CEC - Efficiency - Qualification

- for Battery Charging Systems (BCSs) -

FRIWO® CEAG AG

Manufacturer:	Friwo Gerätebau GmbH
Drw. Number:	15.2741
Product Description:	power tool charger

Nameplate Information - Please Enter

AC Input Voltage	220-240	VAC
Input Power	80	W
AC Input Current		A
Input Volt-Amperes		VA
Input AC Frequency	50-06	Hz
Output Voltage (min)	12	V
Output Voltage (max)	18	V
Output Current	2500	mA
Efficiency Level Mark		
Manufactured Date		

Measurement Equipment:	**Model:**	**Next Calibration:**
AC-Source:	CHROMA Model 6408	
Power Meter:	ZES LMG95	02/09
Discharger:	ELV: ALC 8500 Expert	02/09

Comments:

115 VAC / 60 Hz Battery Charging System Results Summary				
	Battery #1	Battery #2	Battery #3	Average
Charge and Maintenance Mode Efficiency [%]				
Needed Efficiency - Tier A [%]				
Needed Efficiency - Tier B [%]				
Maintenance Mode [W]				
No-Load Mode [W]				

230 VAC / 50 Hz Battery Charging System Results Summary				
	Battery #1	Battery #2	Battery #3	Average
Charge and Maintenance Mode Efficiency [%]	59.35%	54.30%		
Needed Efficiency - Tier A [%]	29.98%	21.34%		
Needed Efficiency - Tier B [%]	53.23%	42.94%		
Maintenance Mode [W]	0.74	0.75		
No-Battery Mode [W]	0.56			

Required Performance Criteria		
	Tier A	Tier B
Min. Efficiency	see above	
Max. Maintenance Mode (W)	1.5	0.5
Max. No-Load Mode (W)	1.0	0.3
Power Factor	-	0.5 - 0.9

Approved?

Yes

TIER A

Test Lab: FRIWO Geraetebau GmbH

Engineer: T. Vogt (R&D)

Date: 2008-05-07

Drw. Number: 15.2741

Tested batteries:

Batterie	Manufacturer	Type	U_{Bat} [V]	C_{Bat} [mAh]	U_{EoD} [V]
#1	Sanyo	Li-Ion	18	2600	15.0
#2	Sanyo	Li-Ion	14.4	1300	12.0
#3					

Table of additionally available batteries

Nr.	Manufacturer	Type	U_{Bat} [V]	C_{Bat} [mAh]	U_{EoD} [V]
#4					
#5					
#6					
#7					
#8					
#9					
#10					
#11					
#12					
#13					

Address of Testing Location:
Friwo Geraetebau GmbH Von-Liebig-Strasse 11 48346 Ostbevern/Germany

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- measurement results -

Drw. Number: 15.2741

	115 VAC / 60 Hz Results			230 VAC / 50 Hz Results		
	Batterie #1	Batterie #2	Batterie #3	Batterie #1	Batterie #2	Batterie #3
B. Charge and Maintanance Mode Test						
Total Charger Input Energy (Wh):				72.574	30.319	
Total charge & maint. time (h):				24	24	
Maintenance Mode Energy (Wh):				2.975	2.995	
Total Time MM (h):				4.00	4.00	
Avg Maintenance Mode Energy (W):				0.744	0.749	
Power Factor (beginning of charge):				0.523	0.522	
Power Factor (end of charge):				0.225	0.226	
Crest Factor of input current (beginn. of C):				3.33	3.53	
Crest Factor of input current (end of C):				4.75	4.75	
Rest period before charging (hr:min):				01:00	01:00	
electrolytic temp before charge (°C):				-	-	
sample rate (s):				60	60	
Date (dd.mm.yy):				06.05.08	08.05.08	
Time (h:m):				11:30	08:30	
C. Battery Discharge Test						
Battery Energy (Wh):				43.076	16.462	
Starting battery voltage (V):				20.370	16.207	
Ending battery voltage (V):				14.988	11.985	
Rest period before discharging (hr:min):				01:00	01:00	
electrolytic temp before charge (°C):				-	-	
sample rate (s):				60	60	
steps, to get access to the battery: (discription)				disconnection from power tool		
Date (dd.mm.yy):				07.05.08	09.05.08	
Time (h:m):				13:00	9:00	
D. No-Battery Mode and Off Mode Test						
Category of Product:				2 (power tools)		
Avg no-battery mode power (W):				0.56		
Power Factor:				0.19		
Input current crest factor:				4.20		
Avg Off Mode Power (W):						
Power Factor:						
Input current crest factor:						
Date (dd.mm.yy):				07.05.08		
Time (h:m):				12.30		
E. General						
Charge & Maintenance Mode Efficiency:				59.35%	54.30%	
Minimum efficiency needed (Tier A):				29.98%	21.34%	
Minimum efficiency needed (Tier B):				53.23%	42.94%	
notes or comments in general:						

Insert photo of the
Power Supply nameplate label
that will be applied
when the product ships.

Reduce the size of the image
to keep the file size small.

The photo