

## **CADDY SEISMIC HANDBOOK - FM**

SUPPORTO ALLA PROGETTAZIONE E INSTALLAZIONE DI SISTEMI DI  
PROTEZIONE ANTISISMICA PER IMPIANTI SPRINKLER SECONDO L'FM  
GLOBAL PROPERTY LOSS PREVENTION DATA SHEET 2-8 *PROTEZIONE  
DA TERREMOTI PER IMPIANTI DI SPEGNIMENTO AD ACQUA*

September 28, 2017

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# AGENDA

- Introduzione
- Organizzazione del CADDY Seismic Handbook
- Legenda dell'Handbook
- Struttura dell'Handbook (da panoramica a dettagli)

# INTRODUZIONE

# OBIETTIVO

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**CADDY ha collaborato con gli esperti dell'Università di Udine per creare un SEISMIC HANDBOOK:**

- Pensato per essere di supporto alla progettazione e installazione dei sistemi di protezione antisismica per gli impianti sprinkler
- Sviluppato secondo quanto previsto in FM Global Property Loss Prevention Data Sheet 2-8: *Earthquake Protection for Water-based Fire Protections Systems*

(E' attualmente in fase di sviluppo l'HANDBOOK conforme ai requisiti di *NFPA 13: Standard for the Installation of Sprinkler Systems*)

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**Supporto alla progettazione e installazione**

# OBIETTIVO

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Il CADDY SEISMIC HANDBOOK è stato concepito:

- **Per applicazioni in strutture/edifici:**
  - *Situati in zone sismiche da 50 a 500 anni secondo FM Global Data Sheet 1-2, Earthquakes*
  - Localizzati in zone sismiche di rilievo per le Autorità Aventi Competenza
- **Per essere di aiuto a:**
  - *PROGETTISTI* di impianti sprinkler
  - *INSTALLATORI* di impianti sprinkler
  - *ISPETTORI* di impianti sprinkler
- **... E in aggiunta a:**
  - *PROJECT MANAGERS* di lavori che prevedano impianti sprinkler
  - *RESPONSABILI* di strutture/edifici con impianti sprinkler
  - *PROPRIETARI* di strutture/edifici con impianti sprinkler

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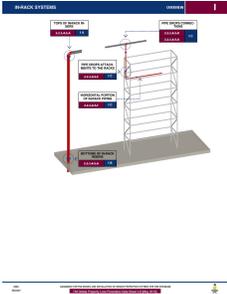
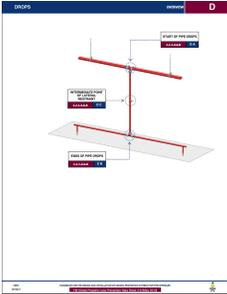
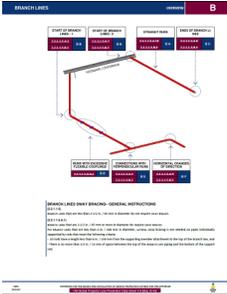
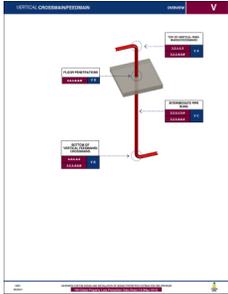
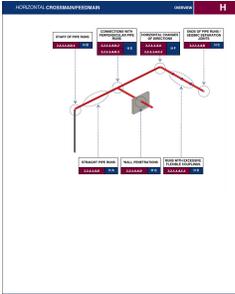
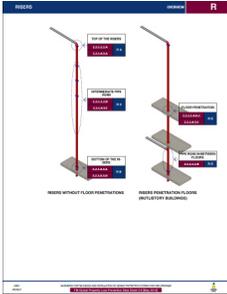
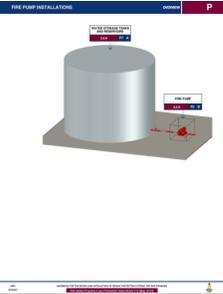
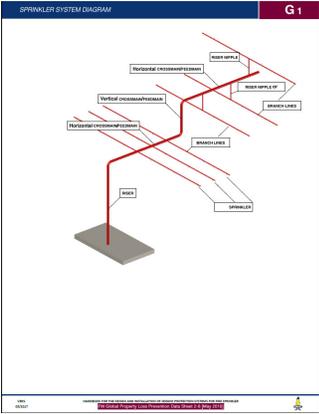
**Supporto alla progettazione e installazione**

