POLITECNICO
MILANO 1863

Laboratorio Prove Materiali - NB 1777 CPR

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product, the AVCP methods nor the manufacturing conditions in the plant are modified significantly, unless suspended or withdrawn by the notified product certification body.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

Prof. Ing. Carlo Poggi
Head of Certification Body

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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 A[1] 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. [1]

The viscous fluid A is in accordance with clause 7.2.4 of hEN 15129:2009. [1]

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

The intended use is in buildings and civil engineering works.

[1] 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.

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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	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	250	kN
	Maximum velocity V_d	400	mm/s
	Seismic displacement* d_{bd}	±45	mm
	Constitutive law parameter C	101.8	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.15	==
	Wind load frequency f_w	1.59	Hz
	Wind load amplitude d_w	±5	mm
Rotation capability	==	±0.052	rad
Energy dissipation capability	EDC	43.14	kJ
	Damping efficiency frequency f_0	1.414	Hz
	Damping efficiency amplitude d_0	±45	mm
Stroke	Thermal displacement d_{th}	±10	mm
	Maximum displacement d_{max}	±50	mm
==	Minimum service temperature T_L	-25	° C
	Maximum service temperature T_U	+50	° C

According to Test Report no. 2021/1405.

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DAHT FVD 3000±385 *Load capacity ±3000 kN* *Maximum stroke ±385 mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	3000	kN
	Maximum velocity V_d	400	mm/s
	Seismic displacement d_{bd}	±125	mm
	Constitutive law parameter C	1648	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.1	==
	Wind load frequency f_w	1.59	Hz
	Wind load amplitude d_w	±5	mm
Rotation capability	==	±0.052	rad
Energy dissipation capability	EDC	1435	kJ
	Damping efficiency frequency f_0	0.509	Hz
	Damping efficiency amplitude d_0	±125	mm
Stroke	Thermal displacement d_{th}	±50	mm
	Maximum displacement d_{max}	±385	mm
==	Minimum service temperature T_L	-25	° C
	Maximum service temperature T_U	+50	° C

According to Test Report no. 2021/1406 .

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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 B[1] 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.

[1] 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

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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	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	1260	kN
	Maximum velocity V_d	900	mm/s
	Seismic displacement d_{bd}	±150	mm
	Constitutive law parameter C	323	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.2	==
	Wind load frequency f_w	0.25	Hz
	Wind load amplitude d_w	±10	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	673.34	kJ
	Damping efficiency frequency f_0	0.7162	Hz
	Damping efficiency amplitude d_0	±150	mm
Stroke	Thermal displacement d_{th}	±25	mm
	Maximum displacement d_{max}	±250	mm
==	Minimum service temperature T_L	-20	° C
	Maximum service temperature T_U	+40	° C

According to Test Report no. 2023/0234 .

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DAHT FVD 180±85 *Load capacity ±180 kN* *Maximum stroke ±85 mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	180	kN
	Maximum velocity V_d	750	mm/s
	Seismic displacement d_{bd}	±60	mm
	Constitutive law parameter C	48	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.2	==
	Wind load frequency f_w	0.25	Hz
	Wind load amplitude d_w	±10	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	38.48	kJ
	Damping efficiency frequency f_0	1.492	Hz
	Damping efficiency amplitude d_0	±60	mm
Stroke	Thermal displacement d_{th}	±25	mm
	Maximum displacement d_{max}	±85	mm
==	Minimum service temperature T_L	-20	° C
	Maximum service temperature T_U	+40	° C

According to Test Report no. 2023/0235 .

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

According to Test Report no. 2023/2928 .

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DAHT FVD 280±120 *Load capacity ±280 kN* *Maximum stroke ±120 mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resisance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force Fd	280	kN
	Maximum velocity Vd	500	mm/s
	Seismic displacement dbd	±30	mm
	Constitutive law parameter C	110	kN (m/s)$^{-\alpha}$
	Constitutive law parameter α	0.15	==
	Wind load frequency fw	0.25	Hz
	Wind load amplitude dw	±3	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	32	kJ
	Damping efficiency frequency f0	2.65	Hz
	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 .

