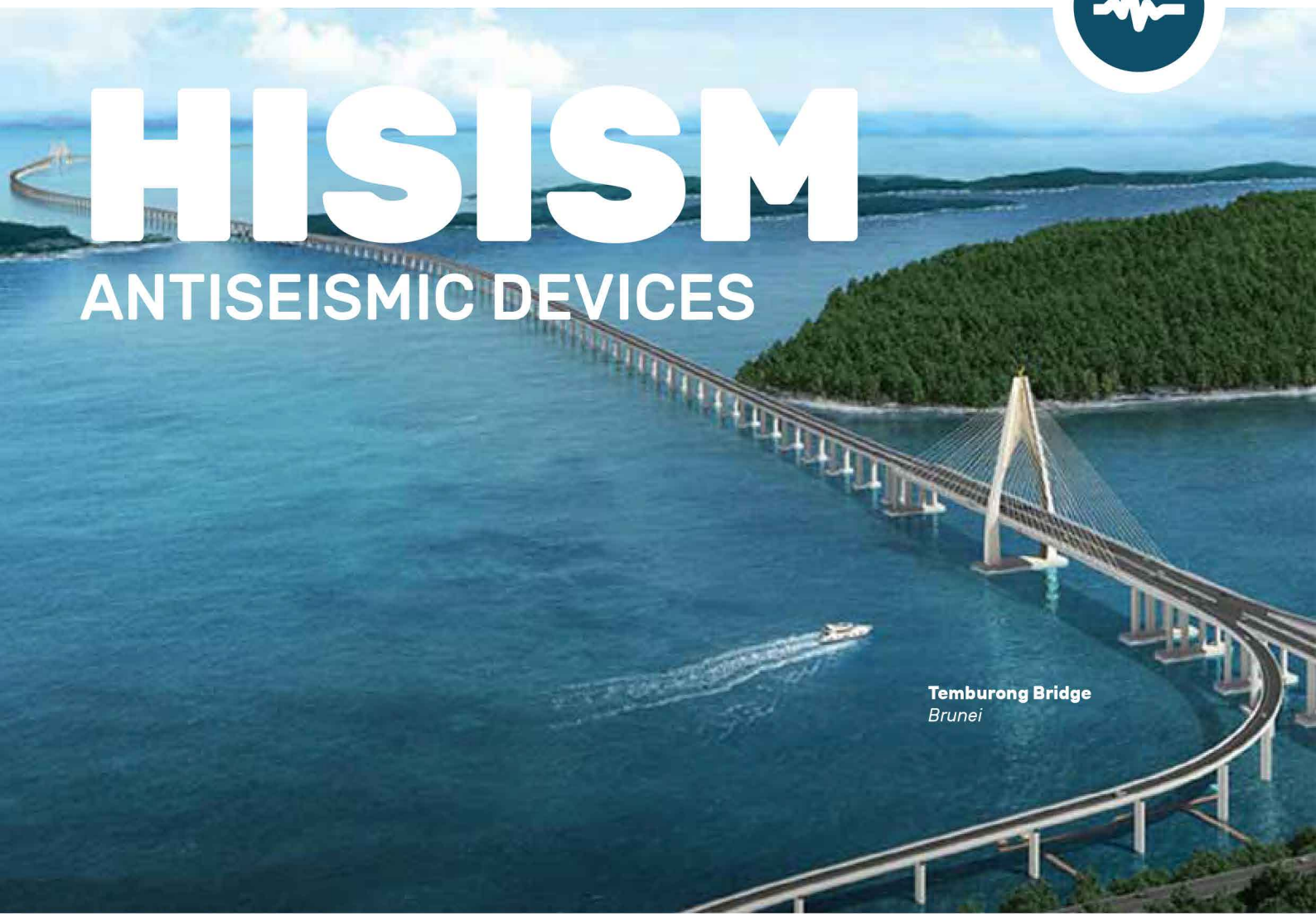
HISISM

ANTISEISMIC DEVICES



Temburong Bridge
Brunei

www.cecobearings.com | www.hirun.eu

Dependable Joining Technology

Viscous Dampers and Dynamic Links

They are commonly grouped as Hydraulic devices
Hydraulic devices cannot be considered base isolators because they do not provide two of the required functions: they do not support the vertical load of the structure and they don't have re-centering capacity. When incorporated in a structure the re-centering capacity shall be provided by the structure itself or by other isolators working in parallel.
Under the name of hydraulic devices a wide variety of devices may be considered that utilize the viscosity properties of a fluid to reach some positive effect on the structures in order to improve their resistance against the effects of an earthquake.
Common feature of the different types of hydraulic dampers is the presence of a cylinder filled with oil. The cylinder is divided into two chambers by a piston. The device is fixed to the structure, normally through spherical hinges, in such a way that the relative movement of the structure causes the piston to move inside the cylinder. The movement of the cylinder causes the oil to flow from one chamber to the other through a Hydraulic circuit. The flow of the oil causes the behavior of the device that is depending from the viscosity of the fluid and the properties of the hydraulic circuit.

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