# CADDY SEISMIC HANDBOOK

## ORGANIZZAZIONE

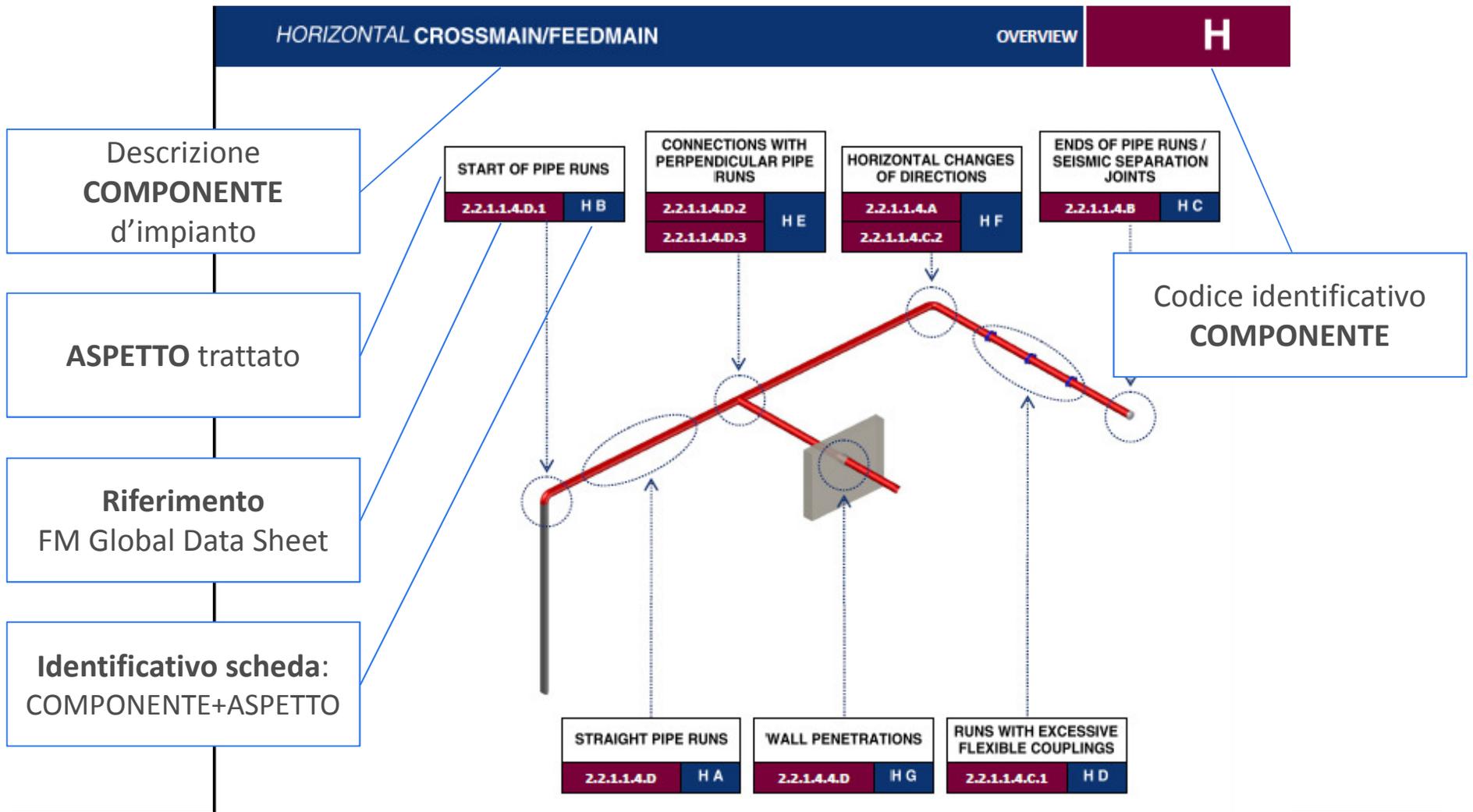
# ORGANIZZAZIONE DELL'HANDBOOK

IL CADDY SEISMIC HANDBOOK E' DIVISO IN SEZIONI,  
DALLA RISERVA IDRICA FINO ALLE TESTINE SPRINKLER



**Coinvolge l'intero impianto sprinkler, dall'inizio alla fine**

# ORGANIZZAZIONE DELLE SEZIONI DELL'HANDBOOK



Ogni sezione è introdotta da uno schema riassuntivo

# CONTENUTI ADDIZIONALI

## ALL'INIZIO E' PRESENTE UN BREVE TUTORIAL SUI PRINCIPI DI FUNZIONAMENTO DI SWAY BRACES E CLEARANCES

SWAY BRACING
SB 1

Locations allowed:  
Angles  $\geq 30^\circ$  from vertical  
Optimal locations:  
Angles at or near  $45^\circ$  from vertical

Not allowed:  
Angles  $< 30^\circ$  from vertical

**LONGITUDINAL 2-WAY SWAY BRACE**  
 SWAY BRACE intended to resist movement parallel to the axis of the system piping.  
 LONGITUDINAL BRACE elements shall be sized and configured according to the guidelines of section 2.2.1.3.5.  
 Braces can be steel pipe, steel angle, steel rods, or steel flats.  
 Section 2.2.1.3.5.A calls for positioning the diagonal brace element(s) at an angle of at least  $30^\circ$  from the vertical.  
 Note. It is recommended to target a brace angle as close to  $45^\circ$  from the vertical as possible.

CLEARANCES
OVERVIEW
C

Impiego dei giunti rigidi/flessibili: **DESCRITTO**

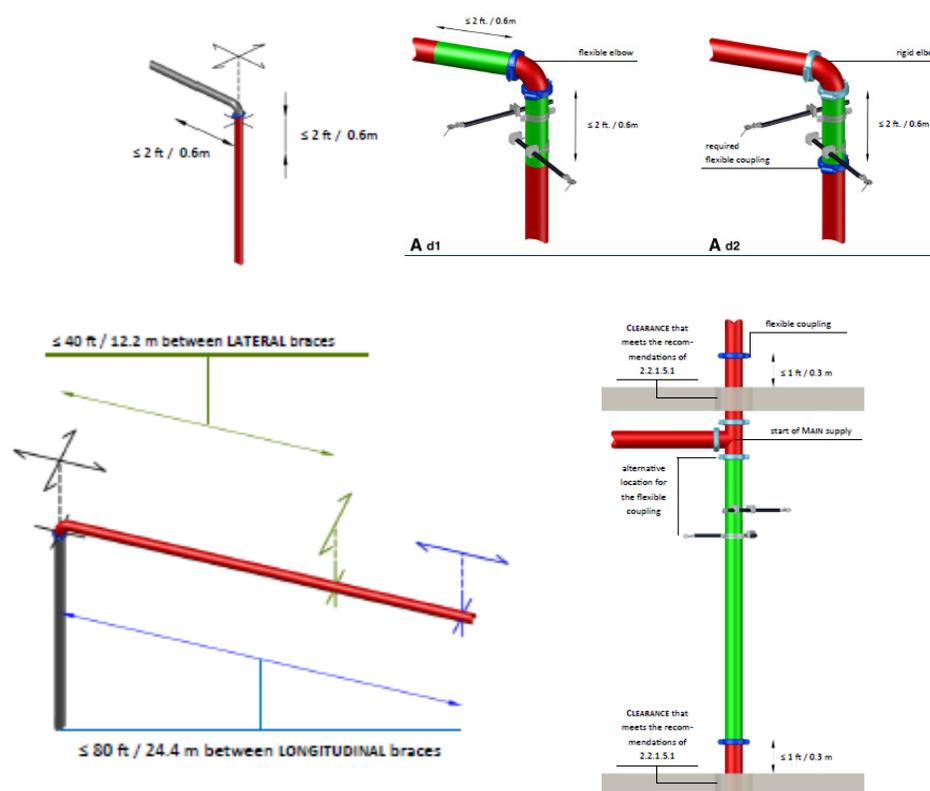
Installazione dei supporti gravitazionali: **NON DESCRITTA**

# RAPPRESENTAZIONE GRAFICA DELLE SITUAZIONI

I REQUISITI PER GLI IMPIANTI ANTINCENDIO SONO  
**RAPPRESENTATI GRAFICAMENTE**

LE ILLUSTRAZIONI INCLUDONO:

