



# Notified Body 1777 - CPR

## CERTIFICATE OF CONSTANCY OF PERFORMANCE 1777 - CPR - 21.02

In compliance with Regulation (EU) No. 305/2011 of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR), this certificate applies to the construction product

#### **Fluid Viscous Damper**

with trade name

#### **DAHT FVD**

velocity dependent device, to use in buildings and civil engineering works where requirements on individual devices are critical,

placed on the market under the name or trade mark of

#### **DAHT SRL**

C.da Alezza zona PIP - 74012 Crispiano (TA) - Italy

and produced in the manufacturing plant

DAHT SRL - C.da Alezza zona PIP - 74012 Crispiano (TA) - Italy.

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in Annex ZA of the standard

#### EN 15129:2009

under System 1 for the performance set out in this certificate are applied and that the factory production control conducted by the manufacturer is assessed to ensure the

# constancy of performance of the construction product.

This certificate was first issued on 8 July 2021 and will remain valid as long as neither the harmonised standard, the construction product, the AVCP methods nor the manufacturing conditions in the plant are modified significantly, unless suspended or withdrawn by the notified product certification body.

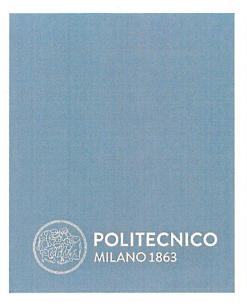
The main characteristics of the product are reported in the Annex to this certificate.

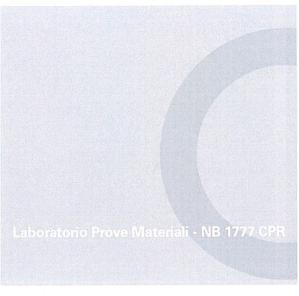
Milan, 8 July 2021

Revision n. 0

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Prof. Ing. Carlo Poggi Head of Certification Body







# Annex to Certificate of Constancy of Performance no. 1777 - CPR - 21.02

#### **Fluid Viscous Dampers**

with trade name

#### **DAHT FVD**

# product families

DAHT FVD product families comprise fluid viscous dampers devices that provide an axial force in either tension or compression that depends on the imposed velocity only and complies with the constitutive law declared by the manufacturer over a velocity range extending at least two decades down from the maximum design level. The devices are manufactured from ferrous materials and the active surface of the piston rod is hard chromium plated. The devices are classified as Velocity Dependent, type Fluid Viscous Dampers, in accordance with Table 1 of hEN 15129:2009.

DAHT FVD devices are presented in the product families described below.

#### DAHT FVD with viscous fluid A1 and accumulator

#### Description of the product

DAHT FVD with viscous fluid A and accumulator devices comprise fluid viscous dampers that provide an axial force in either tension or compression that depends on the imposed velocity only and comply with the constitutive law declared by the manufacturer over a velocity range extending at least two decades down from the maximum design level. The devices are manufactured from ferrous materials and the active surface of the piston rod is hard chromium plated. The devices are classified as Velocity Dependent, type Fluid Viscous Dampers, in accordance with Table 1 of hEN 15129:2009.

The device is equipped with a hydraulic accumulator.

The active surfaces are in accordance with clause 7.2.3 of hEN 15129:2009. <sup>1</sup> The viscous fluid A is in accordance with clause 7.2.4 of hEN 15129:2009. <sup>1</sup>

The temperature range is from -25° C to +50° C.

The intended use is in buildings and civil engineering works.

<sup>1</sup> appropriate documents reporting the identification characteristics of the fluid, active surfaces and outsourced manufacturing processes are deposited at the Notified Body involved in the attestation of constancy of performance procedure.







