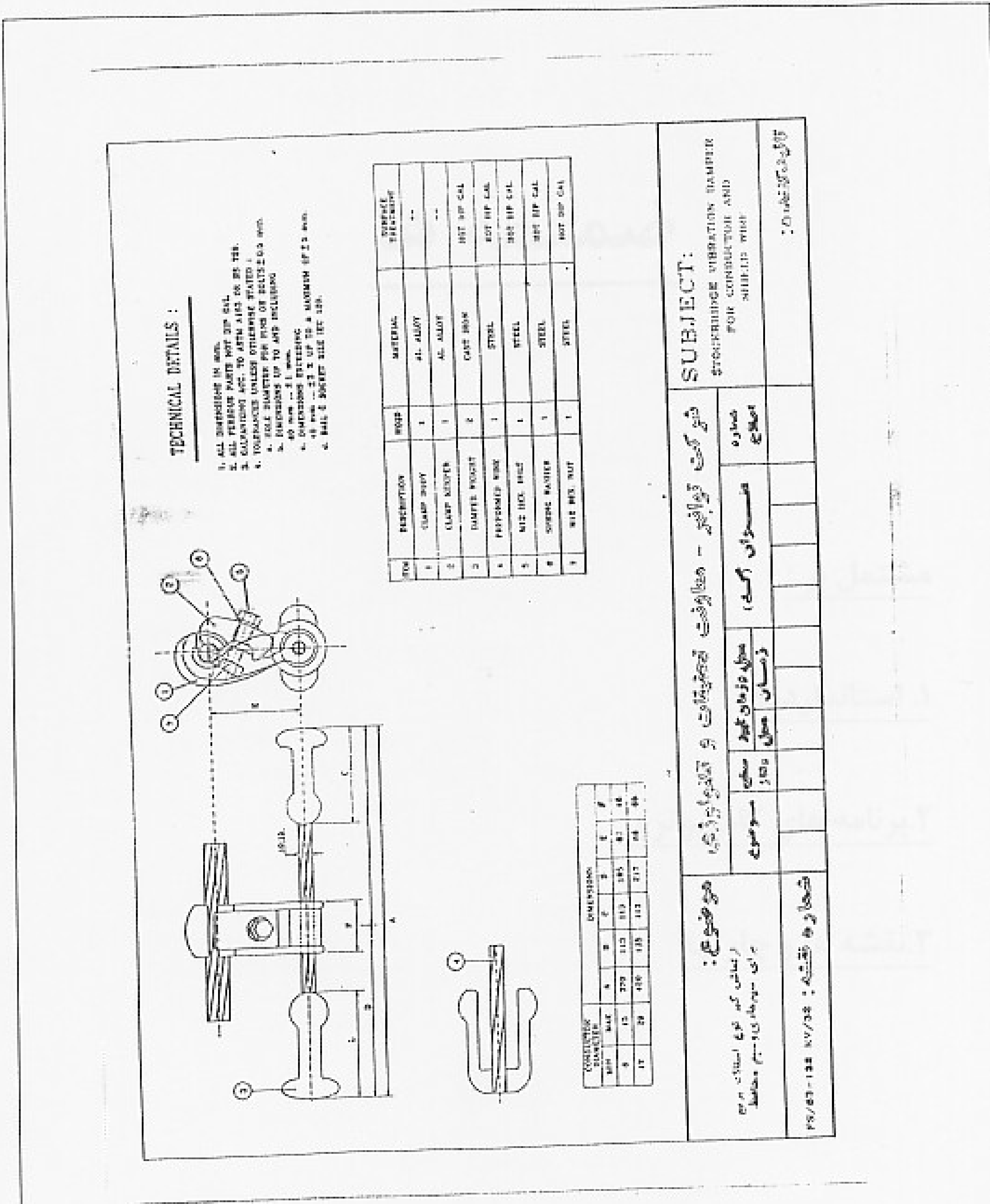


شکل ۱-۶ نقشه ارائه شده از مستهلک کننده مورد استفاده در خطوط ۶۳ کیلو ولت

ضمیمه ها

مشتمل بر :

۱. استانداردها

۲.برنامه های کامپیوتری

۳.نقشه ها و چارتها

۱. استانداردها :

(۱-۱)

Techical help to Exproters

TRNSLATION

DIN VDE 0312
Part 51 – July 1986
Fittings for overhead lines and
Switchgerr

Original language version
Armaturen fur Freileitungen und Schaltanlagen
Dynamisch – mechanisches Verhalten
Von Schwingungsschutzarmaturen

Issued by
VDE VERLAG GMBH (VDE)
D – 1000 Berlin 12
Bismark Str 33
WESTGERMANY

UDC 621.315.66:534.282:
621.316.3:620.1

DEUTSCHE NORMEN

July 1986
DIN
VDE 0212
Part 51

Fittings for overhead lines and
Switchgear
Dynamic – mechanical behaviour of
Anti – vibration fittings

This standard which is aslo approved by the Verband Deutscher Elektrotechniker (VDE) e.v. is simultaneously a VDE – Specification in accordance with VDE 0022. It has been incorporated in the VDE – Requlations under the number given above and has been published in the 'etz' Elektrotechnical Journal.

No international or regional standars cover the scope of this standard.

Start of validity

This standard (VDE specification) applies from lst July 1986.

Contents

Contents

Deutsche Elektrotechnischnische Kommission im DIN und VDE (DKE) (German Electrotechnical Commission in DIN and VDE (DKE))

1 Scop

this standard applies to the testing of th dynamic-mechanical behavior of anti-vibration fittings for overhead lines within the meaning of DIN VDE 0210 and switchgear within the meaning of DIN VDE .

2 Difination

2.1 Vibrations

vibration is cyclical or harmonic movements of lines caused by winds , normal to the wind direction . the transverse vibrtions are mainly vertical and produced alternating bendig stress in the line .

2.2 Anti-vibration spirals

An anti-vibration spiral is a component which increases the cross-section of the line at places of elevated mechanical stressing and thus increases its stifness .

2.3 Vibration dampers

A vibration damper is a component which removes from the line some of the energy introduced by the winds and changes it mainly into heat .

2.4 vibration compensators

Avibration compensators is a component which builds up a counter force on the vibrating line and thus compensates for part of the wind force intruduced .

