

DL500

Operation and Maintenance Manual

K1010631E

Serial Number 5001 and Up

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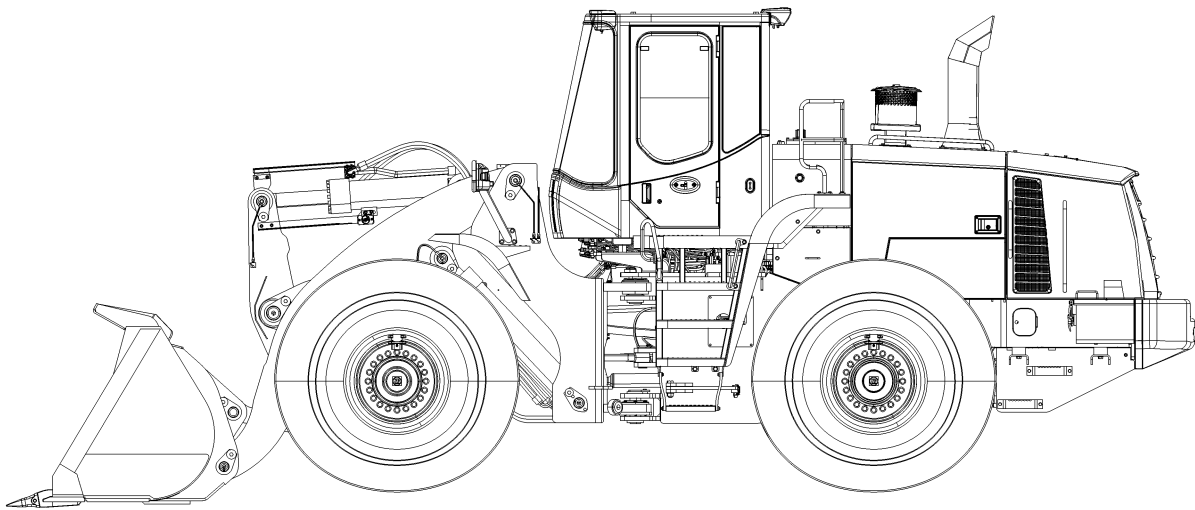
DOOSAN reserves the right to improve our products in a continuing process to provide the best possible product to the market place. These improvements can be implemented at any time with no obligation to change materials on previously sold products. It is recommended that consumers periodically contact their distributors for recent documentation on purchased equipment.

This documentation may include attachments and optional equipment that is not available in your machine's package. Please call your distributor for additional items that you may require.

Illustrations used throughout this manual are used only as a representation of the actual piece of equipment, and may vary from the actual item.

Presentation

PRESENTATION



FG001780

Figure 1

Intended Use

The machine is intended to be used under normal conditions for the applications described in the Operator's Manual. If it is used for other purposes or in potentially dangerous environments, for example explosive atmosphere or areas with dust containing asbestos, etc., special safety regulations must be followed and the machine must be equipped for such use. Contact the manufacturer/dealer for further information.

The machine is designed for a maximum machine weight (includes equipment and attachments) of 22,500 kg (49,603 lb) for DL400. If the maximum weight is exceeded, no warranties on the part of the manufacturer will apply. However, always pay attention to national regulations for traveling on public roads.

Engine

DL400 has a Cummins QSL9 8.9 liter engine. The engine has intercooling and is fitted with common rail system. The common rail system is positioned at an angle above the pistons and are controlled via the camshaft and a electronic control module (ECM).

The cylinder head covers all cylinders.

The engine has four valves per cylinder.

The accelerator position is transferred electrically from accelerator pedal.

Electrical System

The machine has three control units. The Gauge Panel for the instrumentation is integrated with the display unit, warning lights and instruments and provides the operator with information via there. The Control Unit (for the machine) receives signals from sensors on the machine and these are passed to the Gauge Panel. The E-ECU controls the engine.

Power Transmission

The transmission is electrohydraulically controlled, where all gears are in constant mesh. The gear ranges are achieved by applying different combinations of clutches. Between the engine and transmission gears there is a hydraulic torque converter, which controls the output torque. The front and rear axles have planetary gears in the wheel hubs and this reduces the strain on the respective drive shafts. The axles differentials use a LSD (Limited Slip Differential) design.

Brake System

The machine is provided with a dual circuit, all hydraulic, brake system with one circuit for each axle. Each circuit meets the requirements for secondary brake capability.

