SLOVENSKI STANDARD

SIST EN 15431:2008

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Oprema za vzdrģevalna dela zimske sluģbe in sluģbe za vzdrģevanje cest - Pogon in krmiljenje priključ enega stroja - Zamenljivost in zahtevane lastnosti

Winter and road service area maintenance equipments - Power system and related controls - Interchangeability and performance requirements

Winterdienst- und Straßenbetriebsdienstausstattung - Antrieb und Steuerung von Anbaumaschinen - Anforderungen an Austauschbarkeit und Leistung

Matériels de viabilité hivernale et d'entretien des dépendances routieres - Organes de puissance et commandes associées - Interchangeabilité et exigences de performance

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Winter and road service area maintenance equipments - Power system and related controls - Interchangeability and performance requirements

Matériels de viabilité hivernale et d'entretien des dépendances routières - Organes de puissance et commandes associées - Interchangeabilité et exigences de performance

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 15431: 2008) has been prepared by CEN/TC 337/WG 3 "Interface between tools and vehicle", the secretariat of which is held by UNI-CUNA, under the direction of Technical Committee CEN/TC 337 "Winter maintenance and road service area maintenance equipment", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2008, and conflicting national standards shall be withdrawn at the latest by July 2008.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document applies to power systems equipped for the operation and able to drive implements and attachments such as snow ploughs and/or spreaders on winter service vehicles or mowers on road service area maintenance vehicles, equipped with front-mounting plates according to EN 15432.

The purpose of this standard is to ensure interchangeability of vehicles and implements. The minimum requirements on the performance and the components of the hydraulic system as well as the kind, the size and the location of the connecting elements between the vehicle and the implement are specified in this standard.

This standard does not deal with airport equipment.

This standard does not cover applications, where the implements need a continuous hydraulic oil flow exceeding 45 l/min.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references the latest edition of the referenced document (including any amendments) applies.

ISO 1185, *Road vehicles – Connectors for the electrical connection of towing and towed vehicles – 7-pole connector type 24 N (normal) for vehicles with 24 V nominal supply voltage*

ISO 1724, *Road vehicles – Connectors for the electrical connection of towing and towed vehicles – 7-pole connector type 12 N (normal) for vehicles with 12 V nominal supply voltage*

ISO 16028, *Hydraulic fluid power – Flush-face type, quick-action couplings for use at pressures of 20 MPa (200 bar) to 31,5 MPa (315 bar) – Specifications*

ISO 16844-2, *Road vehicles – Tachograph systems – Part 2: Recording unit, electrical interface*

3 Power System and related controls

3.1 Hydraulic system for municipal vehicles - Specifications

3.1.1 Drive of the oil pump

The oil pump shall be driven directly by the vehicle engine and independently from the vehicle drive train. A clutch or a coupling between the engine and the pump is permissible. A drive ratio between the engine and the pump is allowed.

3.1.2 Hydraulic Circuits

The hydraulic circuits must be open type circuits.

The hydraulic system consists in either one variable displacement pump or one or two constant pumps.

If there are two circuits, they shall provide flowrate and pressure independent at any working condition.

For each circuit there shall exist:

- one primary excess pressure protection device and
- one switching device for unpressurized circulation. Each circuit or both circuits together shall be equipped with an oil reservoir and a filter for protection of the hydraulic system.

3.1.3 Connection between the hydraulic system of the vehicle and the implements

Hydraulic connectors shall be ensured by the use of quick couplings, refer to 3.1.10.

3.1.4 Flow Rates

Nominal Flow Rate circuit No. 1:	min. 20 l/min +/- 5 l/min at 75 % of the nominal engine speed (e.g. snow plough);
Nominal Flow Rate circuit No. 2:	min. 40 l/min +/- 5 l/min at 75 % of the nominal engine speed (e.g. spreader).