#### Performance characteristics

DAHT FVD with viscous fluid A and accumulator devices meet the following requirements in accordance with hEN 15129:2009:

- pressure test, clause 7.4.2.2
- low velocity test, clause 7.4.2.3
- constitutive law test, clause 7.4.2.5
- damping efficiency test, clause 7.4.2.7
- wind load cycle test, clause 7.4.2.8
- seal wear test, clause 7.4.2.9
- stroke verification test, clause 7.4.2.10

#### Type, identification and use

DAHT FVD with viscous fluid A and accumulator product types are evaluated on the basis of the results reported below

DAHT FVD 250±50			
Load capacity ±250 kN Maximum stroke ±50 mm			
Essential characteristics	Performanc	es	
Axial load transmission capability	Conforming		
Durability aspects	Conforming	9	
	Parameter	Design value	Unit
	Axial force F <sub>d</sub>	250	kN
Resistance to seismic	Maximum velocity V <sub>d</sub>	400	mm/s
loads/shock	Seismic displacement* d <sub>bd</sub>	±45	mm
absorption (Survivability against	Constitutive law parameter C	101.8	kN (m/s)⁻ª
repeated load	Constitutive law parameter a	0.15	==
cycling)	Wind load frequency f <sub>w</sub>	1.59	Hz
	Wind load amplitude d <sub>w</sub>	±5	mm
Rotation capability	7 == 7 = 1	±0.052	rad
Factor distriction	EDC	43.14	kJ
Energy dissipation	Damping efficiency frequency f <sub>0</sub>	1.414	Hz
capability	Damping efficiency amplitude d <sub>0</sub>	±45	mm
Stroke	Thermal displacement d <sub>th</sub>	±10	mm
	Maximum displacement d <sub>max</sub>	±50	mm
	Minimum service temperature T <sub>L</sub>	-25	° C
==	Maximum service temperature T <sub>U</sub>	+50	° C

According to Test Report no. 2021/1405.







DAHT FVD 3000±385			
Load capacity ±3000 kN Maximum stroke ±385 mm			
Essential characteristics	Performances		
Axial load transmission capability	Conforming		
Durability aspects	Conforming	9	
9 9	Parameter	Design value	Unit
	Axial force F <sub>d</sub>	3000	kN
Resistance to seismic	Maximum velocity V <sub>d</sub>	400	mm/s
loads/shock	Seismic displacement d <sub>bd</sub>	±125	mm
absorption (Survivability	Constitutive law parameter C	1648	kN (m/s)⁻ª
against repeated load cycling)	Constitutive law parameter a	0.1	==
	Wind load frequency f <sub>w</sub>	1.59	Hz
	Wind load amplitude d <sub>w</sub>	±5	mm
Rotation capability		±0.052	rad
,	EDC	1435	kJ
Energy dissipation capability	Damping efficiency frequency f <sub>0</sub>	0.509	Hz
	Damping efficiency amplitude d <sub>0</sub>	±125	mm
	Thermal displacement d <sub>th</sub>	±50	mm
Stroke	Maximum displacement d <sub>max</sub>	±385	mm
	Minimum service temperature T <sub>L</sub>	-25	° C
==	Maximum service temperature T <sub>U</sub>	+50	° C

According to Test Report no. 2021/1406.







DAHT FVD with viscous fluid A and accumulator types and sizes covered by the present Certificate of Constancy of Performance are manufactured in accordance with the same design and with the same parametric technical solutions.

The dimensions of the products covered by the present Certificate of Constancy of Performance can vary in the dimensional range defined below in accordance with clause 7.2.4.1 of hEN 15129.

Load Capacity	Maximum velocity	Test Report
200 to 300 kN	up to 400 mm/s	2021/1405
2400 to 3600 kN	up to 400 mm/s	2021/1406

#### DAHT FVD with viscous fluid B1 without accumulator

#### Description of the product

DAHT FVD with viscous fluid B without accumulator devices comprise fluid viscous dampers that provide an axial force in either tension or compression that depends on the imposed velocity only and comply with the constitutive law declared by the manufacturer over a velocity range extending at least two decades down from the maximum design level. The devices are manufactured from ferrous materials and the active surface of the piston rod is hard chromium plated. The devices are classified as Velocity Dependent, type Fluid Viscous Dampers, in accordance with Table 1 of hEN 15129:2009.

The active surfaces are in accordance with clause 7.2.3 of hEN 15129:2009.  $^{1}$  The viscous fluid B is in accordance with clause 7.2.4 of hEN 15129:2009.  $^{1}$  The temperature range is from -20° C to +40° C.

The intended use is in buildings and civil engineering works.

<sup>1</sup> appropriate documents reporting the identification characteristics of the fluid, active surfaces and outsourced manufacturing processes are deposited at the Notified Body involved in the attestation of constancy of performance procedure.

