RBC–Effibar Busbars by MOSELECTRO Group of Companies

Trunk Line and Distribution Busbars
Nominal voltage up to 1,000 V
Nominal current 250 to 6,300 A
MOSELECTRO Group of Companies:

Over 70 years in business
Over 1,000 employees
Over 2,000 completed projects

MOSELECTROSHIELD

ERA Marin Engineering Center

MOSELECTRO

SPECENERGO

Основные отрасли – потребители:

Electric-power networks
Construction
Industry
Oil & Gas industry
Infrastructure, housing and utilities
Nuclear industry
Hydropower industry
Heat-power industry
Transport
70 years of progress

1946
Moscow plant “Moselectroshield” was founded

1954
First small-sized switchgear development in the USSR

1972
The 1000th worker of the plant was awarded the title of “Shock Worker” (73% of the total staff), including 140 efficiency specialists)

1990
The plant manufactured 70% of packaged switchgear and 40% of busducts in the country

1950
First switchgear manufactured for the Bolshoi Theater

1960
Busbars manufacturing started

1984
Production of switchgear of K-104M series was launched

1991
Manufacture of vacuum-breaker switchgear began

2001
SPETSENERGO Company was established

2013
Russian Busbar Center engineering company was established and became a member of the Group

2013
New engineering solution was developed – a small-sized recloser

2012
Engineering Center Energy LLC joined the Group

2009
Production of “would-be classic” switchgear of K-125, K-128, K-129 series commenced

2008
Production of 20 kV switchgear of K-131 series commenced
Own Solutions – Key Products

6–35 kV switchgear cubicles:
- K-125 “Transformer”
- K-128 “Classic”
- K-129 “Optima”
- K-130 “Guarantor”
- K-131 “Progress”
- K-132 “Innovator”

6/10 kV reclosers with/without energy accounting meters:
- Acting as sectioning switches
- With energy accounting meters

Low-voltage package modules:
- Conventional distribution switchboards
- Protection regulating switchboards for substations (DC boards, auxiliaries boards)
- LV switchgear for unit transformer substations

Mobile substations:
- Mobile substations 110/10(6) kV
- Mobile substations 35/10(6) kV
- Modular substations 110/10(6) kV
- Modular substations 35/10(6) kV
**Portfolio of Our Products and Services**

2. **Busbar systems with solid molded insulation:**
   - Three-phase version with polymer compound insulation;
   - Phase-screened in solid insulation (RIP technology); and
   - Low-voltage in molded polymer insulation.

1. **Low-voltage busbars (up to 1 kV):**
   - Busbar with molded polymer insulation;
   - Busbar with sandwich insulation.

3. **Air-insulated busbar systems:**
   - Complete enclosed busbars;
   - Complete medium-voltage busbars; and
   - Low-voltage busbars.

4. **Gas-insulated busducts:**
   - High-voltage SF6-insulated busbars.

7. **Packaged supplies of electrical equipment for energy facilities complete with busbars for any system**

6. **Full range of associated services, including:**
   - Design;
   - Electrical installation for busbars of any type;
   - Start-up and commissioning;
   - Maintenance; and
   - Energy audit.

5. **Supplementary systems for busbar reliability enhancement:**
   - Pressurization systems for generator busbars; and
   - Bus support monitoring devices.
RBC–Effibar Busbar

Busbar is a system of insulated rigid buses (copper, aluminum) in a metal protective enclosure, designed for transmission and distribution of electric power of up to 1,000 V.

**Distribution busbars** are intended for electric power distribution between consumers, using special devices for power takeoff from the main busduct line (cable splice boxes, junction boxes with automatic circuit breaker, etc.).