2.5 Amplitude y_0

Amplitude is the deflection of the line on side , mesured in the center between two vibration nodes S (see fig. 1) .

2.6 Wavelength λ

Wavelength is twice the distance between two vibration nodes S (see fig. 1) .

2.7 Viration angle ß

Vibration angle is a value for the intensity of vibration of a line and is determined for amplitude and wavelength (see fig. 1) .

2.8 Alternating bending strain ε

Alternating bending strain is the (alternating) boundary strain occuring in stranded or homogeneous line (see fig. 3)

2.9 Limiting frequency f_G

The limiting frequency of the damper is the upper or lower value of the frequency range in which the damper works .

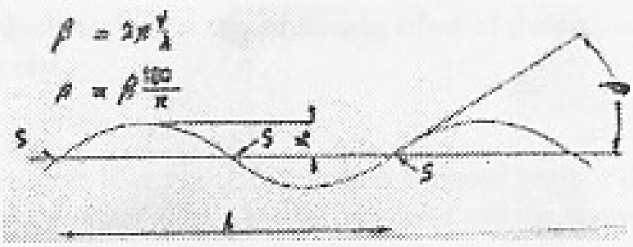


fig .1 Geometrical illustration of a conductor cable section vibrating in a free field , wavelength , amplitude , vibrating angle and vibration nodes .

2.10 Assigned frequency f_k

the assigned frequency is the fundamental frequencyb of the simmetric al form of vibration of the pipe system .

2.11 Oscillator

An oscilltor is a mechanically , electrodynamically , hydraulically or pneumatically operated unit which is capable of building up an approximately sinusoidal alternating force of given amplitude and frequency .

2.12 Excittion force f_A

the excitation force is the force transmitted to the line or testpiece by the oscilator .

2.13 Table speed v_e

The table speed of the oscilltor is the sinusoidal displacement of the vibration table per unit of time .

2.14 Runout angle α

the runout angle I the angle between the horizontal and the conductor cable measured at a distance of L/5 from the centre of the clamp (see fig. 2) .

2.15 Damper impednce z

The dmper impedance is the quotient o the excitation force an the table speed .

2.16 Phase angle φ

The phase angle is the angle between the the excitation force and the table speed .

3. Requirments and testing

the following tests shall be carried out as type tests . The tests shall be carried out under conditions similar to those met in service . They shall orrespond to the stresses occurring most frequently in operation hith regard to frequency , amplitude bending strain , tensile and compressive forces .

3.1 Testing the effect of the anti-vibration spirls or similar fittings

3.1.1 Taking the testpieces and preparation for test

The test shall be carried out on a testpiece from the first series of production . No spicial pretreatment is permissible .

3.1.2 Static test

The static test serves to prove the stiffening effect of the anti-vibration spirl on the conductor cable at rest .

3.1.2.1 Test rig
In a line section at last 10 m long (L/2) whith a runout angle 5 deg. (see fig. 2), the conductor cable is passed over a supporting point and the testpiece is installed .

3.1.2.2 Performance of test
Bfore and after the testpiece is applied the bending strain $\varepsilon_o and \varepsilon_p$ shall be measured on the conductor cable at a tensile force on the onductor F_L corresponding to the highest permissible tension on the conductor in acordihg whith DIN VDE 0210(see fig. 3) . the greatest of the three measured values sall be evaluted .

the oscillator is not connected .

3.1.2.3 Evaluation
The ratio of the bending strain shall be

$$\frac{\varepsilon_{p1}}{\varepsilon_o} \leq 0.7 \; and \; \frac{\varepsilon_{p2}}{\varepsilon_0} \leq 0.5 \qquad (1)$$

where
ε_p *and* ε_o : represents the pending strain on the cable with testpiece and represents the bending strain on the cable without testpiece .

3.1.3 Dynamic test
The static test serve to prove the stiffening effect of the anti-vibration spirl with the conductor cable vibrting . it shall be proved that the bending stress of the vibrating cable at the supporting point is reduced by the testpiece.

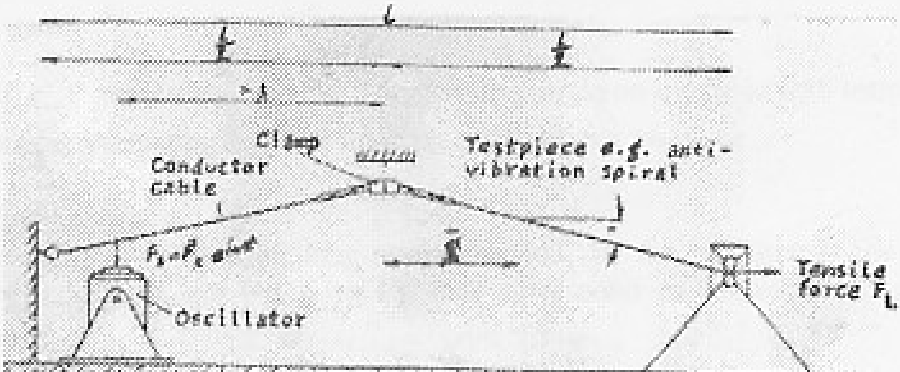


Fig.2 A vibration rig for testing anti-vibration spirals or simmilar fitting .

3.1.3.1 Test reg
The oscillator shall be connected in the vibration rig in accordance with fig. 2 and the line caused to vibrate .

3.1.3.2 Performnce of test
The conductor cable shall be caused to vibrate in such a way that a symmetrical form of vibration occurs with reference to the centre of the supporting clamp.