#### Performance characteristics

DAHT FVD with viscous fluid B without accumulator devices meet the following requirements in accordance with hEN 15129:2009:

- pressure test, clause 7.4.2.2
- low velocity test, clause 7.4.2.3
- constitutive law test, clause 7.4.2.5
- damping efficiency test, clause 7.4.2.7
- wind load cycle test, clause 7.4.2.8
- seal wear test, clause 7.4.2.9
- stroke verification test, clause 7.4.2.10







## Type, identification and use

DAHT FVD with viscous fluid B without accumulator product types are evaluated on the basis of the results reported below

	DAHT FVD 1260±250			
Load capacity ±1260 kN Maximum stroke ±250 mm				
Essential characteristics	Performan	ces		
Axial load transmission capability	Conforming			
Durability aspects	Conformin	g		
	Parameter	Design value	Unit	
	Axial force F <sub>d</sub>	1260	kN	
Resistance to	Maximum velocity V <sub>d</sub>	900	mm/s	
seismic loads/shock	Seismic displacement d <sub>bd</sub>	±150	mm	
absorption (Survivability	Constitutive law parameter C	323	kN (m/s)-a	
against repeated load cycling)	Constitutive law parameter a	0.2	==	
	Wind load frequency f <sub>w</sub>	0.25	Hz	
	Wind load amplitude d <sub>w</sub>	±10	mm	
Rotation capability		±0.035	rad	
	EDC	673.34	kJ	
Energy dissipation capability	Damping efficiency frequency f <sub>0</sub>	0.7162	Hz	
	Damping efficiency amplitude d <sub>0</sub>	±150	mm	
Stroke	Thermal displacement d <sub>th</sub>	±25	mm	
	Maximum displacement d <sub>max</sub>	±250	mm	
	Minimum service temperature T <sub>L</sub>	-20	° C	
==	Maximum service temperature T <sub>U</sub>	+40	° C	

According to Test Report no. 2023/0234.



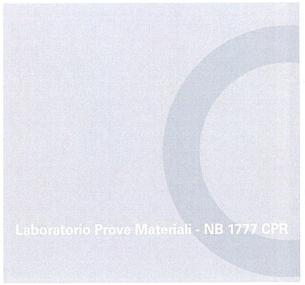




DAHT FVD 180±85			
Load capacity ±180 kN Maximum stroke ±85 mm			
Essential characteristics	Performano	es	
Axial load transmission capability	Conforming	9	
Durability aspects	Conforming	9	
	Parameter	Design value	Unit
	Axial force F <sub>d</sub>	180	kN
Resistance to	Maximum velocity V <sub>d</sub>	750	mm/s
seismic loads/shock	Seismiċ displacement d <sub>bd</sub>	±60	mm
absorption (Survivability	Constitutive law parameter C	48	kN (m/s)⁻ª
against repeated load cycling)	Constitutive law parameter a	0.2	==
	Wind load frequency f <sub>w</sub>	0.25	Hz
	Wind load amplitude d <sub>w</sub>	±10	mm
Rotation capability	==	±0.035	rad
	EDC	38.48	kJ
Energy dissipation capability	Damping efficiency frequency f <sub>0</sub>	1.492	Hz
	Damping efficiency amplitude d <sub>0</sub>	±60	mm
	Thermal displacement d <sub>th</sub>	±25	mm
Stroke	Maximum displacement d <sub>max</sub>	±85	mm
	Minimum service temperature T <sub>L</sub>	-20	° C
	Maximum service temperature T <sub>U</sub>	+40	° C

According to Test Report no. 2023/0235.



