

TÜLOMSAŞ



Company Profile And Introduction

The foundations of the initial and unique locomotive and wagon producer of Türkiye were laid in 1894. TÜLOMSAfi, a state owned company, related to the Turkish State Railways, located in Eskifehir just west of Ankara started as a small workshop, founded for the maintenance and repair of locomotives. In the 20 th century this workshop has grown into TÜLOMSAfi

With its 7 production plants, almost 1950 distinguished and qualified staff, 500.000 m² available land of which 176.000 m² is used for production, 9 technical and administrative units is TÜLOMSAfi a giant organization. The yearly manufacturing capacity consists of 60 diesel-electric and electric mainline locomotives or diesel hydraulic mainline and shunting locomotives, 500 bogie freight cars, 2500 tonnes of steel and pig iron, 100 different kinds of diesel motors and alternators, traction motors and 10 railway maintenance cars.

For more than a century, TÜLOMSAfi's locomotives have hauled freight and passengers. Nearly 85 % of Turkish railway vehicles were realized with nearly 700 locomotives and over 7600 freight cars manufactured up to today in TÜLOMSAfi in accordance with ISO 9001-2000 Standards.

To keep up with the latest technologies in the world for TÜLOMSAfi in the 21st century, to ensure the adaptation of these technologies, to increase the quality of products and to realize new projects are the aims of the Research and Development Department which concluded its studies to a successful implementation, when the own designed Diesel Hydraulic Shunting locomotive were launched in 1997 with type DH 7000. This marked the beginning of the diversification of its diesel hydraulic



locomotive product range. According to the requests of its clients, innovations were applied and TÜLOMSAfi began the production of type DH 9500 and hereafter became involved in the production of type DH 10000 and had sold 14 units of these type to Iraq Railways. TÜLOMSAfi 's products have been performed in nearly every imaginable condition and are still used by its clients with much satisfaction.

TÜLOMSAfi, never complacent with its achievements, is pressing ahead to achieve its goal of expanding its locomotive and wagon market. TÜLOMSAfi, will continue to meet the needs of the domestic and global rolling stock market as before backed by its advanced technology and high production capacity, being a powerful establishment within the heavy industry with the confidence and experience of its

Activities and Facilities



ACTIVITIES

TÜLOMSAfi, meets the rolling stock needs of the Turkish Railway Administration besides serving the domestic and global market with a production line consisting of diesel-electric and electric mainline locomotives, diesel hydraulic mainline and shunting locomotives, bogie freight cars, steel and pig iron, different kinds of diesel motors and alternators, traction motors and railway maintenance cars. Over 600 locomotives and 6500 freight cars are manufactured up today. The maintenance and repair of these products are also realized.

PRODUCTION FACILITIES

• **Locomotive Factory:** Diesel-electric, diesel-hydraulic and electric mainline and shunting locomotives of different types ranging from 360 to 4300 HP, as well as track maintenance cars are manufactured in the Locomotive Factory, the largest factory in TÜLOMSAfi. Construction of bogie, underframe, hoods, complete assembly, painting and testing works, as well as maintenance and repair of these railway vehicles are performed in this factory.

• **Engine Factory:** The Engine Factory produces diesel engines of 2400 HP. Furthermore, maintenance & repair, production of spare parts used in the 2400 HP diesel engines and other engines of different types and powers are carried out in this factory. A wide machine capability is provided in the Engine Factory.

• **Electrical Machinery Factory:** The Electrical Machinery Factory is producing traction motors up to 530 kW for the use of locomotives. In addition, production of alternators and control cabinets, cabling and impregnation works are performed.

• **Wagon and Track Equipment Factory:** Manufacture, maintenance and repair of various type bogie freight cars are performed in the Wagon and Track Equipment Factory. Types of freight cars produced are Sliding Wall Wagon, Tank Wagon, Borax Carrying Wagon, Container Platform Wagon, Hopper Wagon, Slab Wagon and Tank Carrying Platform Wagon. Carried out with a wide range of machines capability including CNC Laser Cutting Machine, and CNC Hydraulic Press provided in the Wagon and Track Equipment Factory.