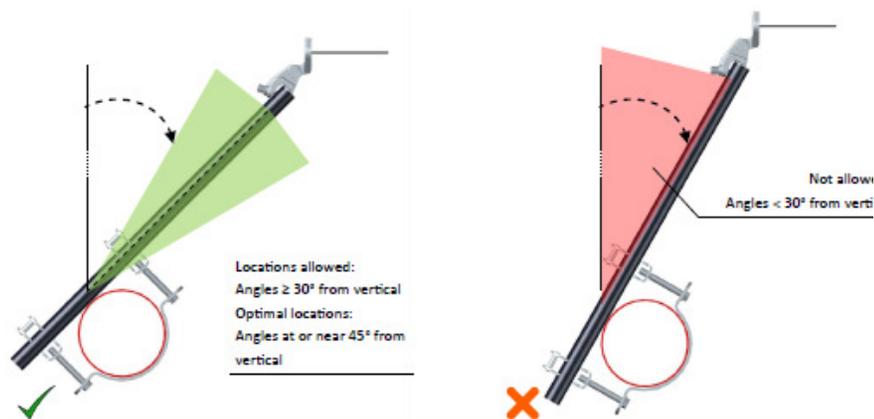
- Posizionamento degli sway braces
- Massima distanza tra sway braces
- Tipologie di giunti richiesti



## Rappresentazioni grafiche

# ILLUSTRAZIONI

- Sono riportati i capitoli di FM Global Data Sheet 2-8 riferiti alla situazione descritta
- Sono accompagnate da commenti che riassumono i requisiti descritti



## LATERAL 2-WAY SWAY BRACE

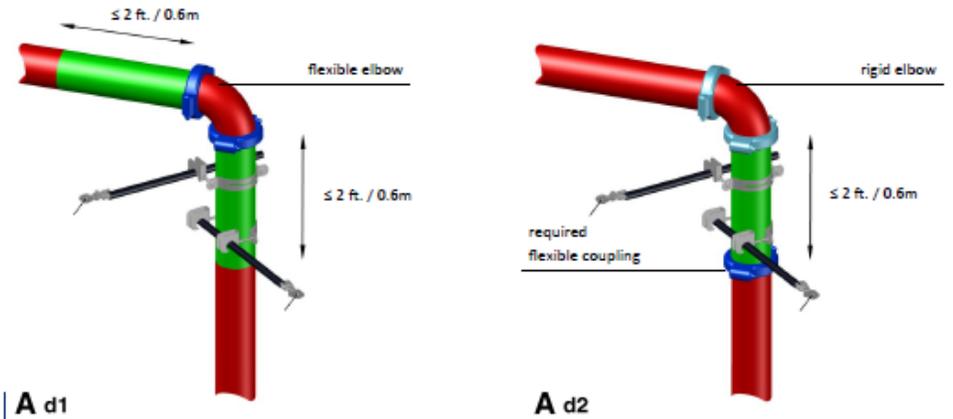
SWAY BRACE intended to resist movement perpendicular to the axis of the system piping.

LATERAL BRACE elements shall be sized and configured according to the guidelines of section 2.2.1.3.5.

Braces can be steel pipe, steel angle, steel rods, or steel flats.

Section 2.2.1.3.5.A calls for positioning the diagonal element(s) at an angle of at least  $30^\circ$  from vertical.

Note. It is recommended to target a brace angle as close to  $45^\circ$  from the vertical as possible.



A d1

A d2

## BRACE WITH FLEXIBLE OR RIGID COUPLINGS AT TOP OF THE RISER (2.2.1.1.2.A; 2.2.1.4.3.A)

Provide a FOUR-WAY sway brace within 2 ft / 0.6 m of the top of the RISER. The FOUR-WAY brace may be located either on the RISER or on the main (see green pipe location in A1).

For risers directly connected to underground piping, provide a flexible coupling within 2 ft / 0.6 m of the top of each individual RISER. This applies to risers located outside and inside buildings.

Generally speaking a FOUR-WAY brace goes within 2 ft / 0.6 m from a flexible coupling on the RISER.

Gli errori più frequenti vengono evidenziati di volta in volta

## Requisiti citati e spiegati

# SEZIONE RELATIVA AI PRODOTTI CADDY

E' PRESENTATA LA GAMMA  
DEGLI SWAY BRACES DI CADDY

Tabelle con dimensionali tubi incluse

Immagini di applicazioni

**CSB** LAT 2
LATERAL SWAY BRACES



QUICK GRIP JR. LATERAL SWAY BRACE—PART NUMBER CSBQIKL##HEG

Pipe to brace:	in.	1	1½	2
	DN	25	32	40

Product information is available at [erico.pentair.com](http://erico.pentair.com)



**FM**  
APPROVED



QUICK GRIP LATERAL SWAY BRACE—PART NUMBER CSBQG##HEG

Pipe to brace:	in.	2½	3	4	6	8
	DN	65	80	100	150	200

Product information is available at [erico.pentair.com](http://erico.pentair.com)



**FM**  
APPROVED



HANDBOOK FOR THE DESIGN AND INSTALLATION OF SEISMIC PROTECTION SYSTEMS FOR FIRE SPRINKLER

FM Global Property Loss Prevention Data Sheet 2-8 [May 2010]

VERS:  
05/2017

**Prodotti CADDY approvati FM descritti per ogni applicazione**

# SITUAZIONI RICORRENTI

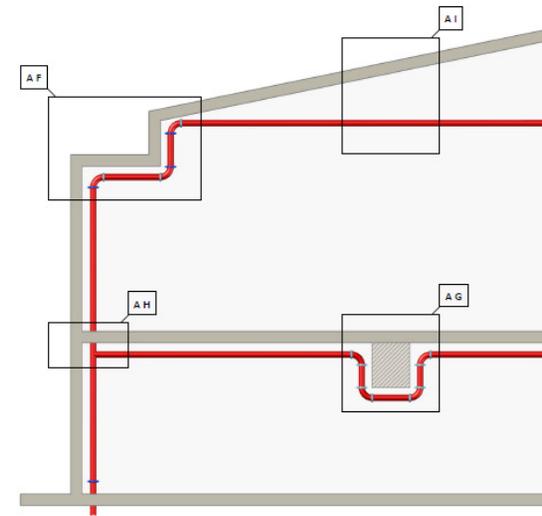
SONO INCLUSE SOLUZIONI PRATICHE PER LE SITUAZIONI PIU' COMUNI

- Superamento di ostacoli
- Passaggi attraverso muri o solai
- Attraversamenti di giunti strutturali
- Cambi di direzione
- Soffitti inclinati
- ...