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DAHT FVD 80±50 *Load capacity ±80 kN* *Maximum stroke ±50 mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resisance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force Fd	80	kN
	Maximum velocity Vd	300	mm/s
	Seismic displacement dbd	±40	mm
	Constitutive law parameter C	96	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.15	==
	Wind load frequency fw	0.318	Hz
	Wind load amplitude dw	±3	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	11.9	kJ
	Damping efficiency frequency f0	0.895	Hz
	Damping efficiency amplitude d0	±40	mm
Stroke	Thermal displacement dth	±10	mm
	Maximum displacement dmax	±50	mm
==	Minimum service temperature TL	-20	° C
	Maximum service temperature TU	+40	° C

According to Test Report no. 2024/2693 .

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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
224 to 336 kN	up to 500 mm/s	2023/3477
64 to 96 kN	up to 300 mm/s	2024/2693

DAHT FVD with viscous fluid C[1] 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 -25° C to +40° C.

The intended use is in buildings and civil engineering works.

[1] 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

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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	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	600	kN
	Maximum velocity V_d	200	mm/s
	Seismic displacement d_{bd}	±40	mm
	Constitutive law parameter C	460	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.05	==
	Wind load frequency f_w	0.955	Hz
	Wind load amplitude d_w	±5	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	84.5	kJ
	Damping efficiency frequency f_0	0.43	Hz
	Damping efficiency amplitude d_0	±37	mm
Stroke	Thermal displacement d_{th}	±50	mm
	Maximum displacement d_{max}	±100	mm
==	Minimum service temperature T_L	-25	° C
	Maximum service temperature T_U	+40	° C

According to Test Report no. 2023/2706.

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DAHT FVD 483±58 *Load capacity ±483 kN* *Maximum stroke ±58mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	483	kN
	Maximum velocity V_d	200	mm/s
	Seismic displacement d_{bd}	±30	mm
	Constitutive law parameter C	68	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.37	==
	Wind load frequency f_w	1.592	Hz
	Wind load amplitude d_w	±3	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	39.1	kJ
	Damping efficiency frequency f_0	0.531	Hz
	Damping efficiency amplitude d_0	±29	mm
Stroke	Thermal displacement d_{th}	±25	mm
	Maximum displacement d_{max}	±58	mm
==	Minimum service temperature T_L	-25	° C
	Maximum service temperature T_U	+40	° C

According to Test Report no. 2023/3379.

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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

DAHT FVD with viscous fluid D[1] without accumulator

Description of the product

DAHT FVD with viscous fluid D 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 D is in accordance with clause 7.2.4 of hEN 15129:2009. [1]

The temperature range is from -15° C to +50° C.

The intended use is in buildings and civil engineering works.

[1] 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 D 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

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Type, identification and use

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

DAHT FVD 350±110 *Load capacity ±350 kN* *Maximum stroke ±110 mm*			
Essential characteristics	**Performances**		
Axial load transmission capability	Conforming		
Durability aspects	Conforming		
	Parameter	Design value	Unit
Resistance to seismic loads/shock absorption (Survivability against repeated load cycling)	Axial force F_d	350	kN
	Maximum velocity V_d	750	mm/s
	Seismic displacement d_{bd}	±70	mm
	Constitutive law parameter C	360	kN $(m/s)^{-\alpha}$
	Constitutive law parameter α	0.1	==
	Wind load frequency f_w	0.318	Hz
	Wind load amplitude d_w	±3	mm
Rotation capability	==	±0.035	rad
Energy dissipation capability	EDC	86.3	kJ
	Damping efficiency frequency f_0	1.137	Hz
	Damping efficiency amplitude d_0	±66.5	mm
Stroke	Thermal displacement d_{th}	±10	mm
	Maximum displacement d_{max}	±110	mm
==	Minimum service temperature T_L	-15	° C
	Maximum service temperature T_U	+50	° C

According to Test Report no. 2024/1998.

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DAHT FVD with viscous fluid D 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*
280 to 420 kN	up to 750 mm/s	2024/1998

Milan, 28 October 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. 4 dated 19 January 2024

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