• **Foundry & Chemical Processing Factory:** The annual casting capacity of the foundry is 2500 tonnes. Annealing, tempering, case-hardening, nitrification and induction hardening processes are performed in the heat treatment unit; whereas chrome, nickel, silver, zinc plating as well as phosphate processing are performed in the electroplating unit.



Advantages Of Diesel Hydraulic Locomotives

- ✔ Having a high operation reliability , Diesel-Hydraulic Locomotives are preferred widespread.
- ✔ Transmissions are operating for 60 000 hours by before main overhaul is getting necessary.
- ✔ Easy to use.
- ✔ Short stopping time at short distances.
- ✔ Advantage of hydro-dynamic braking due to turbotransmission.
- ✔ Resistant to shunting duties. No negative effects caused by shock impacts.
- ✔ Transmission components are easy to maintain.
- ✔ There is no need for forced cooling of axle transmissions.
- ✔ Starting moment at first start-up is higher and more efficient.
- ✔ Since turbotransmission and axle transmissions are coupled together directly by means of cardanshafts, all wheels are moving and stopping simultaneously.
- ✔ There is no need for an additional gear box.
- ✔ Longer maintenance intervals due to a minimum effecton by environmental pollution.
- ✔ Total costs and maintenance costs are low.

DH 7000 TYPE DIESEL HYDRAULIC SHUNTING LOCOMOTIVE



The DH 7000 type Diesel Hydraulic Locomotives have been designed for shunting operations with a speed range between 0-40 km/h in factory areas and train stations. The diesel engine power of the locomotive is 709 HP, and it is provided with 3 axles without bogie. The locomotive has a modular structure which consists of underframe, cooling, engine, driver cab and pneumatic units. Bi-directional operations are possible and a good track sight from the drive cab is ensured. The dynamic brake system as a result of the turbo transmission sustains the pneumatic brake system, and at the same time extends its economic life and keeps wheel and brake shoe wear to minimum level. Weight of locomotive is 51 tonnes. A fuel tank with 1800 lt. capacity is provided under the driver's cab and a part of the fuel tank is located under the frame. Helical springs and vertical hydraulic suspensions are provided at the wheel sets and underframe. The control system is operated electro-pneumatically. The locomotive conforms to UIC standards. Headlights and signal backlights are provided at both ends of the locomotive. Draw gear and super buffers are of miner's elastomer type. Draw gear and draw hook is suitable for fitting automatic coupling.

Load – gradients – velocity table : km/h

Load Ton	Gradient in %0							
	0	2,5	5	10	15	20	25	30
150	40	40	40	40	34	28	23	18
300	40	40	39	29	20	16	13	11
341	40	40	37	26	18	14	12	10
400	40	40	34	22	16	13	10	
411	40	40	34	21	15	12	10	
450	40	40	32	19	14	11		
500	40	38	29	17	13	10		
600	40	34	25	15	11			
800	40	28	18	12				
900	39	25	17	10				
1000	37	22	15					
1200	33	18	13					
1400	30	17	11					
1600	26	14						
1800	23	13						
2000	20	12						
2200	18	10						

DH 7000

MAIN CHARACTERISTICS:

Locomotive type	Diesel Hydraulic Shunting
Axle arrangement	C (3 axle)
Axle load	17 t
Weight of locomotive	51 t
Drive system	Diesel engine + Turbo transmission + Cardan shafts + Axle transmission
Max. speed	40 km/h
Length	10184 mm
Width	3000 mm
Height	4200 mm
Gauge	1435 mm
Height over buffers	1065 mm
Wheel diameter	1000/940 mm
Fuel tank	1800 lt

TYPE OF POWER, CONTROL AND BRAKE SYSTEM:

Type of diesel engine	CUMMINS KTTA 19-L1
Engine power and speed	522 kW-709 HP 2100 rpm
Type of turbo transmission	VOITH L3 r4 U2
Input power to turbo transmission	460 kW
Turbo transmission input / output speed	2100/1497,6 rpm
Axle transmissions	VOITH V20/22
Axle transmission conversion ratio	5,95
Cardan shafts	VOITH SX 250.9, S 285.9
Control system	KNORR Electro-Pneumatic
Brake blocks	KNORR PC 7TF-PC 7T
Battery (Lead)	2 units 24 V, 210 Ah

At different loads and gradients

Load Ton	Gradient %0		
	15	20	27
310	19		
460	14		
642	10		
750	-		
235		19	
345		14	
492		10	
575		-	
160			20
245			15
365			10
420			



CHARACTERISTICS OF AUXILIARY EQUIPMENT:

Compressor	KNORR W 230 / 180-2
Hydrostatic twin pump	71 kW Rexroth A10 VSO 100/71
Power and type of ventilation hydromotor	37 kW A2FM45
Power and type of compressor hydromotor	14 kW A2FM28
Ventilator	VOITH 930 mm
Hydraulic oil tank	VOITH KIII

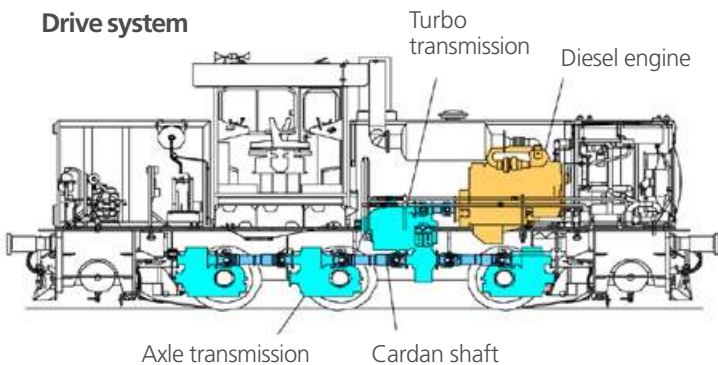
TYPE AND QUANTITY OF OILS:

Diesel engine	SAE 15W40	55lt
Turbo transmission	CALTEX TORQUE FLUID 32	75lt
Axle transmission	KEBAN EP SAE 90	15lt/each
Hydrostatic oil tank	CALTEX TORQUE FLUID 32	54lt
Compressor	S15W/40	3,2lt

COOLING WATER QUANTITIES:

Radiators (8 units)	40 lt
Expansion tank	60 lt
Diesel engine	130 lt

Drive system



DH 9500 TYPE DIESEL HYDRAULIC MAINLINE AND SHUNTING LOCOMOTIVE



DH 9500 type Diesel Locomotives are designed for shunting duties at 0-40 km/h speed and for passenger transportation duties on secondary lines within a speed range of 0-80 km/h. This feature is ensured via a two stage hydraulic turbo transmission. The locomotive is equipped with a diesel engine of 950 HP and two bogies (4 axles). An anti-slip and anti-skid device is provided on the locomotive. The locomotive has a modular structure, which consists of underframe, bogie, cooling unit, engine, driver's cab and pneumatic units. Bogies are interchangeable. Bi-directional operation is possible and a good track sight from the driver's cab is ensured. The dynamic brake system resulting from the turbo transmission consolidates the pneumatic brake system, thus extends its economic life and reduces wheel and brake shoe wear. The locomotive weight is 68 tonnes. Two fuel tanks with a total capacity of 2800 litre are provided under the frame. Helical springs and vertical-horizontal hydraulic suspensions are present at the bogie and underframe. The control system is electro-pneumatic. The locomotive conforms to UIC standards. Headlights and signal backlights are provided at both ends of the locomotive. Draw gear and super buffers are of miner's elastomer type. The locomotive is designed with facilities for automatic coupling.