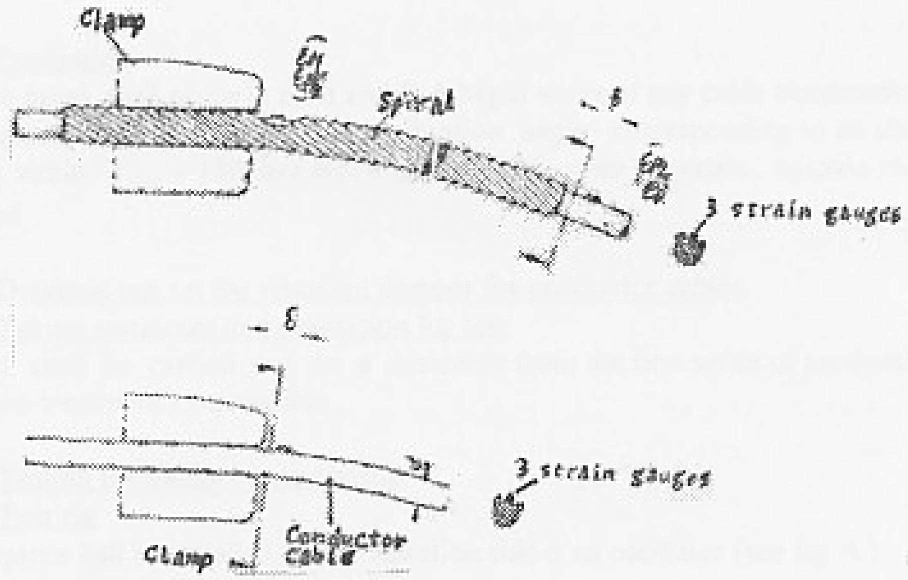


Fig. 3 Arranegment of strain gauges when measuring the bending strain at the supporting point .

optionally , a test rig may be selected in which the supporting clamp is held rigid and the cable is caused to vibrte on one side of the clamp .

At least three different forms of vibration shall be set within the frequency range f=150/d to 1500/d (f in Hz , cable diameter d in mm) .

3.1.3.3 Evaluation

The ratio of alternating bending strain shall be

$$\frac{\varepsilon_{wp1}}{\varepsilon_{wo}} \leq 0.7 \; and \; \frac{\varepsilon_{wp2}}{\varepsilon_{wo}} \leq 0.5 \qquad (2)$$

Where

ε_{wp} *and* ε_{wo}: represents the alternating bending strain on the cable with testpiece and represents the alternating bending strain on cable without testpiece .

3.1.4 Endurance test

This serves to investigte the long-term behaiviour of the testpiece . the dynamic boundary conditions on the testpiece shall correspond to those occurring during operation .

3.1.4.1 Test rig

The anti-vibration spiral shall be installed inthe vibration rig (see fig. 2) in accordance with the manufacturers or users instructions .

3.1.4.2 Performance of test

The oscillator shall be connected in such a way that no inadmissible stresses occure in the conductor cable at the place of connection .

The bending strain of the cable at the supporting point shall be measured as shon in fig. 3 .

3.1.4.3 Evaluation

No wire break shall occur in E Al and E AlMgSi wires of any cable cunstruction or on the testpiece after 3E7 cycles at a vibration angle corresponding to an alternating bending strain $\varepsilon_{wcal} = 150\mu m / m(1)$. for wires of other materials , suitable vlues shall be agreed .

3.2 Dynamic test on the vibration damper for conductor cables

3.3.1 Taking testpieces and prepartion for test

The test shall be carried out on a testpiece from the first series of production . No spicial pre-treatment I permissible .

3.2.2 Testing the damper haracteristic

3.2.2.1 Test rig

The testpiece hall be installed on the vibration tble o an oscillator (see fig. 4)

3.2.2.2 Perormnce of test

using an agreed table speed a frequency rnge of f=50/d to 1500/d (f in Hz , cable diameter d in mm) hall be passed through slowly (not exceeding 0.5 Hz/s) and the excitation force measured .

during the process the effective energy applied $P_w = F_A . v_e . \cos\varphi$, and the mechanicl impednce Z=F/v shall be measured and plotted as a function of th oscillator freuency f in a graph (damper characteristic). the damper characteristic shall be taken before and after the fatigue test in accordance with section 3.2.3 .

Note: for anti vibration divices which cn not be teted by this method , a suitable test method shall be agreed .

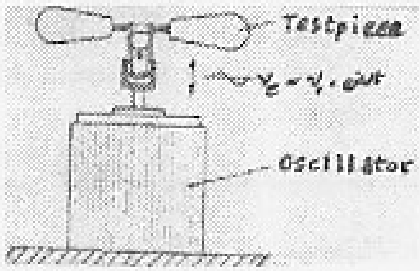


Fig. 4 oscillator for testing vibration dampers .

3.2.2.3 Evaluation

within the fruency band to be tested for the conductor cable , at a table speed = 10 cm/ s , the ratio of maximum energy to minimum energy shall be

$$\frac{P_{max}}{P_{min}} \leq 5$$

(*see fig.* 6) (3, 4)

$$P = k_L . m_d$$

Where :

m_d *and* k_L represents the total weight of the dmper in kg and is acorrection factor = 0.1 m^2/s^3 .

3.2.3 Fatigue test

3.2.3.1 Test rig

the damper shall be installed on the test rig in accordance with the manufacturers or users instructions .

3.2.3.2 Performance of test

The testpiece shall be moved on the test rig (oscillator) at the agreed table speed .
the vibrtion frequency f shall change periodiclly at approximately 0.2 decades / min with linear frequency increase between a lower and upper frequency limit stated by the mnufacturer .

3.2.3.3 Evaluation

The testpiece shall withstand 1E8 load cycles without breakage of wire in th damper support cable or other damage . the damper characteristic before and after the test shall not change fundamentally . the test report shall include all data effecting the result of measurement , e.g. table speed , and speed of change in frequency .

3.3 dynamic test of vibrtion damper or vibration compensator for conduit

3.3.1 Taking of tetpieces and prepartion for test

The test shall be carried out on a testpiece from the first series of production . no pre - treatment permissible .

3.3.1.1 Test rig

the damper or compensator shall be installed in the vibration rig in accordance with fig. 5 or in the switchgear in accordance with the instructions of of the conduit manufcturer . the distance between supports and boundary conditions shall be in accordance with the assembly instructions of the user .

3.3.1.2 Performance of test

The conduit shall be caused to vibrate with harmonic transverse vibrations using an oscillator .

The vibration amplitude shall be reach approximately 0.33 .d at resonance in the center of the span without damper or compensator .

After installation of damper or compensator , the vibration amplitude shall be measured at centre of the span under the same excitation conditions .

Only the vibration at the assigned frequency of the conduit is of importance .

The point of resonance at the assigne frequency shall be passed through slowly starting from the bottom frequency to the upper frequency ($f_k - f_k / 2 to f_k + f_k / 2$) .

During this process the vibration amplitude shall be plotted as a function of the vibration frequency f .

