/ Rail Transit



矿山/冶金
Mines / Metallurgy



文教 / 卫生
Culture/
Education and Healthcare



体育场馆 / 会展 / 酒店
Stadiums and Gymnasiums /
Exhibition and Conference
Venues / Hotels



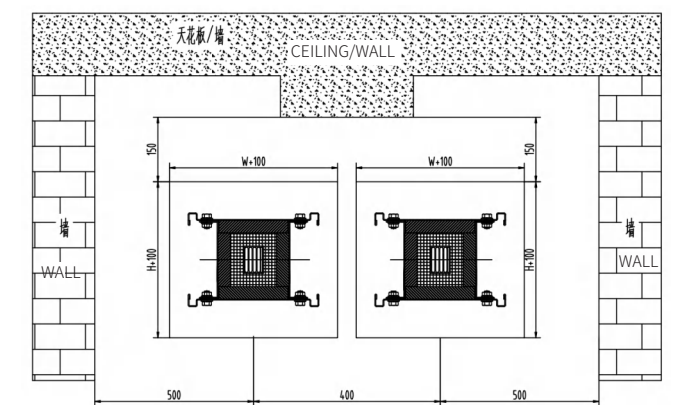
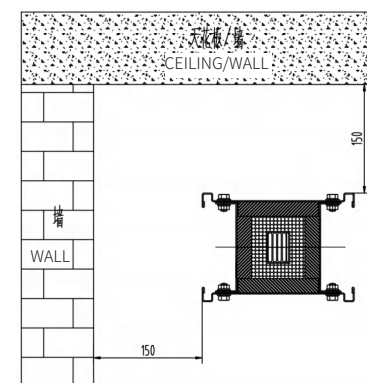
汽车 / 造纸
Automotive Industry /
Paper-Making Industry



电力电网
Electric Power and
Power Grids

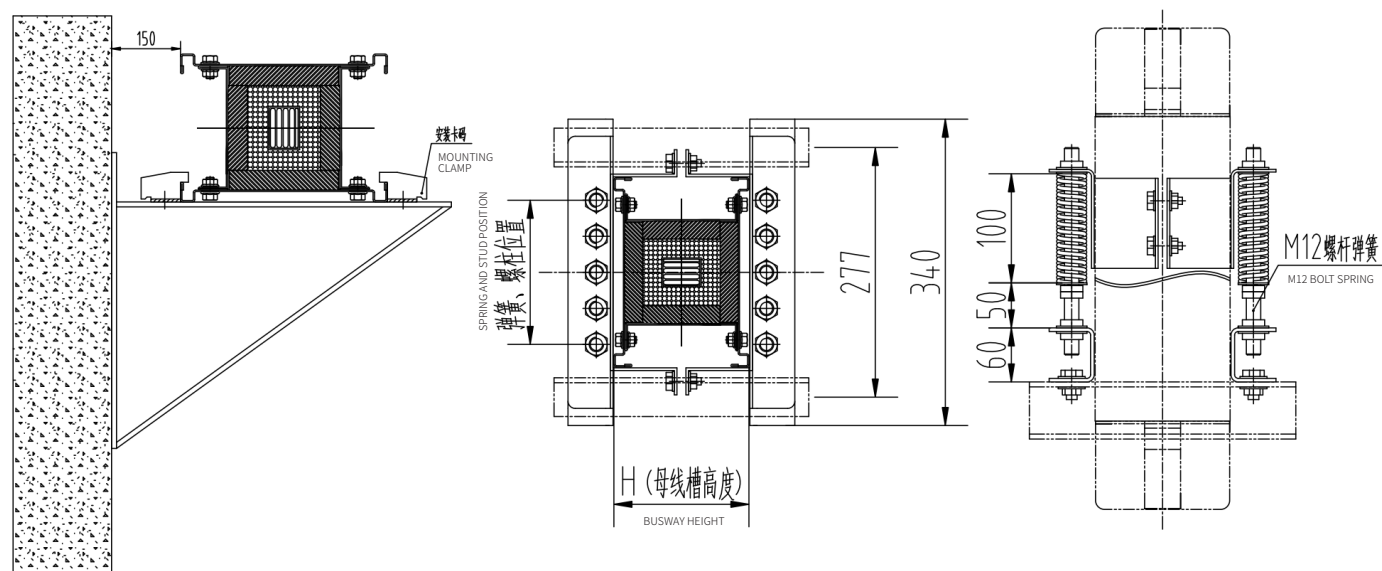


航运 / 其他
Shipping / Others



竖并垂直弹簧支架安装

Installation of Vertical Spring Supports for Shafts



3200A~5500A	全部孔 All Holes
2000A~2500A	两边双孔 Double Holes on Both Sides
1000A~1600A	两边单孔+中间孔 Single Holes on Both Sides + Middle Hole
400A~800A	两边单孔 Single Holes on Both Sides
适用电流 Applicable Current	弹簧、螺柱位置 Positions of Springs and Studs



PRECISION IN DETAIL