A 2

OVERVIEW

APPLICATIONS



Section view

APPLICATIONS

- A F) Risers with offsets, vertical changes of directions
- A G) Obstacles avoidance—Beams
- A H) Floor penetrations
- A I) Sloped ceilings



HANDBOOK FOR THE DESIGN AND INSTALLATION OF SEISMIC PROTECTION SYSTEMS FOR FIRE SPRINKLER  
FM Global Property Loss Prevention Data Sheet 2-8 (May 2010)

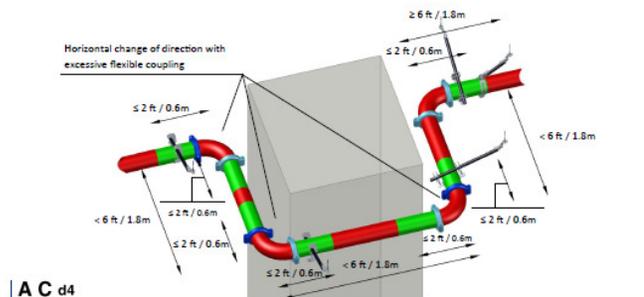
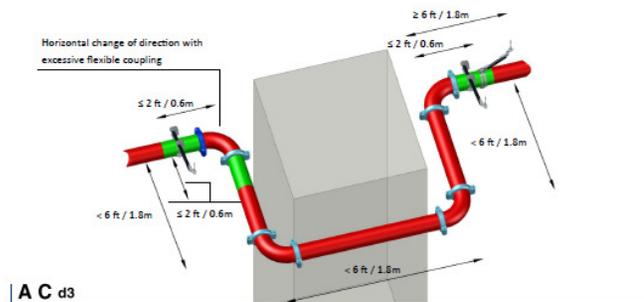
VERS.  
05/2017

**Schemi riassuntivi in pianta e sezione delle situazioni descritte**

# SUGGERIMENTI DI POSIZIONAMENTO/INSTALLAZIONE

## VERTICAL OBSTACLES AVOIDANCE

AC3



### AC d4 HORIZONTAL CHANGES OF DIRECTION, USE OF FLEXIBLE COUPLINGS, OFFSET LESS THAN 6 FT / 1.8 M

When horizontal CROSSMAINS or FEEDMAINS need to avoid an obstacle (e.g. a pillar, a stairwell, elevator, or distribution systems), the instructions for horizontal CROSSMAINS or FEEDMAINS per 2.2.1.1.4.A and 2.2.1.1.4.C may be applied.

When pipe runs adjacent to a horizontal change of direction are less than 6 ft / 1.8m, LATERAL and LONGITUDINAL sway bracing is not required as long as flexible couplings are not present in the change of direction. Conversely, when pipe runs adjacent to a horizontal change of direction are 6 ft / 1.8m long or more, both LATERAL and LONGITUDINAL sway bracing is required within 2 ft / 0.6m of the change of direction.

When flexible couplings are present within the changes of directions, for each flexible coupling present an additional LATERAL sway brace is to be located within 2 ft / 0.6m of the change of direction, no matter what is the length of the pipe run adjacent to the change of direction. When the piping diameter remains the same on both ends of the change of direction, the LATERAL sway brace may be indifferently located on one of the two runs as long as it is within 2 ft / 0.6m of the change of direction. On the other hand, when there is a change in piping diameter, place the LATERAL sway brace on the pipe run with the largest diameter.

Presentazione di soluzioni basate su istruzioni contenute nei diversi capitoli di  
FM Global Data Sheet 2-8

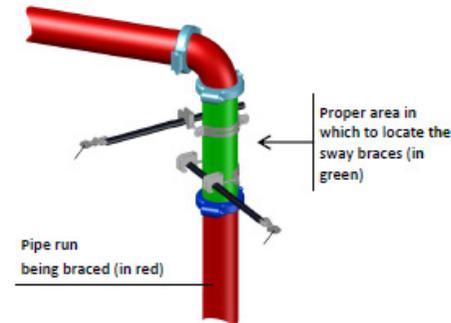
# LEGENDA

## SPIEGAZIONI

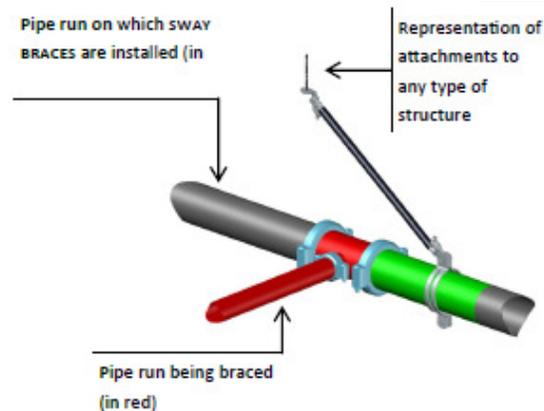
# POSIZIONAMENTO CORRETTO DEI RINFORZI

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AREA CORRETTA DI POSIZIONAMENTO DEL BRACE IN VERDE  
TUBAZIONE DA RINFORZARE IN ROSSO



QUALORA LE TUBAZIONI SU CUI I BRACES SONO APPLICATI NON SIANO QUELLE DA RINFORZARE, SONO RAPPRESENTATE IN GRIGIO



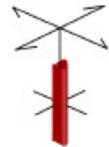
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**Rappresentazione visiva e tramite codici colore**

# GRAFICHE E SIMBOLI UTILIZZATI

## GRAPHICS AND SYMBOLS LEGEND

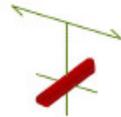
### Sway braces



FOUR-WAY SWAY BRACE symbol and location



FOUR-WAY SWAY BRACE



LATERAL SWAY BRACE symbol and location



LATERAL SWAY BRACE



LONGITUDINAL SWAY BRACE symbol and location

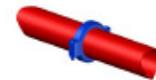


LONGITUDINAL SWAY BRACE

### Couplings



Rigid coupling

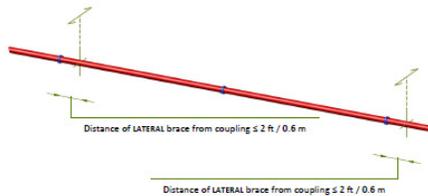


Flexible coupling

Per sway braces e giunti scanalati

# INDIVIDUAZIONE DI ERRORI DI INSTALLAZIONE RICORRENTI

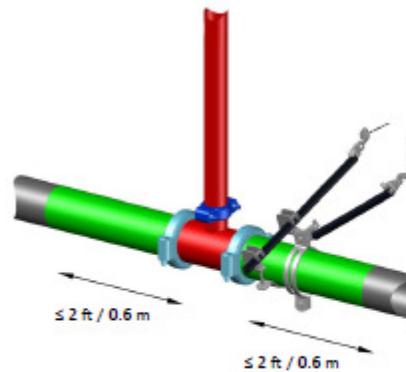
## ESEMPI DI SOLUZIONI NON CORRETTE EVIDENZIATI



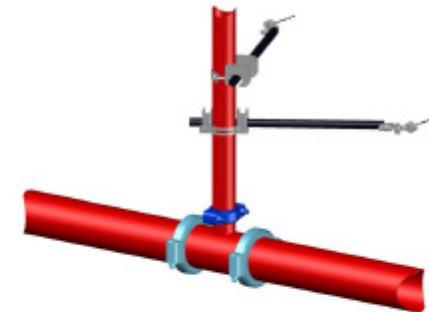
**D1**

### RUNS WITH EXCESSIVE FLEXIBLE COUPLINGS (2.2.1.1.4.C.1)

When more flexible couplings than recommended are installed on feedmains or crossmains, install an additional LATERAL brace at every other flexible coupling within 2 ft / 0.6 m of the flexible coupling.