If the eight or compensator should markedly affect the assigned frequency , the new assigned frequency shall be determined with compensator not acting .

3.3.1.3 evaluation

the ratio of vibration amplitudes shall be

$$\frac{y_y}{y_o} \leq 0.1 \qquad (5)$$

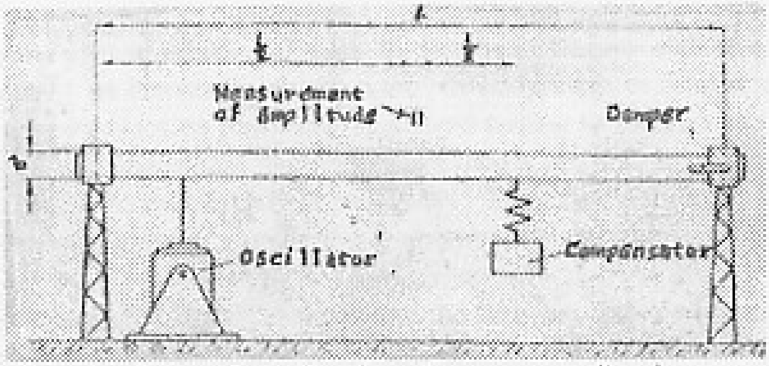


Fig 5. Vibration rig for testing vibration dampers or vibration compensators for conduit . Example of arranegement of vibration damper or vibration compensator .

Standards quoted and other documentation

DIN VDE 0101 Erection of power installation with rated voltages above 1 kv

DIN VDE 0210 Planning and design of overhead power lines with rated voltage above 1 kv .

(1) report of Aeolian Vibrations (drft jue 1981), C.I.G.R.E./SC22-81(WG01)07

Further standards and other documentation

0212 part 50 Fitting for overhead lins and swiychgear ; static mechanical behaviour .

DIN VDE 0212 part 52 Fitting for overhead lins and swiychgear ; electrical operating condition behvior of fitting carrying current under normal operating conditions : Requirments , tests.

0212 part 53 Fitting or overhed lines anmd switchgear ; Partial discharge charcteristics tets .

DIN VDE 0212 part 54 (at preent in draft stage) Fitting for overhead lins and swiychgear ; hot galvnizing.

DI N VDE 0212 part 55 (at preent in draft stage) Fitting or overhed lines anmd switchgear ; insulation behavior of fitting for insulated overhead lines .

2) Recommendations for the evaluation o the life time of transmission line conductors , C.I.G.R.E./SC22-WG04 Electra , 63(03.1979) , pp 103-145.

(3) mocks , l. damping of conductor cable vibrations in high voltage oerhed lines , etz report 15 (1981).

Explanations

thi tsandard was produced by sub-committee 421.2 " clamps , fittings and equipment connections fo overhead lines an switcyhgear above 1kv " of the german Electrotechnicl Commision in DIN and VDE (DKE) (Deutsche Elektrotechnische kommission im DIN und VDE (DKE)).

Testing of the dynmic mechanichal behaviour of anti-vibrtion fitting is new . it is not included in standard VDE 022/05.62 .

The importance of anti-vibrtion fittings in overhead lines , and to some extend in switchgear also , ha increase in recent years . developments in fittings have kept pace with the increase in vibration problems . improved testing techniques and new methods of meaurement and theoritical advances have mde it possible to match anti-vibration fitting more eactly to their task than previously . The experience knowledge gathered in this field has been taken into account in preparing this standard .

with regrd to section 2.4 , attention drawn to the fact that anti-vibration devices which operate , for example , by the stockbridge system , work in accordance with both section 2.3 and 2.4 . They are thus a combination of vibrtion dmper and vibration compensator . anti-vibration devices of tis type are normally designated vibration dampers .

Attention is drawn once more at this point , with reason , to the difference between the effect of anti-vibration spiral , installed largely as a line protection at the supporting point has prctically no effect upon the energy blance of the "overhed line" vibrating system .

If one compares the energy dissipation by inherent damping of the cable in a vibrting conductor cable about 300 m long with an without protective spiral , a very small , practically insignificnt , difference is found . it is thus clear that the protective spiral is of no importance with regard to vibration damping , I .e. a reduction in the intensity of vibration of the line .the anti-vibrtion spiral increase the polar moment of inertia applicable to the bend , or the stiffness . as a consequence , at similar line deflections the strin on the conductor under the spiral , for example directly at the supporting point , is considerably reduced . since the strain , and in particular the alternating bending strain , has a direct effect uppon cable life , the spiral increases the life of the condctor cable .

Section 3.1 deals with testing of anti-vibration spirals or imilar fittings . the effect of these fitting is expressed basically by the curavature of the conductor cable at the support point . A suitable method for determining curvature technically is to imploy strain gauges . A direct comparison of th strain values with and without an increase in coross-section allows the effectiveness of the fitting to be determined directly . This method of measurment and evaluation applies to both the static and dynamic behaviour of the fitting .

The value for permissible alternating bending strain has probably been set somewhat too high within the framework of endurance testing . if strains of 150 micrometere / metere are permitted at a distance of d/4 , the actual applicable strain at the point of clamping is higher . practical exprience will show whether testing techniques will permit the ditance d/4 to be reduced or the permissible value to be reduced somewhat. The value of 150 mcirometere / metere given here complies with a C.I.G.R.E. recommendation (1), (2), but refers directly to the clamping point.

The dynamic characteristic of a vibration damper operating on the spring weight system, is described completely by the magnitude of the impedance and effective energy (see fig. 6) or the real and imaginary part of the impedance. The characteristic itself doe not permit a reliable evauation of the effectiveness of the damper on the vibrating cable.