Viscous Dampers and Dynamic Links

They are commonly grouped as Hydraulic devices
Hydraulic devices cannot be considered base isolators because they do not provide two of the required functions: they do not support the vertical load of the structure and they don't have re-centering capacity. When incorporated in a structure the re-centering capacity shall be provided by the structure itself or by other isolators working in parallel.
Under the name of hydraulic devices a wide variety of devices may be considered that utilize the viscosity properties of a fluid to reach some positive effect on the structures in order to improve their resistance against the effects of an earthquake.
Common feature of the different types of hydraulic dampers is the presence of a cylinder filled with oil. The cylinder is divided into two chambers by a piston. The device is fixed to the structure, normally through spherical hinges, in such a way that the relative movement of the structure causes the piston to move inside the cylinder. The movement of the cylinder causes the oil to flow from one chamber to the other through a Hydraulic circuit. The flow of the oil causes the behavior of the device that is depending from the viscosity of the fluid and the properties of the hydraulic circuit.

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

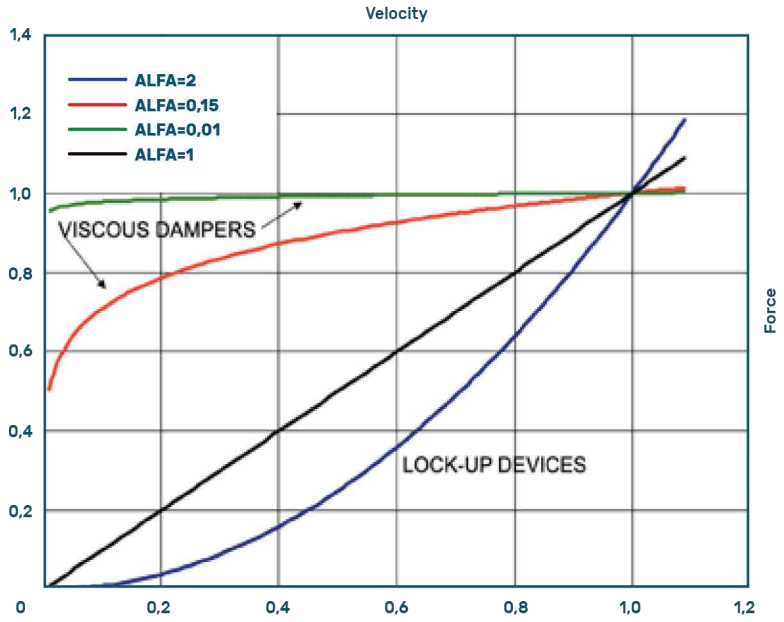
The behavior of viscous dampers can generally be described by the equation