Load - gradient - velocity table: km/h

Load Ton	Gradient in %0							
	0	2,5	5	10	15	20	25	30
150	80	80	80	58	41	35	29	25
300	80	70	58	36	25	21	18	15
341	80	67	52	32	24	19	17	14
400	80	62	46	29	21	18	15	12
411	80	61	45	28	20	16	14	11
500	80	55	38	25	19	15	12	10
600	74	47	32	21	16	12	11	
800	62	36	26	17	12	7		
900	58	33	23	16	11			
1000	54	30	21	14	10			
1200	45	26	18	12				
1400	39	22	16	11				
1600	35	19	15	9				
1800	31	18	14					
2000	29	16	12					
2200	26	15	10					

DH 9500

GENERAL CHARACTERISTICS:

Locomotive type	Diesel Hydraulic Mainline and Shunting
Axle arrangement	Bo-Bo (4 axles)
Axle load	17 t
Weight of locomotive	68 t
Drive system	Diesel engine +Turbo transmission + Cardan shafts + Axle transmission
Speed	0-40 km/h at shunting, 0-80 km/h mainline
Length	13250 mm
Width	3000 mm
Height	4150 mm
Gauge	1435 mm
Height over buffers	1025 mm
Wheel diameter	1000 / 940 mm
Fuel tank	2800 lt

POWER CONTROL, BRAKE DATA:

Diesel motor type	MTU 8V 396 TC 13
Engine power and speed (Continuous)	700 kW-950 HP 1800 rpm
Type of turbo transmission	VOITH L4 r4 zs U2a
Input power to turbo transmission	642 kW
Turbo transmission input/output speed	1800/2600 d/d
Axle transmissions	VOITH V20/22-E20/22
Axle transmission conversion ratio	5,68
Cardan shafts	VOITH SM250.8
Control system	KNORR Electro-Pneumatic
Anti-slip and anti-skid devices	KNORR MGS II
Brake blocks	KNORR PC 7TF-PC
Battery (Lead)	2 units 24 V,180 Ah
Charge alternator	BOSCH T1 (60/89) 24 V,69 A



At different loads and gradients

Load Ton	Gradient %0		
	15	20	27
460	18		
642	13		
750	12		
235		25	
345		18	
492		13	
575		12	
160			25
245			18
365			13
420			12

CHARACTERISTICS OF AUXILIARY EQUIPMENT:

Compressor	KNORR W 230/180-2
Hydrostatic twin pump	73,5 kW Rexroth A10 VSO 140/71
Power and type of ventilation hydromotor	38 kW A2FM80
Power and type of compressor hydromotor	13,5 kW A2FM28
Ventilator	VOITH 1250 mm
Hydraulic oil tank	VOITH K240

TYPE AND QUANTITY OF OILS:

Diesel engine	S15W/40, Special SAE W40	102lt
Turbo transmission	CALTEX TORQUE FLUID 32	190lt
Axle transmissions	KEBAN EP SAE 90	15lt/each
Hydrostatic oil tank	CALTEX TORQUE FLUID 32	58,5lt
Compressor	S15W/40	3,2lt