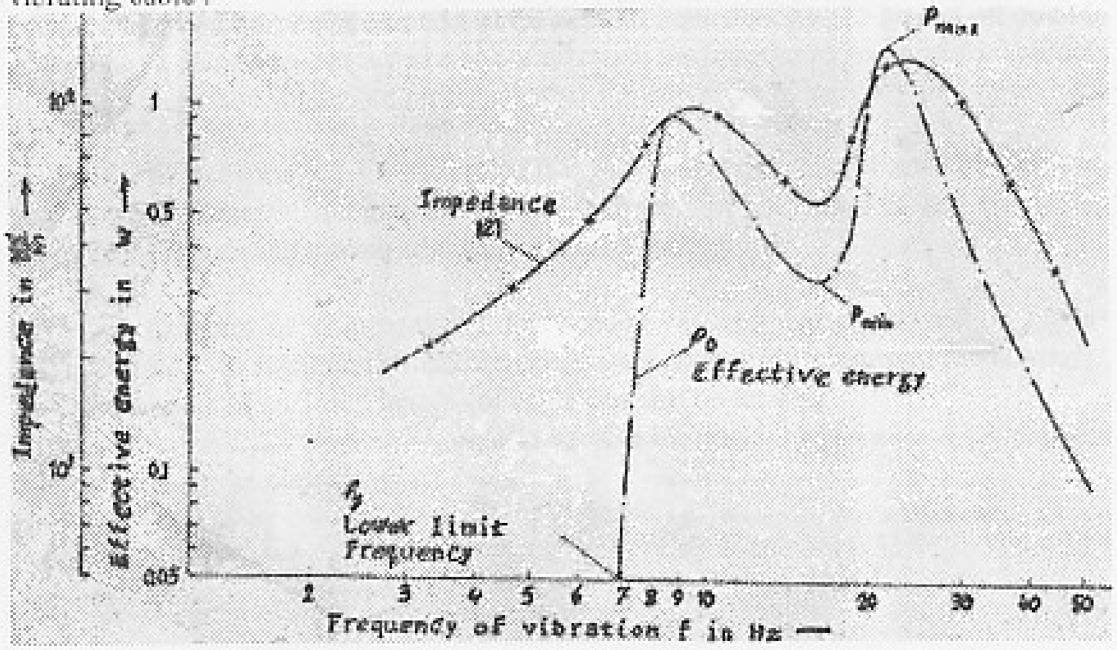


Fig. 6. Impedance and effective energy of a vibration damper

The test in section 3.2.2 provides the user with quality characteristic which allaows an initial comparison of whether the damper characteristic coincides with that of the damper offered. further critical refrence points are the lower and upper limit frequency of the curve. these should never be lower than the lower limit frequency or higher than the upper limit frequency of the conductor cable.

The evaluation in section 3.2.2.3 is based mainly upon values obtained from experience. The requirement that Pmax/ Pmin should not exceed 5 I intended to stop typical energy fall between two resonant frequency of a damper becoming too greater. The requirement that Pmin should be not less than k_f.

m_d has the same purpose, the absolute minimum amount of energy being thus defined, so that a complete description of the minimum value is achieved in the energy characteristic by means of the expression $\frac{P_{max}}{P_{min}} \leq 5$.

In order to test the fatigue strength in accordance with section 3.2.3, a method is required which is expensive but cloe to operation conditions and which I also a new step itemtionally in this form. in principle, the tet method makes it possible to compare the stress of the damper on the vibrating line with that of the damper on the fatigue test rig (3) . if the damper stress on the vibrating conductor cable should be higher than that in the fatigue test , the damper selected I not suitable for the line .

When making a comparative evaluation between characteristic curves of different dampers of one type , scatter of the dynamic dmper data caused by production conditions , and which lead directlty to deviations in a characteristic dmper curves , should be taken into account . In addition , difference in th characteristics occure when testing one and the same damper , largely througth temperature changes in the damper cable . thus , the same damper on the test rig often shows a slightly different curve from the first test curve if a second test carried out immediately . the important point in evaluating a damper curve is therefor not so much the exact agreement of the amounts of the characteristic values but rather whether the curves have basically the same shape .

with regard to section 3.2.3.2 , attention is drawn to the fact that the speed of increase in frequency is partly determined by the type and performance of the measuring equipment determining the impedance or effective energy .

Vibration dampers or compensators for conduit in accordance with section 3.3 can also be tested as regards their effectiveness using the test rig suggested . in this way , the effectiveness of enclosed lengths of cable can also be tested .

<u>International patent classification</u>
H 02 G 7/14
G 01 M 19/00

ST.4E.2634.Z

1. DYNAMIC PERFORMANCE

1.1 Damping performance

The stockbridge damper is installed on a shaker and vibrated within the frequency range of 6 to 80 Hz .

For each frequency step , the force F and dissipated energy H values are recorded . By means of the following formula , the phase angle between force F and displacement D is calculated .

$$\sin \varphi = \frac{H}{\pi . F . D}$$

Test results are satisfactory when F/D and ϕ values are whithin the designed limits for the specific stockbridge damper .

1.2 Vertical fatigue performance

The stockbridge damper is installed on a shaker to the recommended torque and a vibration , at the highest resonnce frequency and 1 mm peak amplitude , is applied .

Test duration : 10 million cycles .

Test results are satisefactory when :

a) No breakage in any part of the stockbridge damper is observed .

b) The unscrewing torque of the bolt is not lower than 50% of the torque applied at the begining of the test .

2. MECHANICAL PERFORMANCE

2.1 Clamp grid performance

Tightened to the recommended torque value , slippage of the clamp on the conductor shall accur at values greater than 250 kg .

2.2 Weights grip performance

Slippage of the weights on the messenger cable shall not accur at pulling force lower than 400 kg .

2.3 Clamp resistance

The clamp is installed on a lenght of the relevant conductore and a torque of 150% of the nominal installation torque is applied .

No deformation of failure of any component shall accur .