$$F=CV^{\alpha}$$

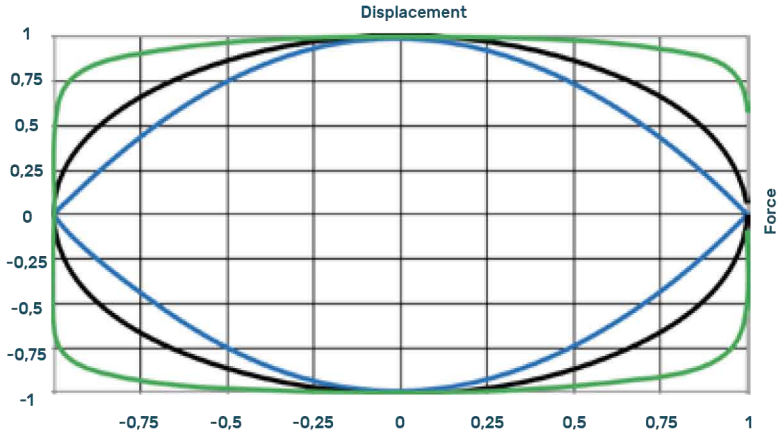
Where:
F is the force applied to the piston
V is the velocity at which a piston is moved
C is a constant depending on the size of the device
α is a constant depending on the properties of the fluid and the hydraulic circuit.
In the following schemes the force-velocity and force-displacements diagrams are plotted for different values of the exponent α.

From the side plots it is obvious that the exponent α =2 or greater will be preferred when the difference of force at low velocity and high velocity shall be maximized. This is the case when the device shall allow slow movements due to thermal variations, creep and shrinkage and became rigid in case of dynamic actions like wind or earthquake and when the energy dissipation is not required. These devices are commonly known as Shock Transmission Units (STU), Lock-Up Devices (LUD) or Hydraulic Couplers (HC).

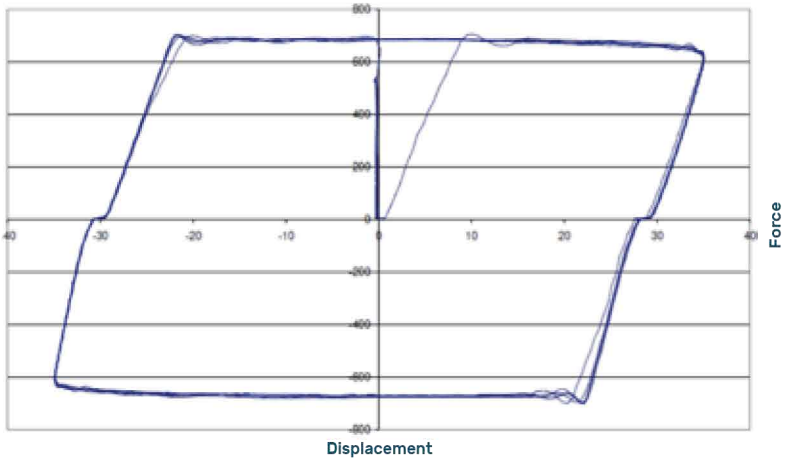
When the dissipation of energy is the principal performance required to the devices, exponent α = 0,2 or smaller is preferred since it is evident from the force-displacement diagram that the energy dissipation, that is proportional to the area of the plot, is increasing when the exponent is decreasing. In this case the devices are more commonly known as Viscous Dampers (VDD)



Force Velocity diagram for different values of the exponent α



Force vs. Displacement plots (for a sinusoidal excitation) of Hydraulic Devices for different values of the exponent α, in an arbitrary scale.



Test verification of the energy dissipation of a viscous damper with exponent α = 0,02 subject to 5 sinusoidal cycles of ± 30 mm displacement at 20°C

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

Plan

Section

Dimensions and performances are given for guidance only.

Different forces and displacements can be considered upon request.

Dimensions Table

HIFLUID

VISCOUS DAMPER DEVICES (VDD)