DH 10000 TYPE DIESEL HYDRAULIC MAINLINE AND SHUNTING LOCOMOTIVE



DH 10000 type Diesel Locomotives are designed for shunting duties at 0-40 km/h speed and for passenger transportation duties on secondary lines within a speed range of 0-80 km/h. This feature is ensured via a two stage hydraulic turbo transmission. The locomotive is equipped with a diesel engine of 1050 HP and two bogies (4 axles). An anti-slip and anti-skid device is provided on the locomotive. The locomotive has a modular structure, which consists of underframe, bogie, cooling unit, engine, driver's cab and pneumatic units. Bogies are interchangeable. Bi-directional operation is possible and a good track sight from the driver's cab is ensured. The dynamic brake system resulting from the turbo transmission consolidates the pneumatic brake system, thus extends its economic life and reduces wheel and brake shoe wear. The locomotive weight is 68 tonnes. Two fuel tanks with a total capacity of 2800 litre are provided under the frame. Helical springs and vertical-horizontal hydraulic suspensions are present at the bogie and underframe. The control system is electro-pneumatic. The locomotive conforms to UIC standards. Headlights and signal backlights are provided at both ends of the locomotive. Draw gear and super buffers are of miner's elastomer type. The draft gear is a mechanical semi-automatic type with a provision fitted for screw coupling.

GENERAL CHARACTERISTICS:

Locomotive type	Diesel Hydraulic Mainline and Shunting
Axle arrangement	Bo-Bo (4 axles)
Axle load	17 t
Weight of locomotive	68 t
Drive system	Diesel engine + Turbo transmission + Cardan shafts + Axle transmission
Speed	0-40 km/h at shunting, 0-80 km/h mainline
Length	12728 mm
Width	3000 mm
Height	4150 mm
Gauge	1435 mm
Height over buffers	1050 mm
Coupling	SA3
Wheel diameter	1000/940 mm
Fuel tank	2800 lt





CHARACTERISTICS OF AUXILIARY EQUIPMENT:

Compressor	KNORR W 230/180-2
Hydrostatic twin pump	73,5 kW Rexroth A10 VSO 140/71
Power and type of ventilation hydromotor	40 kW A2FM80
Power and type of compressor hydromotor	13,5 kW A2FM28
Ventilator	VOITH 1250 mm
Hydraulic oil tank	VOITH K240

TYPE AND QUANTITY OF OILS:

Diesel engine	S15W/40, Special SAE W40	208lt
Turbo transmission	CALTEX TORQUE FLUID 32	190lt
Axle transmissions	KEBAN EP SAE 90	15lt/each
Hydrostatic oil tank	CALTEX TORQUE FLUID 32	58,5lt
Compressor	S15W/40	3,2lt

POWER CONTROL, BRAKE DATA:

Diesel motor type	CUMMINS KTA 38-L1
Engine power and speed (Continuous)	783 kW-1050 HP 1800 rpm
Type of Turbo transmission	VOITH L4 r4 zs U2a
Input power to turbo transmission	703 kW
Turbo transmission input/output speed	1800/2600 d/d
Axle transmissions	VOITH V20/22-E20/22
Axle transmission conversion ratio	5,97
Cardan shafts	VOITH MT250.8
Control system	KNORR Electro-Pneumatic
Anti-slip and anti-skid devices	KNORR MGS II
Brake blocks	KNORR PC 7TF-PC
Battery (Lead)	4 units 12 V,180 Ah
Charge alternator	DELCO-REMY 30SI 24V,100 A

Load - Gradient - Velocity Table

Load (ton)	Gradient in %0																	
	0		2,5		5		10		15		20		25		30			
	Velocity (km/h)																	
	M	A	M	A	M	A	M	A	M	A	M	A	M	A	M	A	M	A
150	40	80	40	80	40	77	40	58	40	41	35	35	30	30	27	27		
200	40	80	40	80	40	70	40	49	36	36	30	30	26	26	23	22		
250	40	80	40	76	40	64	40	40	31	31	27	26	23	22	19	17		
300	40	80	40	72	40	55	36	36	28	28	24	23	19	18	15	14		
350	40	80	40	69	40	51	33	33	26	26	21	20	16	14	13	10		
400	40	80	40	63	40	44	30	30	24	23	18	17	14	12	10	7		
500	40	77	40	55	38	38	27	26	20	18	14	12	10	6	5	1		
600	40	72	40	46	33	33	23	22	15	14	10	7	5	1	0	0		
700	40	69	39	39	30	30	20	19	13	10	7	3	1	0	0	0		
800	40	62	36	36	28	27	17	15	10	7	4	0	0	0	0	0		
900	40	56	33	33	26	25	14	13	7	4	0	0	0	0	0	0		
1000	40	53	30	30	24	23	13	10	5	0	0	0	0	0	0	0		
1200	40	43	28	27	20	18	9	5	0	0	0	0	0	0	0	0		
1400	38	38	25	24	16	14	5	0	0	0	0	0	0	0	0	0		
1600	35	35	22	21	13	11	1	0	0	0	0	0	0	0	0	0		
1800	32	32	20	18	11	8	0	0	0	0	0	0	0	0	0	0		
2000	30	29	17	15	9	5	0	0	0	0	0	0	0	0	0	0		
2200	28	28	15	13	6	2	0	0	0	0	0	0	0	0	0	0		