۲.برنامه های کامپیوتری :

۲-۱. نمایش نیروی وارد بر سیم از طرف باد در یک جریان مشخص :

```
cla
hold on

%          نیروی وارد بر سیم با تغییر زمان

f=40;
ro=1000;
d=.025;
a=pi*d^2/4;

for t=0:.0001:.2,

   fk=(1/2)*ro*(f*d/0.22)^2*a*sin(2*pi*f*t);

   plot(t,fk)

   xlabel('زمان ')
   ylabel('نیروی وارد بر سیم ')
   title('نیروی وارد بر سیم با تغییر زمان ')

end
```

۲-۲.برنامه جهت نمایش دامنه ارتعاش دمپر استک بریج بر حسب تغییرفرکانس تحریک:

```
%          " amplitude versus frequency for stockbridge damper "

%       primary settings
cla
hold on
```

```
i=(-1)^.5;

%           freuency domain

      W=0:.5:50;

            for jj=1:101,

      w=W(jj);

%     stockbridje properties

 m=2.74;
 l=.23;
 j=1.01714;
 mi=.06;
 K=3100.4/4;
 EI=(K/12)*l^3;
  k11=4*K;
  k12=2*K*l;
  k21=k12;
  k22=4*K*l^2/3;

%      matrix relation

      c1=[-m*w^2-k11 -m*l*w^2+k12 ; -m*l*w^2+k21 -
j*w^2+k22];
      c2=(1+i*mi).*[k11;k21];
      xt=inv(c1)*c2;

  xy=[1 0]*xt;
  ty=[0 1]*xt;

 re1=real(xy);
 im1=imag(xy);
 %re2=real(ty);
 %im2=imag(ty);

%           determining the amplitude

      amp1(jj)=(re1^2+im1^2)^.5;
      %amp2(jj)=(re2^2+im2^2)^.5*10;
```

```
        end

plot(W,amp1,'g')
% plot(W,amp2,'y')

%       text operations

gtext('/');
gtext('---First pick');
gtext('---Secound pick');
xlabel('فرکانس تحریک')
ylabel('دامنه')
```

۲-۲. برنامه جهت نمایش نسبت (نیرو به جابجایی) منتقل شده به کابل از مستهلک کننده استاک بریج بر حسب تغییرفرکانس تحریک:

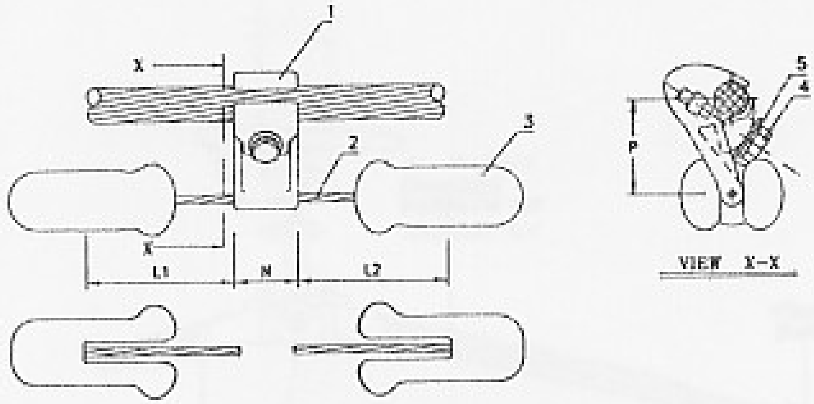
```
cla

i=(-1)^.5;
W=0:.25:200;

        for jj=1:801,
w=W(jj);
                    % stockbridje properties
  m=2.74;
  l=.048;
  L1=.23;
  L2=.29;
  j=0.01714;
  mi=.16;
  K=3100.4/4;
  EI=(K/12)*L1^3;
  k11=4*K;
  k12=2*K*L1;
  k21=k12;
  k22=4*K*L1^2/3;

                    % coefficients matrix
```

```
a1=[(1+mi*i)*k11 ;(1+mi*i)*k21];
b1=[-m*w^2+k11*(1+mi*i) -m*l*w^2+k12*(1+mi*i);
-m*l*w^2+k21*(1+mi*i) -j*w^2+k22*(1+mi*i)];

        % matrix relation's to find the amplitude & phase
 c1=a1';
 d1=c1/b1;
 dd1=d1';
%    **************************************************
  K=3100.4/4;
  EI=(K/12)*L2^3;
  k11=4*K;
  k12=2*K*L2;
  k21=k12;
  k22=4*K*L2^2/3;

 a2=[(1+mi*i)*k11 ;(1+mi*i)*k21];
 b2=[-m*w^2+k11*(1+mi*i) -m*l*w^2+k12*(1+mi*i);
 -m*l*w^2+k21*(1+mi*i) -j*w^2+k22*(1+mi*i)];

        % matrix relation's to find the amplitude & phase
  c2=a2';
  d2=c2/b2;
  dd2=d2';

   f1=m*w^2*([1 l]*dd1);
   f2=m*w^2*([1 l]*dd2);

  rea=real(f1);
  ima=imag(f1);
 ra=real(f2);
  ia=imag(f2);

 amp(jj)=(rea^2+ima^2)^.5;
 am(jj)=(ra^2+ia^2)^.5;
 amt(jj)=amp(jj)+am(jj);
 %phi(jj)=atan(ima/rea)*10000;
                              end

 %          " determining natural frequencies "
```

```
w1=((2*EI/(m*j*L1^4))*(m*L1^3+18*j*L1+((m*L1^3+18*j*L1)^2-
3*m*j*L1^4)^.5))^.5;

w2=((2*EI/(m*j*L1^4))*(m*L1^3+18*j*L1-((m*L1^3+18*j*L1)^2-
3*m*j*L1^4)^.5))^.5;

w3=((2*EI/(m*j*L2^4))*(m*L2^3+18*j*L2+((m*L2^3+18*j*L2)^2-
3*m*j*L2^4)^.5))^.5;

w4=((2*EI/(m*j*L2^4))*(m*L2^3+18*j*L2-((m*L2^3+18*j*L2)^2-
3*m*j*L2^4)^.5))^.5;

w1,w2,w3,w4

semilogy(W,abs(amp),W,abs(am),'r',W,abs(amt),'g'),grid on
```

۳.نقشه ها و چارتها :

REV.	DATE	DESCRIPTION	SIGN.