**Trunk line busbars** are used for electric power transmission from the source to a distribution point (distribution stations, distribution busducts) or to high electric loads.
Sphere of Application for RBC–Effibar Low-voltage Busbars

Applications of RBC–Effibar busbars:

In business centers and high-rise buildings:

- As a feeder between transformers and main switchboards;
- For power distribution to the floors via riser boards;
- Horizontal installation as a feeder to switchboards and equipment; and
- As indoor power distribution ducts/ channels in suspended ceilings and floors.
Sphere of Application for RBC–Effibar Low-voltage Busbars

- Electric power transmission
- Energy transportation
- Lighting
- Electric power distribution
- Electric power distribution
Sphere of Application for RBC–Effibar Low-voltage Busbars

In hotels, sports venues and institutions:
- As a feeder between transformers and main switchboards; and
- For power distribution to the floors via riser boards.

In trade centers/supermarkets:
- As a feeder between transformers and main switchboard;
- For electric power distribution in vertical and horizontal routing; and
- As a feeder for power supply to light fixtures.

In data centers.
## Dimensions and Weight of RBC–Effibar Busbars

### Copper conductors:

<table>
<thead>
<tr>
<th>Dimensions, mm</th>
<th>Weight of 1 meter (kg/m)</th>
<th>4 conductors 100%N</th>
<th>5 conductors 100%N, 50%PE</th>
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<tbody>
<tr>
<td>Current</td>
<td>Width (W)</td>
<td>Height (H)</td>
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<tr>
<td>400 630</td>
<td>125</td>
<td>103</td>
<td>11.8</td>
</tr>
<tr>
<td>800</td>
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<td>118</td>
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<td>1000</td>
<td>125</td>
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<td>153</td>
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<td>125</td>
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<td>5000</td>
<td>125</td>
<td>532</td>
<td>88.2</td>
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<tr>
<td>6300</td>
<td>125</td>
<td>701</td>
<td>114.5</td>
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</table>

### Aluminum conductors:

<table>
<thead>
<tr>
<th>Dimensions, mm</th>
<th>Weight of 1 meter (kg/m)</th>
<th>4 conductors 100%N</th>
<th>5 conductors 100%N, 50%PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Width (W)</td>
<td>Height (H)</td>
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</tr>
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<td>125</td>
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<tr>
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<td>700</td>
<td>54.2</td>
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</table>
Description of RBC–Effibar Busbar: Conductors Used

Conductor materials:

- Tinned aluminum, conductivity > 60%, purity 99.58%, rounded edges;
- Tinned copper, conductivity > 99.58%, purity 99.99%, rounded edges;
- Customized silver-coated conductors are available; and
- Tin or silver coating of conductors reduces transient resistance and voltage drop, minimizing their oxidation.
Description of RBC–Effibar Busbar: Insulation Features

Mylar insulation:

- Insulation of each bus consists of three layers 0.2 mm thick each;
- Total thickness between two conductors – 1.2 mm;
- Just one insulation layer 0.2 mm thick is sufficient to comply with IEC standards;
- Thermal endurance class F (155ºC);
- Excellent dielectric properties (5 kV during 1 minute);
- Experience of Mylar application in insulations exceeds 15 years. No problems have been encountered with the usage of this material; and
- Self-extinguishing insulation (does not support combustion).
Description of RBC–Effibar Busbar: Body Features

**Design:**
- The body consists of 2 parts instead of conventional 4 parts;
- Enhanced moisture/dust protection; and
- High mechanical strength.

**Material: aluminum with magnesium alloy:**
- Effective heat removal;
- Usage of the body as an earthing lead;
- Low weight;
- Corrosion resistance (1,000 hours in salt mist); and
- No eddy currents.
Description of RBC–Effibar Busbar: Joint Blocks

- Single-block joint;
- Double breakaway head bolt;
- Copper splice pieces;
- Class F insulation at junction areas; and
- Heat indicator at every junction (temperature rise is detected at every junction; no need for thermal scanning; incorrect installation is easily detectable).
Description of RBC–Effibar Busbar: Power Takeoff Boxes

- Complete with automatic circuit breakers, fuses; and
- Possible manufacture of non-standard sized boxes.