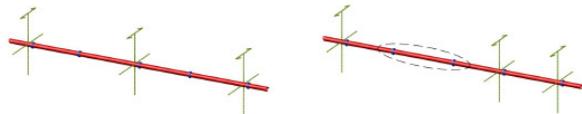


**B1 d1 - B3 d1 - B4 d1**



**B1 d2 - B3 d2 - B4 d2** ❌

Note: Locating the FOUR-WAY on the smaller pipe is acceptable if the larger pipe load is not included in the zone of influence and the larger pipe is braced independently.



**D2** ✓

### RUNS WITH EXCESSIVE FLEXIBLE COUPLINGS (2.2.1.1.4.C.1)

Correct solution (D<sub>2</sub>) and incorrect solution (D<sub>3</sub>).

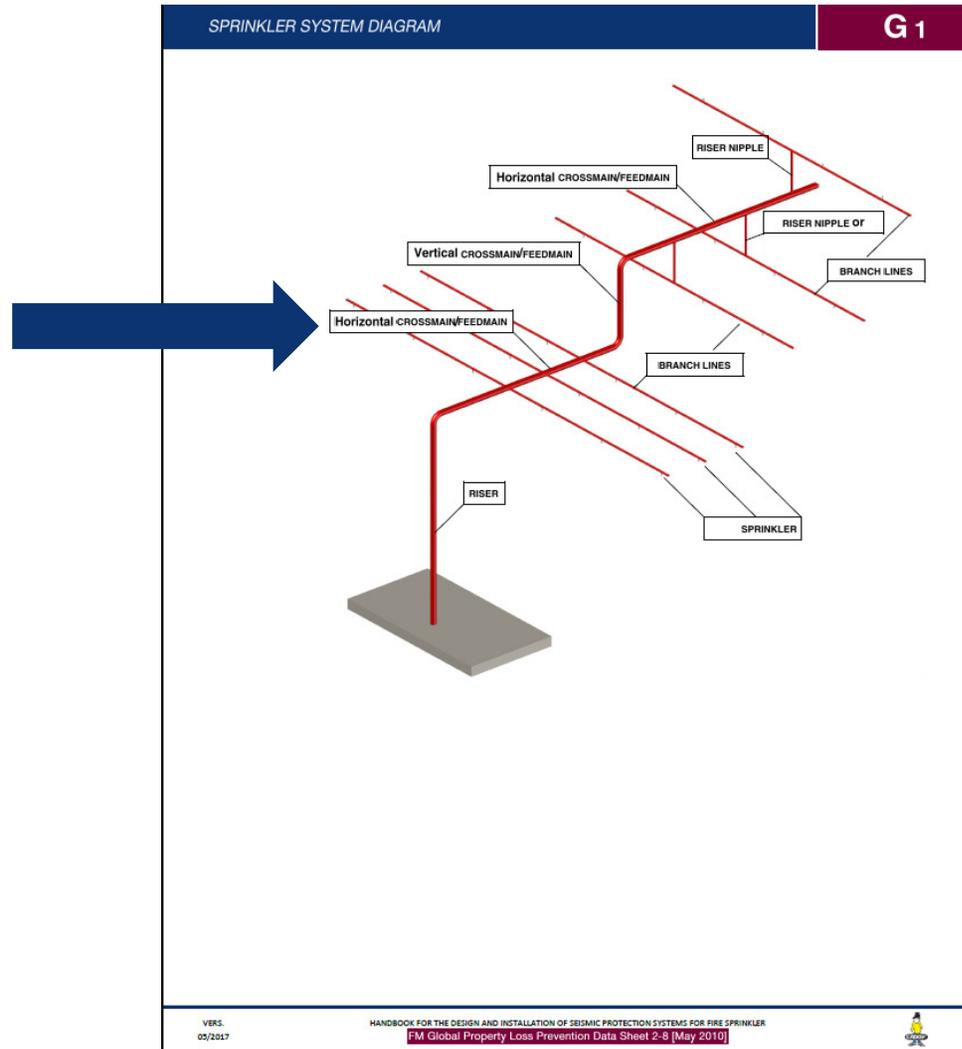
**D3** ❌

## Ispezione semplificata

# COME USARE IL CADDY SEISMIC HANDBOOK

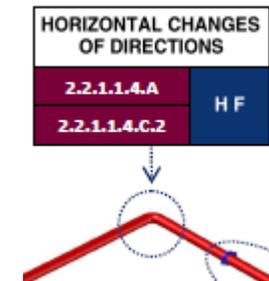
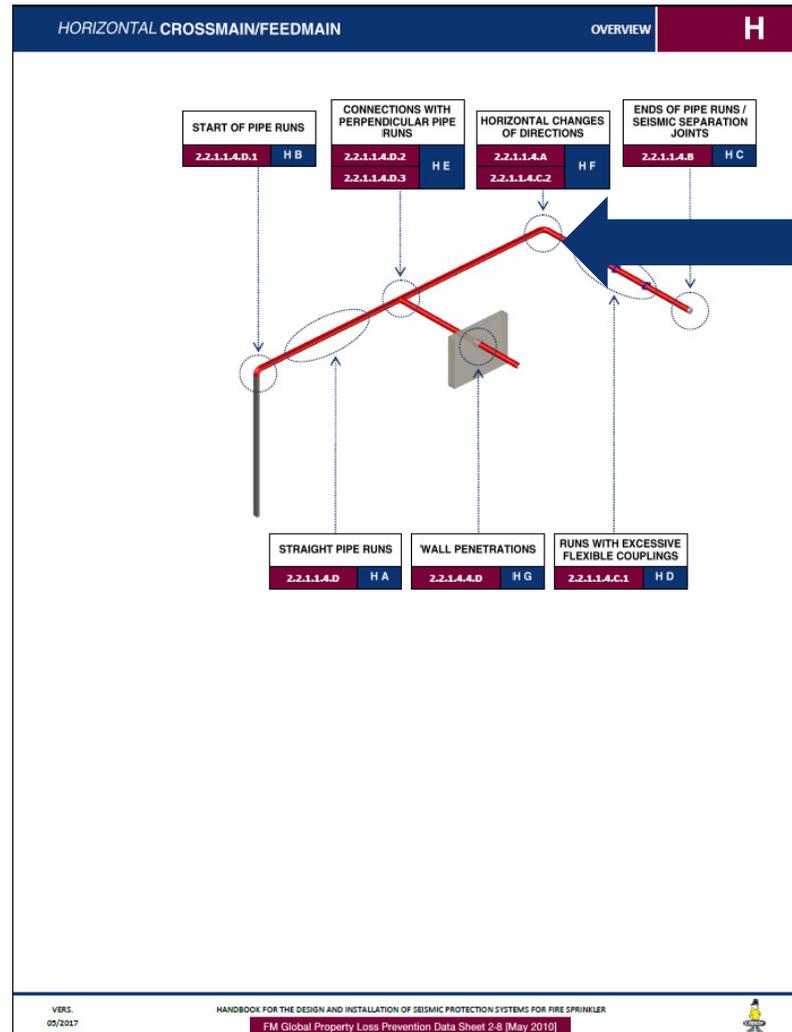
## MANUALE UTENTE