Parking Brake

The parking brake is a dry disk brake built into the transmission output shaft. The brake is applied by spring force and is released hydraulically.

Steering System

The machine uses a load sensing, hydrodynamic steering system. It has a steering arc of 40°.

Cabin

The cabin has a heating and ventilation system with defrosting for front and rear windows. Air-conditioning is standard. The cabin has two emergency exits, the door and right side window.

FOPS and ROPS

The cabin is approved as a protective cabin according to FOPS and ROPS standards. FOPS is an abbreviation of Falling Object Protective Structure (roof protection) and ROPS is an abbreviation of Roll Over Protective Structure (roll over protection).

Never carry out any unauthorized alterations to the cabin, e.g. lowering the roof height, drilling, welding on brackets for fire extinguisher, radio aerial or other equipment, without first having discussed the alteration with personnel at the *DOOSAN Infracore* Engineering Department. This department will decide whether the alteration may cause the approval to become void. It is important that all parties concerned are aware of these regulations.

Hydraulic System

The hydraulic system is load sensing with pumps in common for steering systems and the working hydraulics. However, the brake and steering systems are prioritized by one of the pumps.

Equipment

The machine can be provided with different types of optional equipment, depending on the requirements of different markets. Examples of such equipment are lever steering, Boom Suspension System (LIS), secondary steering, separate attachment locking, automatic greasing.

CE MARKING, EMC DIRECTIVE

CE Marking

(Declaration of Conformity)

(Only applies to machines marketed within the EU/EEA)

This machine is CE marked. This means that when delivered the machine meets the applicable "Essential Health and Safety Requirements," which are given in the Machinery Safety Directive, 98/37EC.

Any person carrying out changes that affect the safety of the machine, is also responsible for the same.

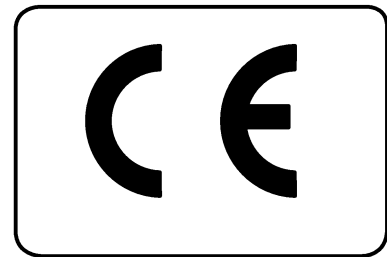
As proof that the requirements are met, the machine is supplied with an EU Declaration of Conformity, issued by *DOOSAN CE* for each separate machine. This EU declaration also covers attachments manufactured by *DOOSAN CE*. The documentation is a valuable document, which must be kept safe and retained for at least ten years. The document should always accompany the machine when it is sold.

If the machine is used for other purposes or with other attachments than described in this manual, safety must at all times and in each separate case be maintained. The person carrying out such action is also responsible for the action which, in some cases, may require a new CE marking and the issue of a new EU Declaration of Conformity.

The EU EMC Directive

The electronic equipment of the machine may in some cases cause interference to other electronic equipment, or suffer from external electromagnetic interference, which may constitute safety risks.

The EU EMC directive on "Electromagnetic Compatibility," 89/336/EEC, provides a general description of what demands can be made on the machine out of a safety point of view, where permitted limits have been determined and given according to international standards.



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Figure 2

A machine or device which meets the requirements must be CE marked. Our machines have been tested particularly for electromagnetic interference. The CE marking of the machine and the declaration of conformity also cover the EMC directive.

If other electronic equipment is fitted to this machine, the equipment must be CE marked and tested on the machine with regard to electromagnetic interference.

COMMUNICATION EQUIPMENT INSTALLATION

IMPORTANT

All installation of optional communication equipment must be carried out by trained professionals and in accordance with the *DOOSAN CE* instructions applicable to the machine.