3.1.5 Pressure

Pressure circuit No.1:	min. 175 bar
Pressure circuit No.2:	min. 200 bar at trucks with GVW ≤ 18 t
	min. 250 bar at trucks with GVW > 18 t

3.1.6 Power

Minimum continuous power for both circuits: P_{min} = 16 kW at trucks with GVW ≤ 18 t

P_{min} = 20 kW at trucks with GVW > 18 t

3.1.7 Capacity of the oil tank

The capacity of the oil tank shall be such that a removal by the implements up to 10 l shall not affect the ability of the hydraulic system to work properly.

3.1.8 Maximum oil temperature, cooling capacity test procedure

The cooling capacity of the hydraulic system for winter maintenance vehicles shall be at least 5 % of the minimum continuous power (see section 3.1.6). For road service area maintenance vehicles including summer operation the cooling capacity shall be at least 25 % of the minimum continuous power. If required, an oil cooler can be installed.

The cooling capacity shall be verified with a test, which is described in the following.

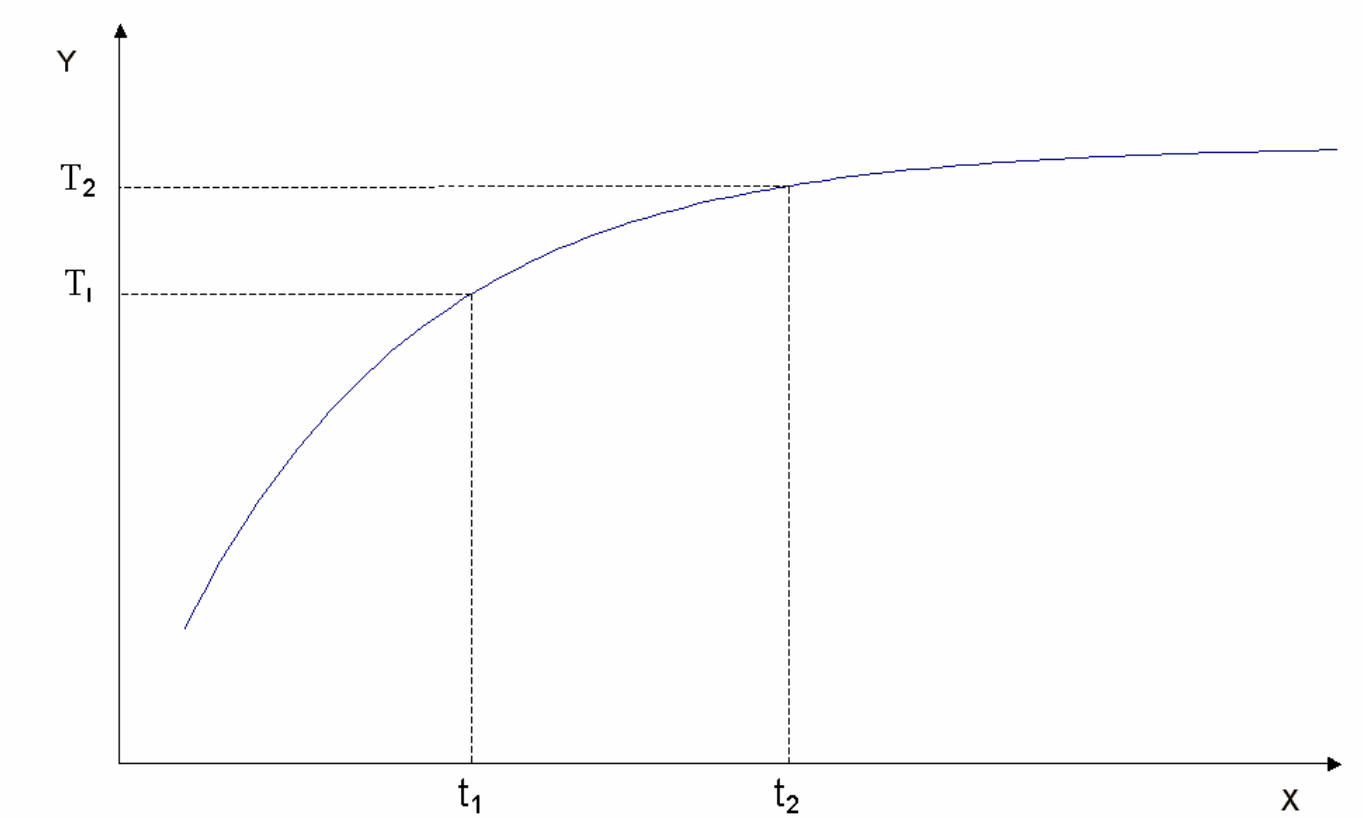
While executing the hydraulic system test in the hydraulic circuit 2, the difference between the hydraulic oil temperature in the oil tank and the ambient air temperature must not exceed ΔT = 50 K, i.e. with an ambient air temperature of 30 °C, the hydraulic oil temperature in the oil tank must not exceed 80 °C.