Mark	Max Force	Displa-cement	L	D	α
Type	*kN*	*mm*	*mm*	*mm*	*rad*
VDD 1000/300	1000	±150	1750	260	
VDD 1000/500	1000	±250	2350	260	0,02 – 1,0
VDD 1500/300	1500	±150	1850	270	0,02 – 1,0
VDD 1500/500	1500	±250	2450	270	0,02 – 1,0
VDD 2000/300	2000	±150	1950	310	0,02 – 1,0
VDD 2000/500	2000	±250	2550	310	0,02 – 1,0
VDD 2500/300	2500	±150	2050	350	0,02 – 1,0
VDD 2500/500	2500	±250	2650	350	0,02 – 1,0
VDD 3000/300	3000	±150	2150	370	0,02 – 1,0
VDD 3000/500	3000	±250	2750	370	0,02 – 1,0
VDD 3500/300	3500	±150	2300	410	0,02 – 1,0
VDD 3500/500	3500	±250	2900	410	0,02 – 1,0
VDD 4000/300	4000	±150	2400	430	0,02 – 1,0
VDD 4000/500	4000	±250	3000	430	0,02 – 1,0
VDD 5000/300	5000	±150	2600	480	0,02 – 1,0
VDD 5000/500	5000	±250	3200	480	0,02 – 1,0

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

Standard

Normally HISLIDE Sliding Pendulum Isolators are designed, manufactured and tested in accordance with EN 15129 and CE marked with supervision of the Notified Body ICECON that executes the regular audit visits as foreseen by the EN standard.

Quality Assurance

The whole production of CECO-HIRUN is subjected to a quality assurance program in accordance with ISO 9000 certified by CQC, member of the International Mutual Acknowledgment Body IQNET.
In addition the production of the Sliding Pendulum Isolators is subjected to a specific quality assurance program in accordance with EN 15129 Annex ZA for the CE marking with the supervision of the Notified Body ICECON. (The relevant certificates are shown on the side)

Sliding Materials

CECO-HIRUN developed outstanding sliding materials:
- HI-3 mainly for use in spherical bearings
- HI-M and HI-H for use in sliding pendulum isolators.
- Here below a comparison table of the most commonly used sliding materials

For the sliding pendulum isolators a dynamic friction from 3 to 9%, according to the Engineers's requirements, can be granted

SLIDING MATERIAL PROPERTY	PTFE	HI-3	HI-M	HI-H
Compressive strength	90 MPa	180 MPa	270 MPa	180 MPa
Heat resistance (long term)	48°C	90°C	120°C	90°C
Heat resistance (short term)	80°C	120°C	180°C	180°C
Wear resistance	10,000 m	50,000 m	50,000 m	10,000 m
Static friction	<3%	<3%	<6%	<10%
Dynamic friction	<3%	<3%	2,5%	6 10%

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

Corrosion protection

The corrosion protection of structural steel is normally performed in accordance with EN ISO 12944.
The working life of the protective coating system on the bearing can be assumed to be fulfilled with a protective system designed for the durability "high" of more than 15 years in accordance with EN ISO 12944-5:2007, 5.5 for corrosivity category C5-I (I=industrial) for inland locations and C5-M (M=marine) for sea side locations.
Surfaces in contact with concrete need no corrosion protection, however a layer of 50 µm of the first pack is applied in order to prevent oxidation during the storage before the installation. A return of at least 50 mm is applied.
In alternative paint will conform to the Project specifications, as specified by the purchaser

Fire resistance

HISLIDE Isolators are fire resistant and don't require special precautions to protect them from the fire. After a fire event an inspection is recommended and, depending on the fire intensity, the sliding material may need to be replaced

Fixings

The HISLIDE Sliding Pendulum isolators are provided with fixings made with bolts or dowels according to the type of structure. The fixing are connected to the Isolator in such a way to allow the easy replacement if necessary.

Fuses

In case of use of the HISLIDE Isolators in railway bridges it is recommended the use of mechanical fuses in order to grant the fixity of the bridge under service condition. In case of a strong earthquake the fuses will be sheared of and the isolators can start their antiseismic function