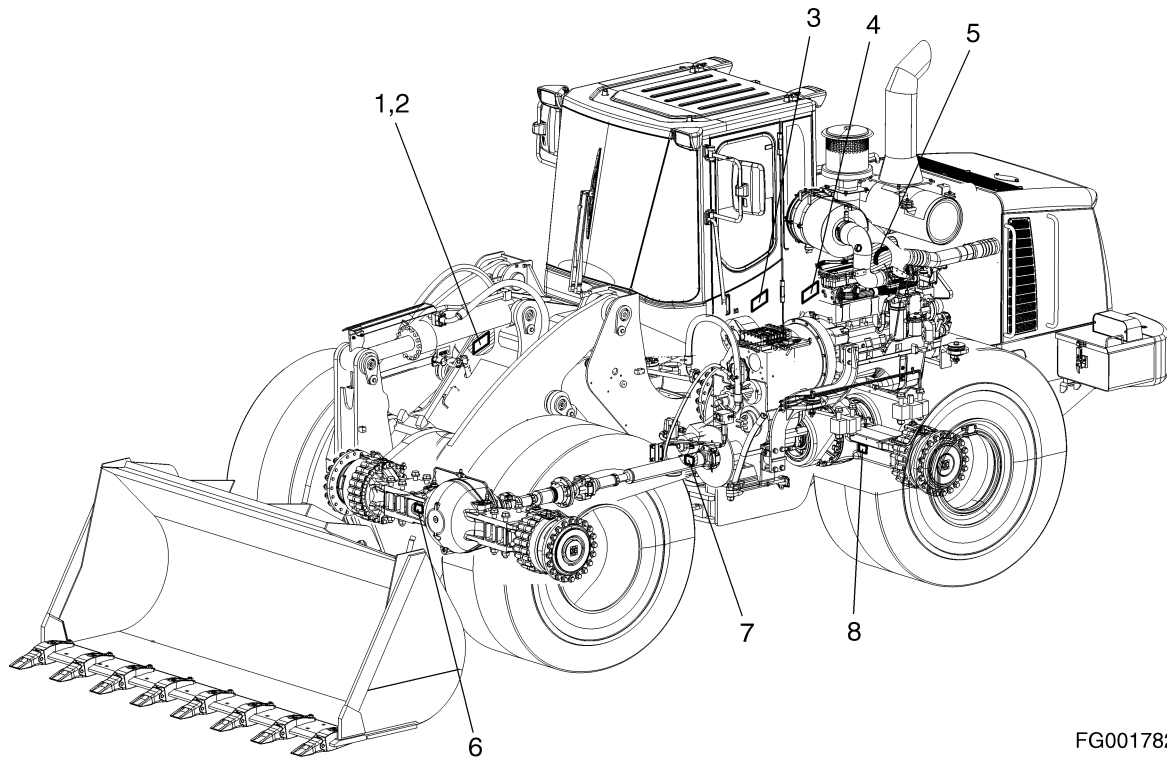
Protection Against Electromagnetic Interference

This machine has been tested in accordance with EU directive 89/336/EEC governing electromagnetic interference. It is therefore very important that all nonapproved electronic accessories, such as communication equipment, must be tested before installation and use, since they can cause interference to the electronic systems of the machine.

PRODUCT PLATES

With the aid of the product plates, shown below, it is possible to identify the machine and its components. The Product Identification Number, PIN, indicates the model designation, engine code and serial number of the machine. The Component Identification Number, CIN, indicates the serial number of the component. Make a note of the identification numbers.

When ordering spare parts, and in all telephone enquiries or correspondence the PIN and CIN must always be quoted.



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Figure 1

Reference Number	Description	
1	Primary Marking	The machine PIN (stamped into right side).
2	Product Plate	The manufacturer's name and address, machine PIN.
3	Additional Plate for Product Plate	Machine weight, engine output year of manufacture, year of delivery and position of CE mark (EU/EEA countries only).
4	Cabin	The manufacturer's name and address, product number, machine model designation, max. machine weight, cabin serial number, ROPS/FOPS number and ROPS/FOPS certificate number.
5	Engine	The engine type designation and number.
6	Front Axle	The manufacturer's name and address and front drive axle CIN.
7	Transmission	The manufacturer's name and address and transmission CIN.
8	Rear Axle	The manufacturer's name and address and rear drive axle CIN.

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Safety

TO THE OPERATOR OF A DOOSAN DAEWOO WHEEL LOADER



Improper use of wheel loader could cause serious injury or death. Before operating wheel loader, or performing maintenance, operator or technician must read and understand entire Operation and Maintenance Manual.

Any operation, maintenance, traveling or shipping methods that do not follow safety guidelines printed in this Manual could cause serious injury or death.

Please respect the importance of taking responsibility for your own safety, and that of other people who may be affected by your actions.

The safety information on the following pages is organized into the following sections:

1. "General Safety Essentials" on page 1-5
2. "Location of Safety Labels" on page 1-5
3. "Unauthorized Modifications" on page 1-14
4. "General Hazard Information" on page 1-14
5. "Before Starting Engine" on page 1-23
6. "Machine Operation" on page 1-27
7. "Maintenance" on page 1-35
8. "Battery" on page 1-46
9. "Towing" on page 1-48
10. "Shipping and Transportation" on page 1-49



WARNING!

Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

Operator and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.