<table>
<thead>
<tr>
<th>Rated current, A</th>
<th>Overall dimensions, mm</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
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<tr>
<td>100</td>
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<tr>
<td>630</td>
<td>800</td>
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<tr>
<td>800-1,000</td>
<td>1,200</td>
</tr>
</tbody>
</table>
Description of RBC–Effibar Busbar: Sections with Power Takeoff Sockets

L1=360 mm
L2=930 mm
L3=1,500 mm
L4=2,070 mm
L5=2,640 mm

Standard section length:
LVC: L=1,000, 2,000, 3,000 mm
LVA: L=1,000, 2,000, 3,000 mm

Non-standard length:
LVC: L=720~2,990 mm
LVA: L=720~4,000 mm
Description of RBC–Effibar Busbar: Power Takeoff Section Design

**Bonding pads:**

- Rated current up to 1,000 A; and
- Silver plated.

Full compliance with the sandwich busbar design excludes potential flame, smoke or gas propagation at power takeoff points.

This design also ensures the equality of fault currents both on a straight transport section and a socket section.
Description of RBC–Effibar Busbar: Terminal Element

Standard length: L=560 mm
Non-standard length: L=560–2,000 mm
Description of RBC–Effibar Busbar: Special Elements

Thermal expansion section

Rated current change section

Phase transposition section
Advantages of Busbars over Cables:

- Simple design;
- Quick and easy installation;
- Compact size and low weight;
- Expandability and possibility to add new loads;
- Service life of busbars is at least 40 years as opposed to 15 years for cables;
- Busbars do not require maintenance during the entire service life;
- Lower electric losses;
- Busbars are fully fire-safe;
- Mechanical strength margin; and
- Low EMR level.
When a Busbar is the Most Cost-efficient Solution:

A busbar costs less than many cable systems. Cost reduction from busbar application is the most notable in case of:

- Usage in lines with increased current loads;
- Long line routes;
- Multiple bends and power takeoff points on the line;
- Less expensive aluminum buses (instead of copper ones) can be used in busbars; and
- Busbars allow engagement of less qualified workers in installation and maintenance activities, resulting in salary savings and human error reduction.
Application of RBC–Effibar Busbars at Various Facilities
Application of RBC–Effibar Busbars at Various Facilities
Services

Design:
- Research and development
- Design of facilities up to 220 kV of any complexity; project management
- Process automation, introduction of energy-saving technologies

Equipment operation services:
- Installation, installation supervision
- Set-up, commissioning
- Warranty and service maintenance

Integrated solutions:
- Indoor integrated transformer substations
- Modular integrated transformer substations 10/0.4 kV in a concrete building for 10(20)/0.4 kV.
- Sandwich-type integrated transformer substations 10(20,35)/0.4 kV.
- Outdoor switchgear 110/10(35) kV.
- Indoor switchgear for GIS 110/10(35) kV
- Automatic voltage control station (AVCS).
● All products of the company’s plant are certified for compliance with Russian and international standards (GOST R and IEC) and safety requirements;

● Certification by OJSC “Russian Networks” (OJSC “FSK”);

● Certification by OJSC “NK ROSNEFT”, OJSC “Gazprom”, OJSC “AK Transneft”;

● License of GosAtomNadzor of Russia for design and manufacture of nuclear power station equipment;

● International Quality Certificate TUV ISO 9001: 2008 in the area of development and design for power stations, substations and industrial enterprises; and

● Other certificates, licenses and qualifications.
Sales Geography

- Finland
- Ukraine
- Belorussia
- Croatia
- Germany
- Russia
- China
- Bangladesh
- Kazakhstan
- Uzbekistan
- Tajikistan
- Iran
- Bulgaria
- Argentina
- Ecuador

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Infrastructure and industry
Defense industry complex
Nuclear power industry
Hydropower industry
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