M: Shunting A: Mainline

COOLING SYSTEM:

Total coolant capacity	332 lt
Diesel motor	CUMMINS KTA 38 L1 125 lt
Radiator	VOITH 16 units 80 lt
Compensation tank	75 lt
Piping	52 lt
Coolant/Anti-Freeze ratio	%50-%50

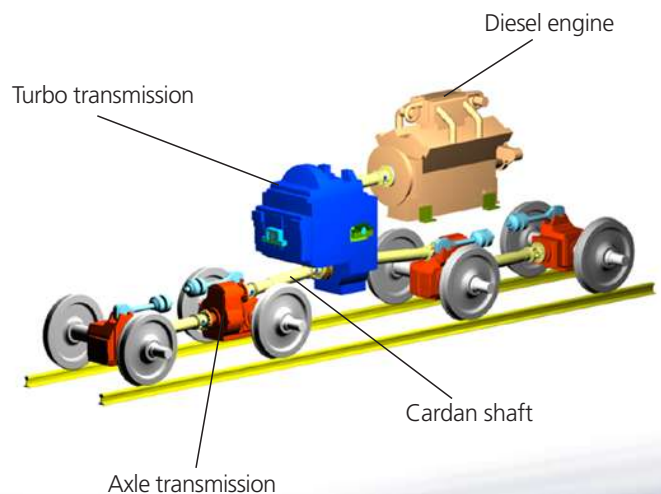
DH 12000 TYPE DIESEL HYDRAULIC MAINLINE AND SHUNTING LOCOMOTIVE



DH 12000 type Diesel Locomotives are designed for shunting duties at 0-50 km/h speed and for passenger transportation duties on secondary lines within a speed range of 0-100 km/h. This feature is ensured via a two stage hydraulic turbo transmission. The locomotive is equipped with a diesel engine of 1200 HP and two bogies (4 axles). An anti-slip and anti-skid device is provided on the locomotive. The locomotive has a modular structure, which consists of underframe, bogie, cooling unit, engine, driver's cab and pneumatic units. Bogies are interchangeable. Bi-directional operation is possible and a good track sight from the driver's cab is ensured. The dynamic brake system resulting from the turbo transmission consolidates the pneumatic brake system, thus extends its economic life and reduces wheel and brake shoe wear. The locomotive weight is 68 tonnes. Two fuel tanks with a total capacity of 2800 litre are provided under the frame. Helical springs and vertical-horizontal hydraulic suspensions are present at the bogie and underframe. The control system is electro-pneumatic. The locomotive conforms to UIC standards. Headlights and signal backlights are provided at both ends of the locomotive. Draw gear and super buffers are of miner's elastomer type. The draft gear is a mechanical semi-automatic type with a provision fitted for screw coupling.