An adjustable restrictor for simulating the power loss shall be connected to the couplings of circuit 2. The restrictor should be adjusted to a value Δp, that gives a power absorption equivalent to 5 alternatively 25 % of the minimum continuous power at 75 % of the rated engine speed. During the test, a temperature difference between the hydraulic oil temperature in the oil tank and the ambient air temperature of ΔT = 50 K must not be exceeded.

The oil temperature has to be measured at the outlet of the oil tank.

For testing the system, the fans of the hydraulic oil cooler – if installed - need to be engaged.

Test condition: ambient air temperature 25 °C ± 10 °C.



Key

X t [s]
Y T [°C]

Figure1 – Temperature rise over time

Table 1 – Minimum cooling capacity

	Cooling capacity [% of the minimum continuous power]	Max. ΔT [K]
Winter maintenance vehicle	5	50
Road service area maintenance vehicle (winter and summer use)	25	50

The test can be terminated, when the temperature gradient $(T_2 – T_1) / (t_2 – t_1)$ is less than 5 K / 20 min.

$P = Q \times \Delta p$ (1)

where

P is the power according to the minimum continuous power (see section 3.1.6);

Q is the volume flow of circuit 2 at 75% of the rated engine speed (max. volume flow when variable displacement umps are being used);

Δp is the adjusted pressure at the flow restrictor;

T is the oil temperature at the outlet of the oil tank;

ΔT is the temperature difference between the hydraulic oil temperature in the oil tank and the ambient temperature;

t is the time.

EXAMPLE for calculating the Δp for the test, which has to be adjusted at the flow restrictor:

GVW of the truck e.g. 19 t ➔ P_{min} = 20 kW (3.1.6)

Rated engine speed e.g. 2 200 min^{-1} ➔ 75 % of rated engine speed = 1 650 min^{-1}

Cooling capacity 5 % (winter maintenance vehicle) ➔ 5 % of 20 kW = 1 kW

Cooling capacity 25 % (road service area maintenance vehicle) ➔ 25 % of 20 kW = 5 kW

Calculation of the pressure at the flow restrictor: Δp = P/Q

E.g. Q = 45 l/min, P = 1kW ➔ Δp = 13,33 bar

E.g. Q = 45 l/min, P = 5kW ➔ Δp = 66,67 bar

With this value of Δp, the test has to be executed.

3.1.9 Line cross sections

Circuit 1	min. internal diameter	10 mm
Circuit 2	min. internal diameter	12 mm
Separate Return Line via filter	min. internal diameter	18 mm
Un-pressurised Return Line	min. internal diameter	10 mm

3.1.10 Couplings and functions

3.1.10.1 General

Standard for a winterservice vehicle are 4 couplings at the front of the vehicle to control i.e. the snow plough and 2 couplings (continous flow) to drive i.e. the salt spreader.

3.1.10.2 Hydraulic circuit 1:

Table 2 – Couplings circuit 1

Circuit	Cell	Port	Symbol	Colour	Function	Size/Standard
Ⓘ	1	1	①	red	Implement lift	ISO 16028 size 12.5 (socket)
		2	②	red	Implement lower	
	2	3	③	green	Move to the left	
		4	④	green	Move to the right	
	3	5	⑤	yellow	Available for additional function	
		6	⑥	yellow		
	4	7	⑦	blue	Available for additional function	
		8	⑧	blue		
		T (Separate return line)		black	Discharge to tank via filter	ISO 16028 size 19 (socket)