Keep this manual in the storage compartment to the rear of the operator's seat, and have all personnel involved in working on the machine read the manual periodically.

Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.

The procedures and precautions given in this manual apply only to intended uses of the machine.

If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for any others. In no event should you or others engage in prohibited uses or actions as described in this manual.

DOOSAN delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult *DOOSAN* or your *DOOSAN* distributor before operating the machine.

SAFETY ALERT SYMBOL

Be Prepared - Get to Know All Operating and Safety Instructions

This is the Safety Alert Symbol. Wherever it appears - in this manual or on safety signs on the machine - you must be alert to potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

Learn Signal Words Used With Safety Alert Symbol

The words "**CAUTION**," "**WARNING**," and "**DANGER**" used throughout this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

CAUTION!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

WARNING!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.

DANGER!

This word is used on safety messages and safety labels and indicates an imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against equipment that may explode or detonate if handled or treated carelessly.

Safety precautions are described in SAFETY from page 1-5 on.

DOOSAN cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact a *DOOSAN* distributor.

GENERAL SAFETY ESSENTIALS

ACCESSORY APPLICATIONS

The wheel loader has been designed primarily for moving earth with a bucket. For use as a grapple or for other object handling, contact *DOOSAN*. Lifting-work applications are permitted in approved lift configuration, to rated capacity only, with no side-loading (unless prohibited by local regulation). Do not use machine for activities for which it was not intended. Do not use bucket for lifting work, unless lift slings are used in approved configuration.

LOCATION OF SAFETY LABELS

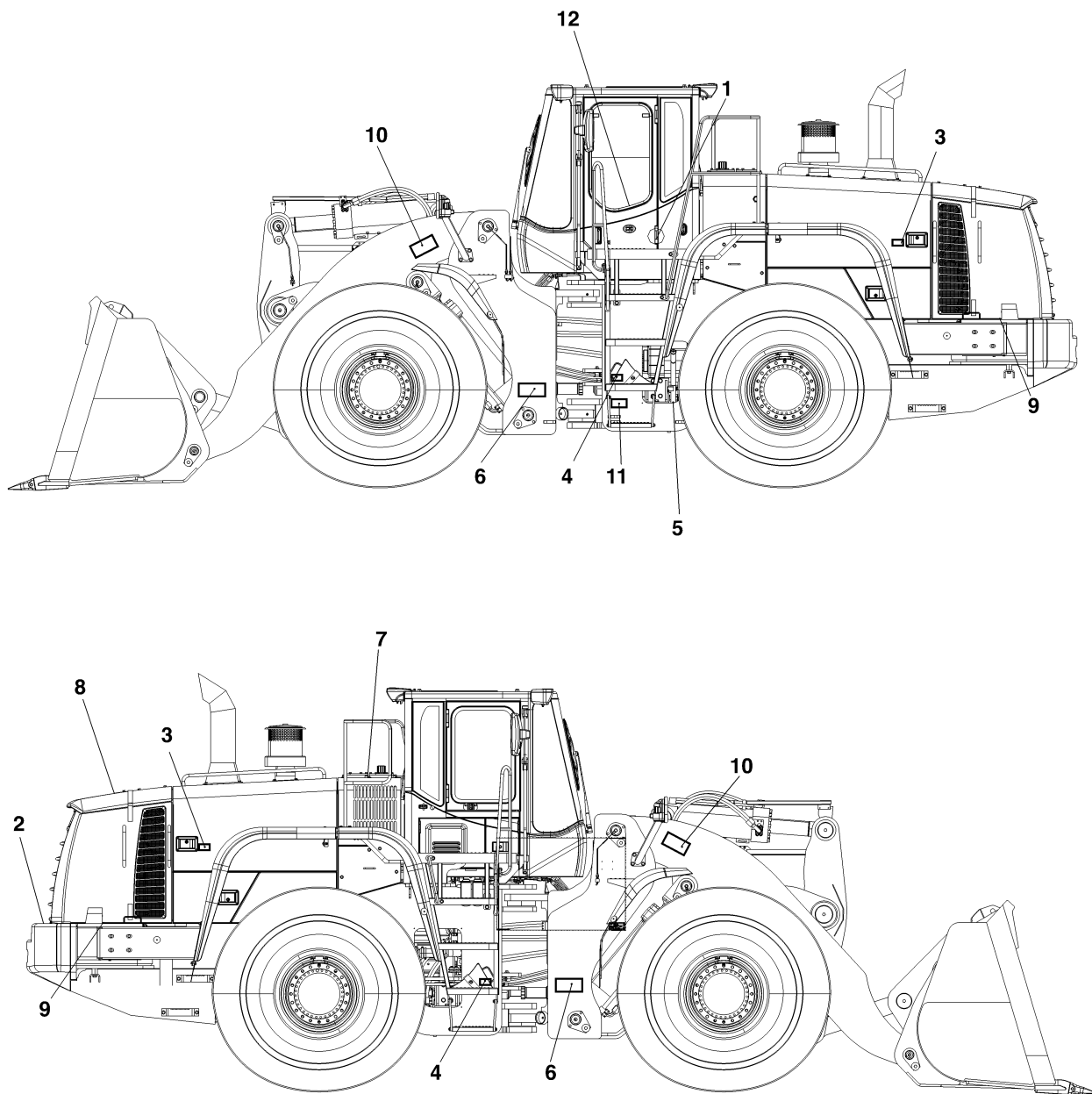
The operator should know and pay attention to the information and warning plates/decals which are positioned on the machine.