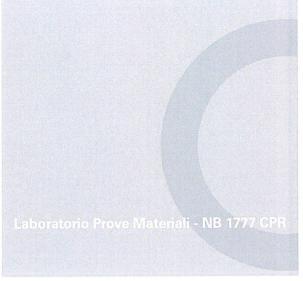




<b>DAHT FVD 670±76</b>			
Load capacity ±670 kN Maximum stroke ±76 mm			
Essential characteristics	Performances		
Axial load transmission capability	Conforming		
Durability aspects	Conformin	9	
	Parameter	Design value	Unit
	Axial force Fd	670	kN
Resisance to seismic	Maximum velocity Vd	500	mm/s
loads/shock	Seismic displacement dbd	±50	mm
absorption (Survivability	Constitutive law parameter C	360	kN (m/s)⁻ª
against repeated	Constitutive law parameter a	0.10	==
load cycling)	Wind load frequency fw	0.25	Hz
	Wind load amplitude dw	±2	mm
Rotation capability	==	±0.035	rad
- L	EDC	130.0	kJ
Energy dissipation	Damping efficiency frequency f0	1.59	Hz
capability	Damping efficiency amplitude d0	±50	mm
Stroke	Thermal displacement dth	±25	mm
	Maximum displacement dmax	±76	mm
	Minimum service temperature	-20	° C
==	Maximum service temperature	+40	° C

According to Test Report no. 2023/2928.



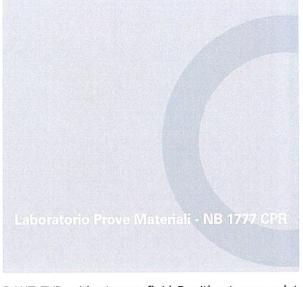




DAHT FVD 280±120			
Load capacity ±280 kN Maximum stroke ±120 mm			
Essential characteristics	Performano	ces	
Axial load transmission capability	Conforming		
Durability aspects	Conformin	g	
	Parameter	Design value	Unit
	Axial force Fd	±280	kN
Resisance to seismic	Maximum velocity Vd	500	mm/s
loads/shock	Seismic displacement dbd	±30	mm
absorption (Survivability	Constitutive law parameter C	110	kN (m/s)⁻ª
against repeated	Constitutive law parameter a	0.15	==
load cycling)	Wind load frequency fw	0.25	Hz
	Wind load amplitude dw	±3	mm
Rotation capability	== ////////////////////////////////////	0.035	rad
	EDC	32	kJ
Energy dissipation	Damping efficiency frequency f0	2.65	Hz
capability	Damping efficiency amplitude d0	±30	mm
Stroke	Thermal displacement dth	±25	mm
	Maximum displacement dmax	±120	mm
	Minimum service temperature TL	-20	° C
	Maximum service temperature TU	40	° C

According to Test Report no. 2023/3477 .







DAHT FVD with viscous fluid B without accumulator types and sizes covered by the present Certificate of Constancy of Performance are manufactured in accordance with the same design and with the same parametric technical solutions.

The dimensions of the products covered by the present Certificate of Constancy of Performance can vary in the dimensional range defined below in accordance with clause 7.2.4.1 of hEN 15129.

Load Capacity	Maximum velocity	Test Report
144 to 216 kN	up to 750 mm/s	2023/0235
1008 to 1512 kN	up to 900 mm/s	2023/0234
536 to 804 kN	up to 500 mm/s	2023/2928
96 to 144 kN	up to 500 mm/s	2023/3477

#### DAHT FVD with viscous fluid C1 without accumulator

#### Description of the product

DAHT FVD with viscous fluid C without accumulator devices comprise fluid viscous dampers that provide an axial force in either tension or compression that depends on the imposed velocity only and comply with the constitutive law declared by the manufacturer over a velocity range extending at least two decades down from the maximum design level. The devices are manufactured from ferrous materials and the active surface of the piston rod is hard chromium plated. The devices are classified as Velocity Dependent, type Fluid Viscous Dampers, in accordance with Table 1 of hEN 15129:2009.

The active surfaces are in accordance with clause 7.2.3 of hEN 15129:2009.  $^{1}$  The viscous fluid C is in accordance with clause 7.2.4 of hEN 15129:2009.  $^{1}$  The temperature range is from  $+18^{\circ}$  C to  $+28^{\circ}$  C.

The intended use is in buildings and civil engineering works.

<sup>1</sup> appropriate documents reporting the identification characteristics of the fluid, active surfaces and outsourced manufacturing processes are deposited at the Notified Body involved in the attestation of constancy of performance procedure.