GENERAL CHARACTERISTICS:

Locomotive type	Diesel Hydraulic Mainline and Shunting
Axle arrangement	Bo-Bo (4 axles)
Axle load	17 t
Weight of locomotive	68 t
Drive system	Diesel engine + Turbo transmission + Cardan shafts + Axle transmission
Speed	0-50 km/h at shunting, 0-100 km/h mainline
Length	12728 mm
Width	3000 mm
Height	4150 mm
Gauge	1435 mm
Height over buffers	1050 mm
Coupling	SA3
Wheel diameter	1000/940 mm
Fuel tank	2800 lt





CHARACTERISTICS OF AUXILIARY EQUIPMENT:

Compressor KNORR W 230/180-2
 Hydrostatic twin pump 73,5 kW Rexroth A10 VSO 140/71
 Power and type of ventilation hydromotor 40 kW A2FM80
 Power and type of compressor hydromotor 13,5 kW A2FM28
 Ventilator VOITH 1250 mm
 Hydraulic oil tank VOITH K240

TYPE AND QUANTITY OF OILS:

Diesel engine S15W/40, Special SAE W40 208lt
 Turbo transmission CALTEX TORQUE FLUID 32 190lt
 Axle transmissions KEBAN EP SAE 90 15lt/each
 Hydrostatic oil tank CALTEX TORQUE FLUID 32 58,5lt
 Compressor S15W/40 3,2lt

POWER CONTROL, BRAKE DATA:

Diesel motor type CUMMINS KTA 38-L1
 Engine power and speed (Continuous) 895 kW-1200 HP 1900 rpm
 Type of turbo transmission VOITH L4 r4 zs U2a
 Input power to turbo transmission 810 kW
 Turbo transmission input/output speed 1900/2802 d/d
 Axle transmissions VOITH V20/22-E20/22
 Axle transmission conversion ratio 4.485
 Cardan shafts VOITH
 Control system KNORR Electro-Pneumatic
 Anti-slip and anti-skid devices KNORR MGS II
 Brake blocks KNORR PC 7TF-PC
 Battery (Lead) 4 units 12 V,180 Ah
 Charge alternator 24V,100 A

Load - Gradient - Velocity Table

Load (ton)	Gradient in %0															
	0		2,5		5		10		15		20		25		30	
	Velocity (km/h)															
	M	A	M	A	M	A	M	A	M	A	M	A	M	A	M	A
150	50	100	50	100	50	96	50	69	50	52	42	42	37	36	33	31
200	50	100	50	100	50	82	50	58	44	44	37	36	32	30	27	24
250	50	100	50	96	50	77	50	49	39	38	33	31	27	24	22	18
300	50	100	50	87	50	67	44	44	35	34	29	26	22	19	19	13
350	50	100	50	78	50	57	40	40	32	30	25	21	19	15	17	8
400	50	100	50	76	50	55	37	37	29	26	21	17	18	10	16	2
500	50	98	50	63	47	47	33	31	23	19	18	10	15	1	13	0
600	50	88	50	56	40	40	28	26	19	13	16	3	13	0	10	0
700	50	78	50	50	37	37	24	20	17	8	14	0	10	0	7	0
800	50	76	45	45	34	33	20	16	16	2	12	0	8	0	4	0
900	50	69	40	40	32	30	19	12	14	0	10	0	5	0	0	0
1000	50	61	38	38	29	26	17	7	12	0	7	0	2	0	0	0
1200	50	54	34	33	23	20	15	0	9	0	3	0	0	0	0	0
1400	48	48	30	28	19	14	13	0	6	0	0	0	0	0	0	0
1600	43	43	27	23	18	9	10	0	2	0	0	0	0	0	0	0
1800	39	39	23	19	16	4	8	0	0	0	0	0	0	0	0	0
2000	37	36	20	16	15	0	5	0	0	0	0	0	0	0	0	0
2200	35	34	19	12	13	0	3	0	0	0	0	0	0	0	0	0

M: Shunting A: Mainline

COOLING SYSTEM:

Total coolant capacity 332 lt
 Diesel motor 125 lt
 Radiator 80 lt
 Compensation tank 75 lt
 Piping 52 lt
 Coolant/Anti-Freeze ratio %50-%50