There are several specific warning signs on this machine. The exact location of hazards and the description of the hazards are reviewed in this section.

Please become familiarized with all warning signs.

Make sure that all of the warning signs are legible. Clean the warning signs or replace the warning signs if you cannot read the words. Replace the illustrations if the illustrations are not visible. When you clean the warning signs, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety signs. Solvents, gasoline, or other harsh chemicals could loosen the adhesive that secures the warning sign. Loose adhesive will allow the warning sign to fall off.

Replace any safety sign that is damaged, or missing. If a safety sign is attached to a part that is replaced, install a safety sign on the replacement part.



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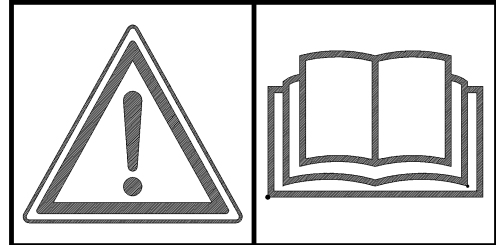
Figure 1

1. Warnings for Operation, Inspection and Maintenance (4190-2545A, 190-00092)



CAUTION!

- Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and on labels on machine.
- Sound horn to alert people nearby before operating, and make sure all persons are clear of area.
- Always make sure when leaving operator's seat to:
 - Lower bucket or other working tools to ground.
 - "LOCK" transmission selector in "NEUTRAL."
 - Set park brake.
 - Turn starter switch "OFF." Remove key from switch.
- If hydraulic components and units are ABNORMAL, consult nearest *DOOSAN* dealer or authorized service shop. Do not attempt to make an overhaul.



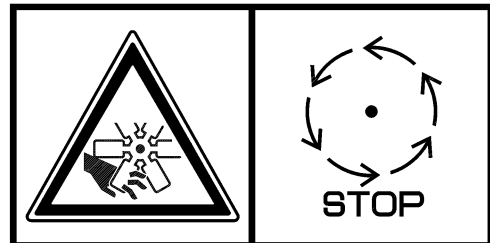
ACO1360L

2. Warnings for Cooling Fan (2190-3315, 190-00557)



WARNING!

Keep your hands away from the fan during operation. Entanglement in the fan can cause serious injury.



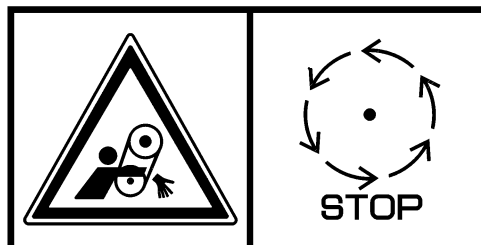
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3. Warnings When Opening Engine Hood (190-00095)



WARNING!

Before opening hood, shut down engine.



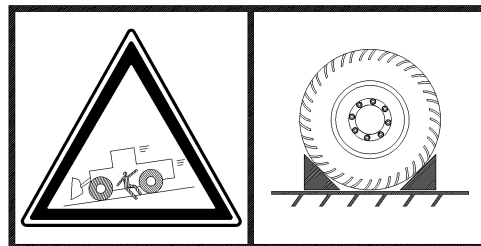
ACO1420L

4. Warnings for Using Wheel Block (4190-2547A, 190-00207)



WARNING!

Block wheels to prevent machine movement before disengaging park brake.



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