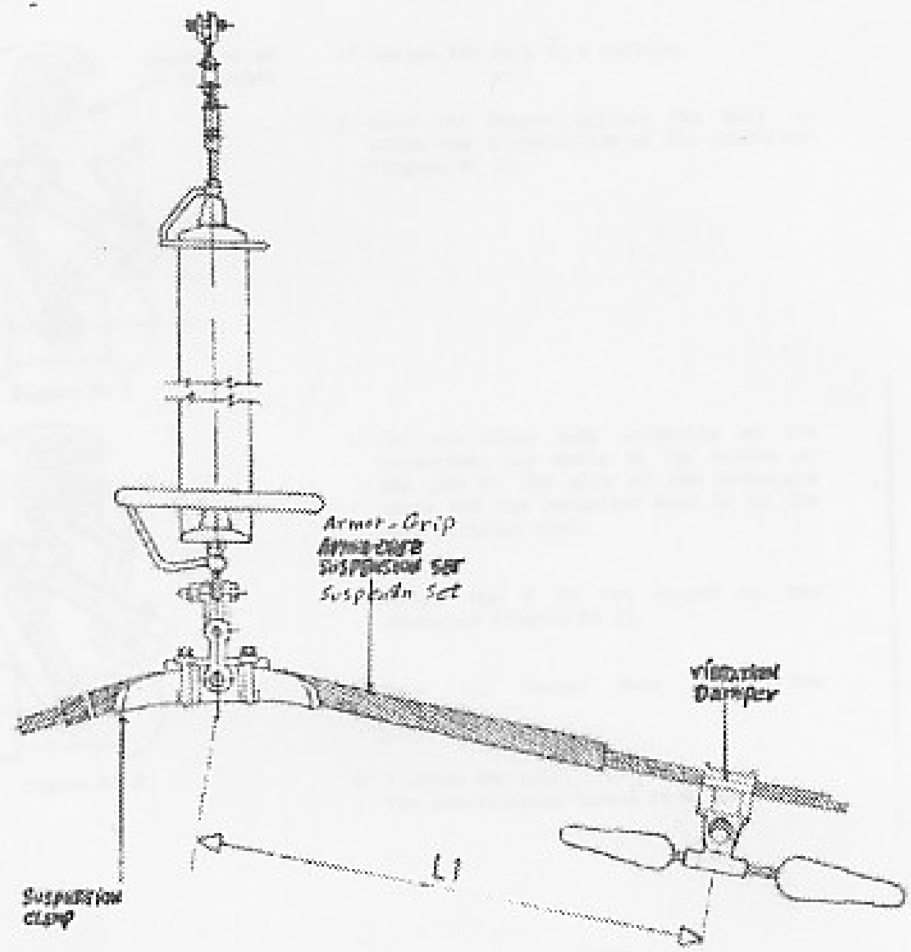
P	L1	N	L2	M	CABLE DIA.	TORQUE ON BOLT	MASSE WEIGHT
100	200	65	150	16	ø25–ø38	5.5m.daN	5.5 kg

ALL DIMENSIONS ARE IN MM

P.NO.	QTY.	P.NAME	DWG.NO.	MATERIAL	WEIGHT(Kg)	DESCRIPTION
5	1	WASHER & SPRING WASHER	-	STAINLESS STEEL	-	-
4	1	BOLT (M16)	-	STEEL	-	-
3	2	WEIGHT	-	CAST ZAMAC	-	-
2	1	WIRE	-	STEEL	-	-
1	1	CLAMP	-	AL.ALLOY	-	-

WEIGHT(Kg):		TEHRAN NIROO COMPANY	SUBJECT: STOCK BRIDGE DAMPER	DRAWN BY:	A.NIKPEYKARAN
BR.LOAD(KN):	-			CHECKED BY:	
SCALE:	N.T.S.			APPROVED BY:	
DWG. NO.:	SD1			DATE :	

(۱-۳) . نمونه ای از مستهلک کننده های ساخت شرکت تهران نیرو



(۲-۳)نحوه قرارگرفتن یک مستهلک کننده استاک بریج بر روی کابل

5. CORRECT INSTALLATION OF A "STOCKBRIDGE" DAMPER

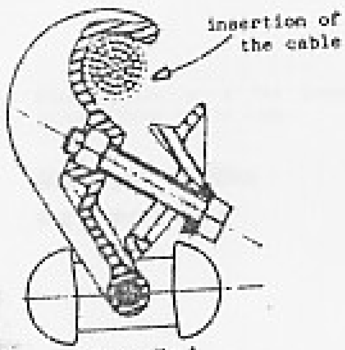


Figure Nr 1

1/ Loosen the bolt to a maximum.

2/ Stop the keeper against the bolt to allow the introduction of the conductor (figure Nr 1).

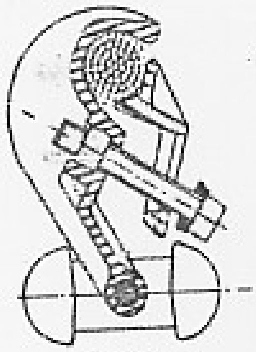


Figure Nr 2

3/ Set the clamp body correctly on the conductor, the cable at the bottom of the jaw V. The axis of the messenger cable and the conductor must be in the same vertical plan.

4/ Centre the V of the keeper on the conductor (figure Nr 3).

5/ Make the keeper turn around the conductor.

6/ Tighten the bolt.
The installation torque is 60 Nm.

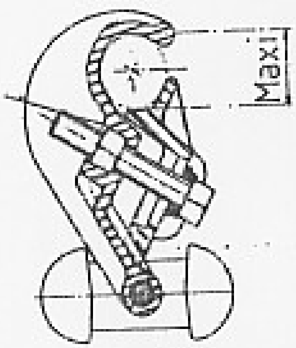


Figure Nr 3
Maximum capacity

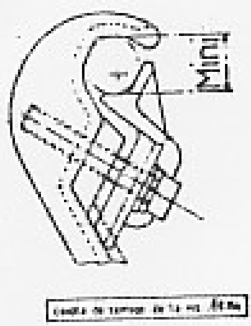


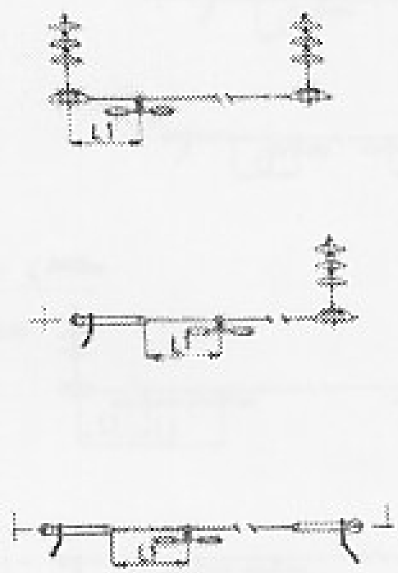
Figure Nr 4
Minimum capacity

(۳-۲) نصب صحیح مستهلک کننده استاک بریج بر روی کابل

Flat terrain or a few undulated, few wooded zones of prevailing winds. perpendicular to the line.