References

Asan Cheonan Expressway
South Korea

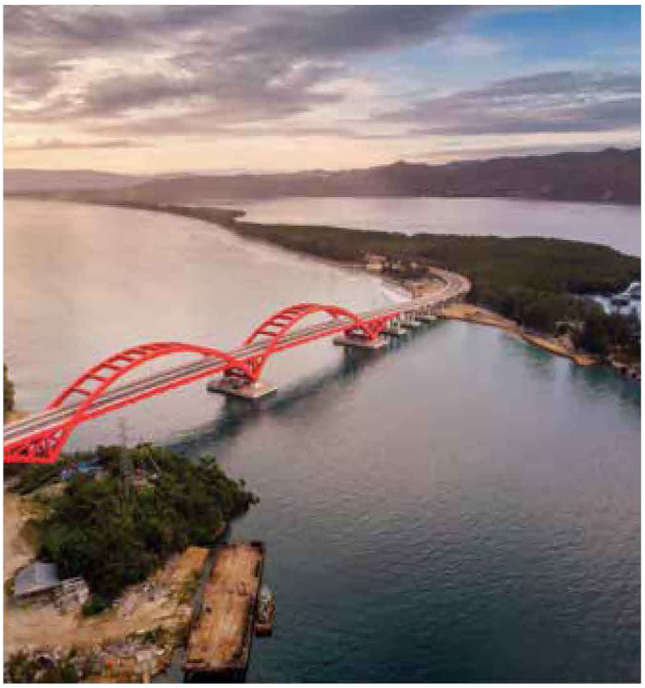
Bursa Hospital
Turkey

Dintai Building
Taiwan

Green Museum
Taiwan

References

Cibubur LRT
Jakarta, Indonesia



Holtekamp bridge
Turkey

Kerch bridge
Russia, Crimea

Casaclima
Rimini, Italy

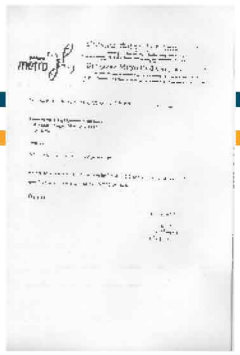
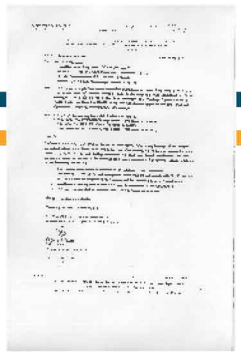
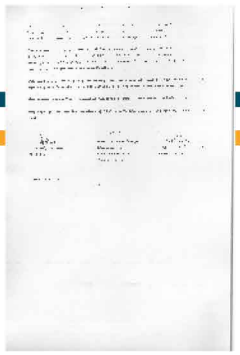
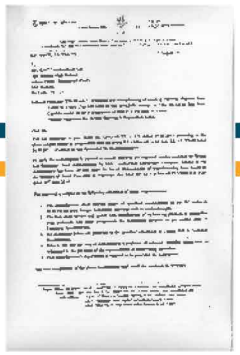
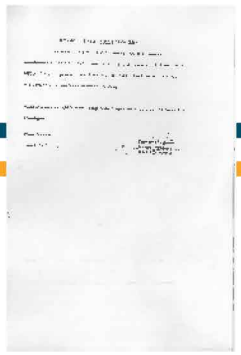
HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

APPROVALS, APPRECIATIONS

CECO has long list of approvals, appreciation letters and satisfactory perfomance repotrs issued from various goverment agencies, many Indian & International cunsultants those who are working in India.


QUALITY CERTIFICATIONS

Hirun International and its partners cooperate with important international institutions in order to guarantee the test performances and the advanced research on materials and products

QUALITY

EUROPEAN CERTIFICATION - CE MARK

EUROPEAN CERTIFICATION - ETA

HIRUN INTERNATIONAL is actively working with its partner to obtain the European Technical Assessment for all its advanced products like special sliding materials, post tensioning kit, expansion joints

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu | Tel. : +39-346-0900669

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

Dependable Joining Technology

Dependable Joining Technology

CECO HIRUN India PVT. LTD.
First Floor, Parashar Trade Tower, Shatabdi Nagar, Sector-1, Delhi Road, Meerut, Uttar Pradesh-250103
E-mail : contact@cecohirun.com | Contact : +918445230422

HIRUN INTERNATIONAL CO.LTD
Hirun Europe S.r.l. Office: via, dell' Annunciata 31CAP, 20121 Milan, Italy
Web. : www.hirun.eu | Email: info@hirun.eu |Tel. : +39-346-0900669