# MANUALE UTENTE



## STEP 1: identificazione della sezione di interesse

# DALLE PAGINE DI INSIEME...

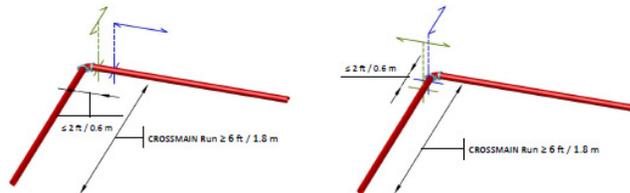


## STEP 2: identificazione dell'aspetto da approfondire

# ... ALLE PAGINE DELL'AREA DI INTERESSE...

HORIZONTAL CROSSMAIN/FEEDMAIN

H F1

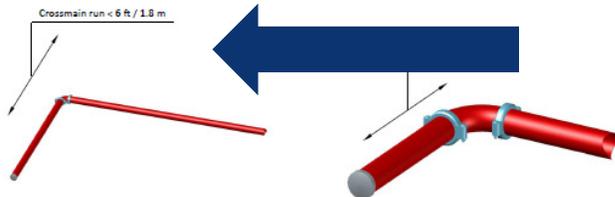


F1

F2

**RUN ADJACENT TO THE CHANGE OF DIRECTION  $\geq 6$  ft. / 1.8 m**  
(2.2.1.1.4.A)

At a horizontal change of direction, when the CROSSMAIN run adjacent to the change of direction is 6 ft / 1.8 m or longer, a LATERAL and a LONGITUDINAL sway braces are required within 2 ft / 0.6 m of the change of direction.



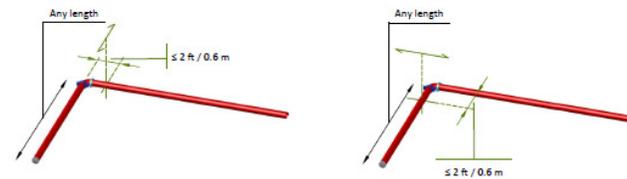
F3

**RUN ADJACENT TO THE CHANGE OF DIRECTION  $< 6$  ft. / 1.8 m**  
(2.2.1.1.4.A)

When the CROSSMAIN/FEEDMAIN runs adjacent to the horizontal direction change are shorter than 6 ft / 1.8 m, additional SWAY BRACE at the change of direction are not required.

H F2

HORIZONTAL CROSSMAIN/FEEDMAIN



F4

F5

**FLEXIBLE COUPLING USED AT CHANGE OF DIRECTION**  
(2.2.1.1.4.A; 2.2.1.1.4.C.2)

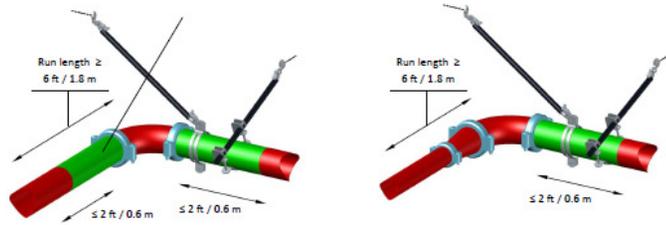
When flexible couplings are present at a horizontal change of direction, an additional LATERAL sway brace must be installed within 2 ft / 0.6 m of the change of direction, regardless of the length of the pipe run adjacent to the change in direction.

## STEP 3: identificazione dell'aspetto trattato

# ...ALLE PAGINE DI DETTAGLIO

HORIZONTAL CROSSMAIN/FEEDMAIN

H F3

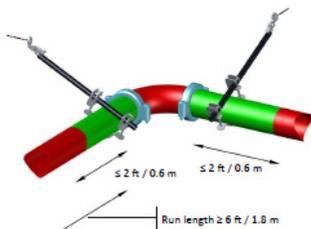


F1 d1

F1 d2

**HORIZONTAL CHANGES OF DIRECTION: CONSTANT AND CHANGING MAIN SIZE**  
(2.2.1.1.4.A)

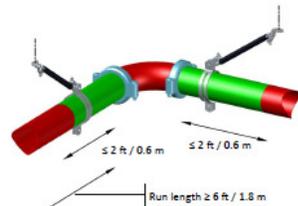
The CROSSMAIN/FEEDMAIN runs longer than 6 ft / 1.8 m adjacent to changes of direction are required to have a LATERAL and a LONGITUDINAL sway braces within 2 ft / 0.6 m of the change of direction.  
If the CROSSMAIN/FEEDMAIN diameter decreases at the change of direction, locate the SWAY BRACES on the run with the larger diameter.



F1 d3

**HORIZONTAL CHANGES OF DIRECTION: ALTERNATIVE SOLUTIONS**  
(2.2.1.1.4.A)

Alternative solutions made with two LATERAL braces, one of which works as a LONGITUDINAL brace for the perpendicular run.



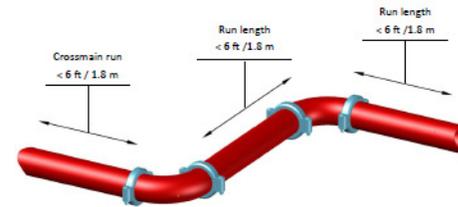
F1 d4

**HORIZONTAL CHANGES OF DIRECTION: ALTERNATIVE SOLUTIONS**  
(2.2.1.1.4.A)

Alternative solutions made with two LONGITUDINAL braces, one of which works as a LATERAL brace for the perpendicular run.