Span Length : < 300m

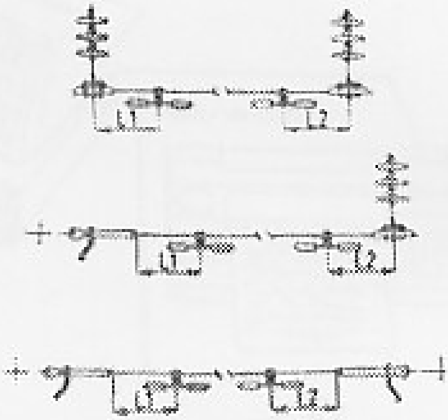
One damper for Span



(۴-۳) تعداد و مکان نصب مستهلک کننده های استاک بریج در شرایط ذکر شده در بالا یعنی مکانی مسطح با پوشش گیاهی (درختان) محدود یا وزش شدید باد در برابر کابل بر اساس بازه یا طول دهانه کابل (span)

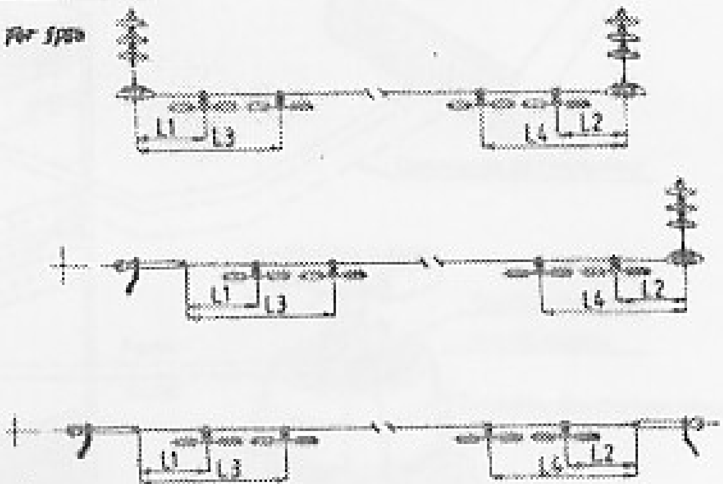
300m < Span length < 500m

Two dampers for span



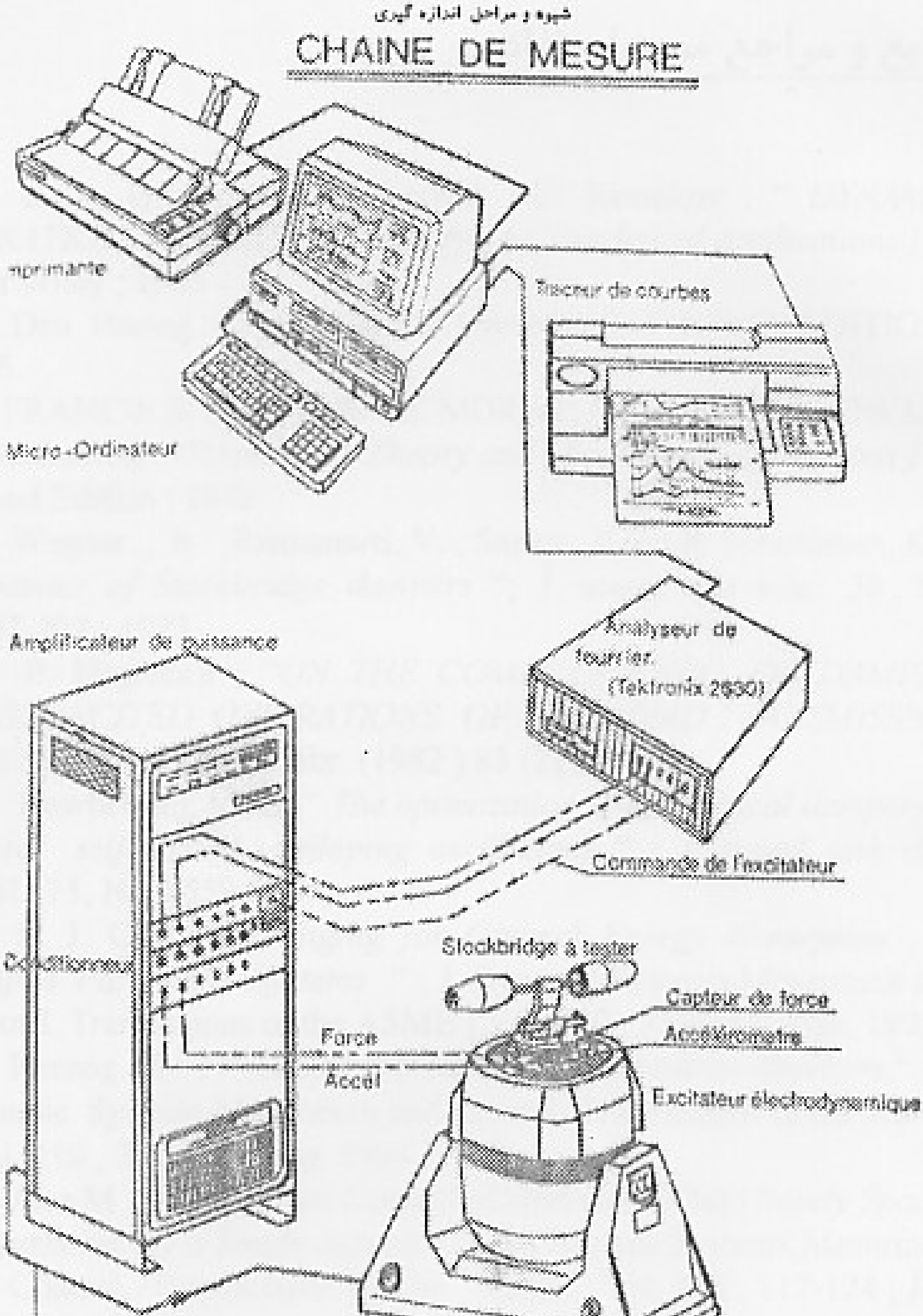
500m < Span length < 2000m

Four dampers for span



Span length > 2000m

Particular study



(۳-۵)مجموعه وسایل و مراحل اندازه گیری به شیوه پاسخ فرکانسی

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