# Performance characteristics

DAHT FVD with viscous fluid C without accumulator devices meet the following requirements in accordance with hEN 15129:2009:

- pressure test, clause 7.4.2.2
- low velocity test, clause 7.4.2.3
- constitutive law test, clause 7.4.2.5
- damping efficiency test, clause 7.4.2.7
- wind load cycle test, clause 7.4.2.8
- seal wear test, clause 7.4.2.9
- stroke verification test, clause 7.4.2.10





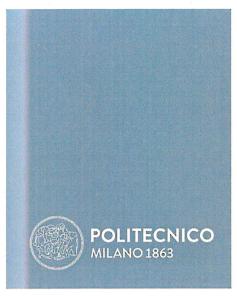


# Type, identification and use

DAHT FVD with viscous fluid C without accumulator product types are evaluated on the basis of the results reported below

DAHT FVD 600±100			
Load capacity ±600 kN Maximum stroke ±100 mm			
Essential characteristics	Performano	es	
Axial load transmission capability	Conforming		
Durability aspects	Conforming	9	
	Parameter	Design value	Unit
	Axial force F <sub>d</sub>	600	kN
Resistance to	Maximum velocity V <sub>d</sub>	200	mm/s
seismic loads/shock	Seismic displacement d <sub>bd</sub>	±40	mm
absorption (Survivability	Constitutive law parameter C	460	kN (m/s)⁻ª
against repeated	Constitutive law parameter a	0.05	==
load cycling)	Wind load frequency f <sub>w</sub>	0.955	Hz
	Wind load amplitude d <sub>w</sub>	±5	mm
Rotation capability	==	±0.035	rad
	EDC	84.5	kJ
Energy dissipation capability	Damping efficiency frequency f <sub>0</sub>	0.43	Hz
	Damping efficiency amplitude d₀	±37	mm
Stroke	Thermal displacement d <sub>th</sub>	±50	mm
	Maximum displacement d <sub>max</sub>	±100	mm
3	Minimum service temperature T <sub>L</sub>	18	° C
==	Maximum service temperature T <sub>U</sub>	28	° C

According to Test Report no. 2023/2706.







	DAHT FVD 483±58			
Load capacity ±483 kN Maximum stroke ±58mm				
Essential characteristics	Performances			
Axial load transmission capability	Conforming			
Durability aspects	Conforming	3		
	Parameter	Design value	Unit	
	Axial force F <sub>d</sub>	483	kN	
Resistance to	Maximum velocity V <sub>d</sub>	200	mm/s	
seismic loads/shock	Seismic displacement d <sub>bd</sub>	±30	mm	
absorption (Survivability	Constitutive law parameter C	68	kN (m/s)-a	
against repeated	Constitutive law parameter a	0.37	==	
load cycling)	Wind load frequency f <sub>w</sub>	1.592	Hz	
	Wind load amplitude d <sub>w</sub>	±3	mm	
Rotation capability	1 1 == 1	0.035	rad	
	EDC	39.1	kJ	
Energy dissipation capability	Damping efficiency frequency f <sub>0</sub>	0.531	Hz	
	Damping efficiency amplitude d <sub>0</sub>	±29	mm	
	Thermal displacement d <sub>th</sub>	±25	mm	
Stroke	Maximum displacement d <sub>max</sub>	±58	mm	
	Minimum service temperature T <sub>L</sub>	-25°C	° C	
	Maximum service temperature T <sub>U</sub>	+40°C	° C	

According to Test Report no. 2023/3379.







DAHT FVD with viscous fluid C without accumulator types and sizes covered by the present Certificate of Constancy of Performance are manufactured in accordance with the same design and with the same parametric technical solutions.

The dimensions of the products covered by the present Certificate of Constancy of Performance can vary in the dimensional range defined below in accordance with clause 7.2.4.1 of hEN 15129.

Load Capacity	Maximum velocity	Test Report
480 to 720 kN	up to 200 mm/s	2023/2706
386.4 to 579.6 kN	up to 200 mm/s	2023/3379

Milan, 19 January 2024

Prof. Ing. Carlo Poggi Head of Certification Body

> Firmato digitalmente da:CARLO POGGI Organizzazione: POLITECNICO DI MILANO/80057930150

The present Annex is only valid together with the Certificate of Constancy of Performance no. 1777 - CPR - 21.02 rev.0 dated 8 July 2021

The present Annex cancels and replaces the previous Annex rev. 3 dated 18 December 2023