H F4

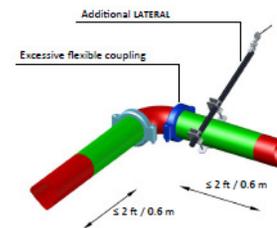
HORIZONTAL CROSSMAIN/FEEDMAIN



F3 d1

**RUNS LESS THAN 6 FT. / 1.8m ADJACENT TO HORIZONTAL CHANGES OF DIRECTION**  
(2.2.1.1.4.A and 2.2.1.1.4.C.2)

When the CROSSMAIN/FEEDMAIN runs adjacent to horizontal direction changes are shorter than 6 ft / 1.8 m, additional sway BRACES at the changes of direction are not required.

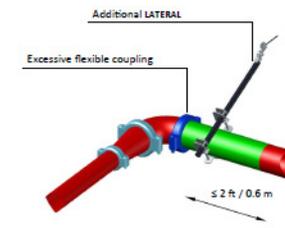


F4 d1

**HORIZONTAL CHANGES OF DIRECTION: ACCEPTABLE SOLUTIONS WHEN FLEXIBLE COUPLING AT ELBOW**  
(2.2.1.1.4.A e 2.2.1.1.4.C.2)

When the pipe connection at changes in direction is made using flexible couplings, an additional LATERAL brace must be inserted within 2 ft / 0.6 m of the change of direction, regardless of the length of the adjacent pipe run. If there is no change in pipe diameter at the change of direction, the LATERAL brace can be indifferently located on either of the two runs as long as it is within 2 ft / 0.6 m limit from the change of direction. On the other hand, if there is a change in pipe diameter, then the LATERAL brace must be located on the pipe with the larger diameter.

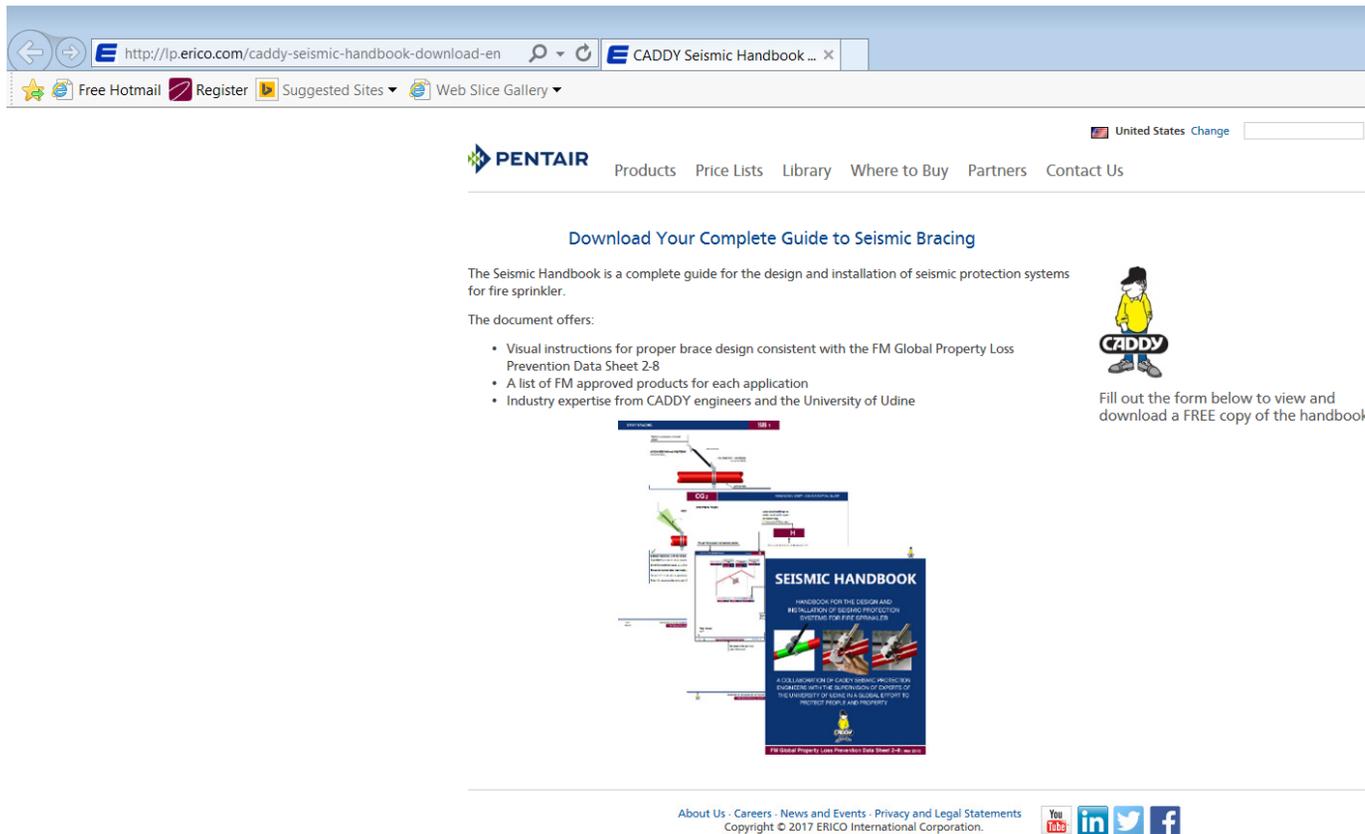
F4 d2



**STEP 4: visualizzazione del dettaglio da approfondire**

# COME RICHIEDERLO

# VERSIONE IN ITALIANO



The screenshot shows a web browser window with the URL <http://lp.erico.com/caddy-seismic-handbook-download-en>. The page features the Pentair logo and navigation links: Products, Price Lists, Library, Where to Buy, Partners, and Contact Us. A dropdown menu shows "United States" with a "Change" button. The main heading is "Download Your Complete Guide to Seismic Bracing". Below this, a paragraph states: "The Seismic Handbook is a complete guide for the design and installation of seismic protection systems for fire sprinkler." The document offers:

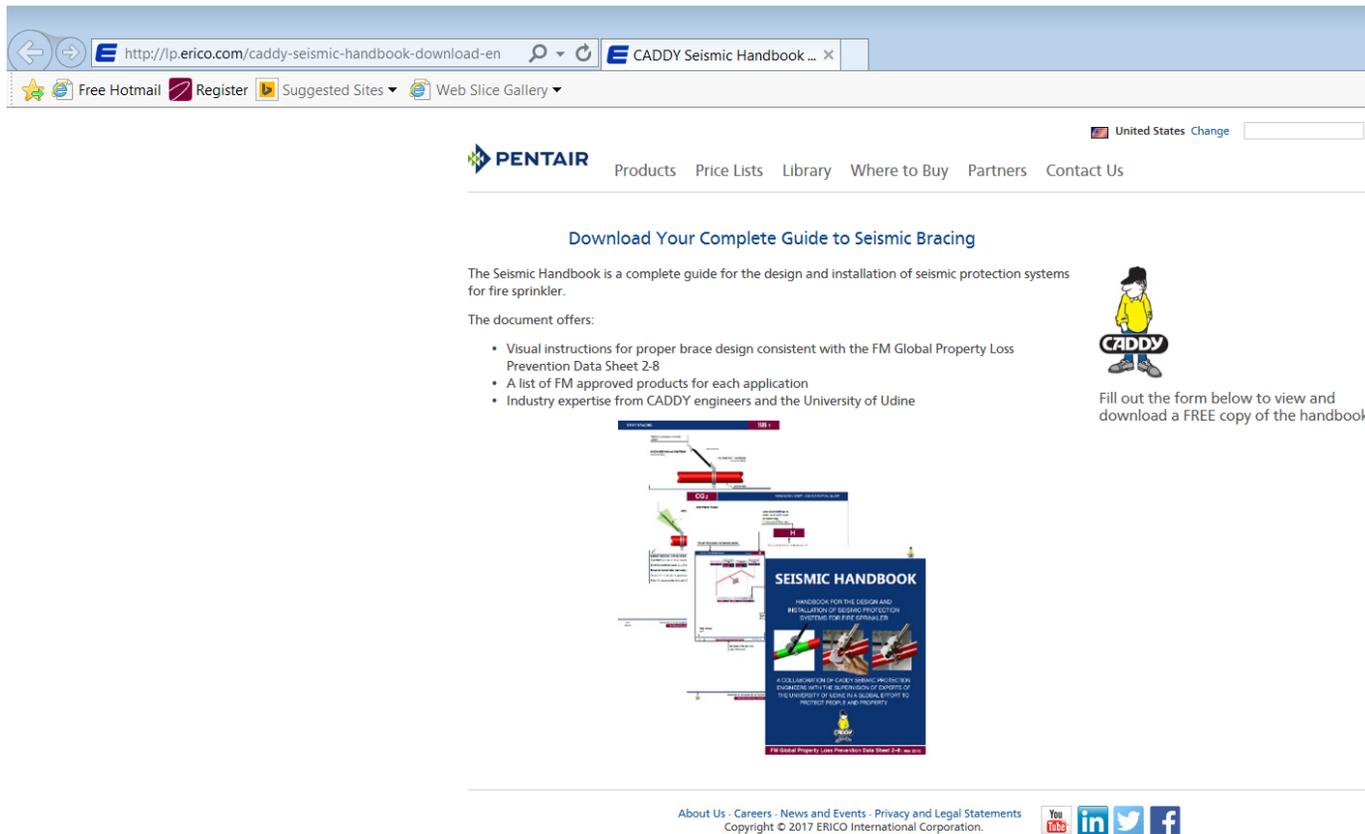
- Visual instructions for proper brace design consistent with the FM Global Property Loss Prevention Data Sheet 2-8
- A list of FM approved products for each application
- Industry expertise from CADDY engineers and the University of Udine

To the right is the CADDY logo (a cartoon character in a yellow shirt) and the text: "Fill out the form below to view and download a FREE copy of the handbook". Below the text is a collage of technical diagrams and the cover of the "SEISMIC HANDBOOK". The cover text reads: "SEISMIC HANDBOOK HANDBOOK FOR THE DESIGN AND INSTALLATION OF SEISMIC PROTECTION SYSTEMS FOR FIRE SPRINKLER. A COLLABORATION OF CADDY SEISMIC PROTECTION ENGINEERS WITH THE ASSISTANCE OF EXPERTS OF THE UNIVERSITY OF UDINE HAS DEVELOPED TO PROTECT PEOPLE AND PROPERTY. FM Global Property Loss Prevention Data Sheet 2-8 and 2-9". At the bottom of the page are links for "About Us", "Careers", "News and Events", "Privacy and Legal Statements", and "Copyright © 2017 ERICO International Corporation.", along with social media icons for YouTube, LinkedIn, Twitter, and Facebook.

La versione in italiano del CADDY SEISMIC HANDBOOK si scarica al seguente link:  
<http://lp.erico.com/caddy-seismic-handbook-fm-it>

**Le copie stampate vanno ordinate**

# VERSIONE IN INGLESE



The screenshot shows a web browser window with the URL <http://p.erico.com/caddy-seismic-handbook-download-en>. The page features the Pentair logo and navigation links: Products, Price Lists, Library, Where to Buy, Partners, and Contact Us. A dropdown menu shows "United States" with a "Change" button. The main heading is "Download Your Complete Guide to Seismic Bracing". Below this, a paragraph states: "The Seismic Handbook is a complete guide for the design and installation of seismic protection systems for fire sprinkler." The document offers are listed as follows:

- Visual instructions for proper brace design consistent with the FM Global Property Loss Prevention Data Sheet 2-8
- A list of FM approved products for each application
- Industry expertise from CADDY engineers and the University of Udine

To the right of the text is the CADDY logo, which depicts a cartoon character in a yellow shirt and black cap. Below the logo, the text reads: "Fill out the form below to view and download a FREE copy of the handbook". In the center of the page, there is a collage of images including technical diagrams and the cover of the "SEISMIC HANDBOOK". The cover text includes: "SEISMIC HANDBOOK", "HANDBOOK FOR THE DESIGN AND INSTALLATION OF SEISMIC PROTECTION SYSTEMS FOR FIRE SPRINKLER", and "A COLLABORATION OF CADDY SEISMIC PROTECTION ENGINEERS WITH THE AUTHORITY OF CORPUS OF THE UNIVERSITY OF UDINE HAS DESIGNER TO PROTECT PEOPLE AND PROPERTY". At the bottom of the page, there are links for "About Us", "Careers", "News and Events", "Privacy and Legal Statements", and "Copyright © 2017 ERICO International Corporation.", along with social media icons for YouTube, LinkedIn, Twitter, and Facebook.

La versione in inglese del CADDY SEISMIC HANDBOOK si scarica al seguente link:  
<http://p.erico.com/caddy-seismic-handbook-fm-en>

**Attualmente in fase di traduzione la versione in spagnolo**

GRAZIE