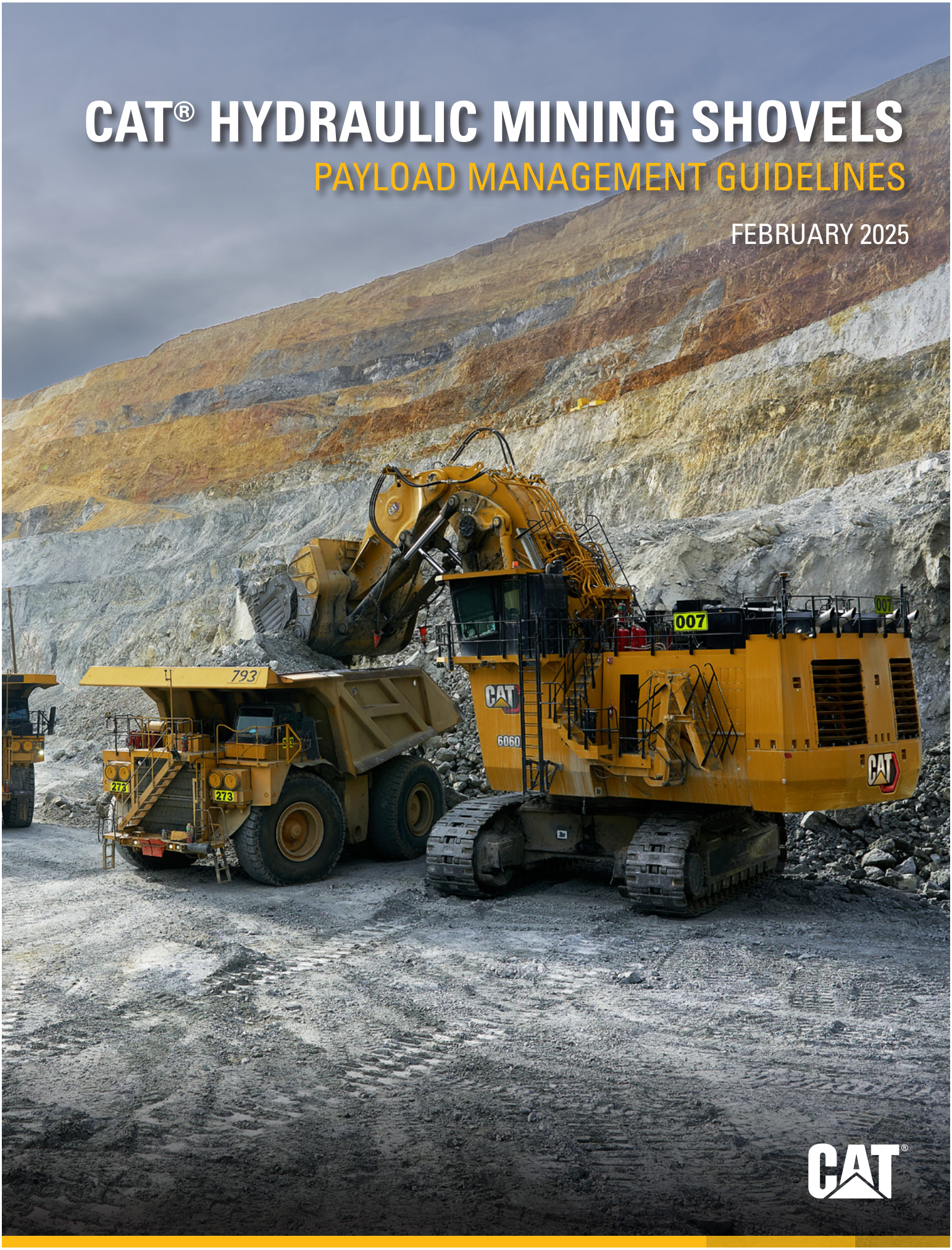
CAT® HYDRAULIC MINING SHOVELS

PAYLOAD MANAGEMENT GUIDELINES

FEBRUARY 2025



INTRODUCTION

Many customers use bucket volume as a key factor to size hydraulic mining shovels. In the past, the rated volume at 100% bucket fill was used to determine the maximum allowed material density for each bucket. However, in many applications, the bucket payload can change dynamically with varying material density and the average bucket fill factor can be lower or higher than 100%. In addition, there can be changes to the bucket weight due to Ground Engaging Tools (GET) or wear protection. For these reasons, this new payload management policy focuses on the Rated Payload of each bucket. This approach helps to ensure machines are used within their specified limits, while being productive and durable. This aligns with related changes occurring with other Caterpillar machine products.

This document is intended to communicate the payload policy, the maximum operating weights of loaded buckets and the payload guidelines Caterpillar will use in support of warranty considerations and Maintenance and Repair Contracts (MARCs) for Hydraulic Mining Shovels (HMS). The intent of the policy is to provide Caterpillar and Cat dealer personnel guidelines to help customers properly select and apply machines and work tools so they will receive the best value. All definitions and calculations are based on standard Cat® buckets and GET.

STANDARDS

This document applies to all current Cat HMS models. The bucket volumes published in HMS technical specifications conform to the following ISO standards at 100% fill factor:

» Backhoe (BH) attachments are rated for 1:1 heaped capacity (ISO 7451).
» TriPower™ Face Shovel (FS) attachments are rated for 2:1 heaped capacity (ISO 7546).

DEFINITIONS AND ABBREVIATIONS

Rated Swung Load (RSL)	RSL is the total amount of weight the machine is designed to carry and is published for each machine model and attachment configuration e.g. FS or BH. The RSL includes the Gross Bucket Weight plus the Rated Payload. The weight of the standard bucket linkage is included in the machine configuration and does not need to be included in the RSL.
Gross Bucket Weight	Gross Bucket Weight includes the total weight of the bucket, GET, wear materials, and quick coupler (if equipped). Changes to the Gross Bucket Weight must be considered when altering the GET and wear package of a bucket for different applications.
Rated Payload (RP)	Rated Payload represents the maximum weight of material that a hydraulic mining shovel is designed to carry in a specific bucket configuration. Rated Payload is the Rated Swung Load minus the Gross Bucket Weight. Rated Payloads are published at 100% of allowed weight, even though a bucket can be filled beyond this in some instances and Caterpillar does allow up to 110% of Rated Payload on an infrequent basis. Reducing the weight of the bucket allows for increased payloads while increasing the weight of the bucket will reduce the Rated Payload. Rated Payload increases or decreases depending on the "Gross Bucket Weight." It does NOT change with additional counterweight, wider tracks etc. Going forward, we will distinguish between Nominal Rated Payload and Field Rated Payload.
Nominal Rated Payload (NRP)	Nominal Rated Payload is a fixed reference value, published for every HMS model. It is calculated for each machine equipped with its standard bucket, including wear package and tips for a target density of 1.8 t/m^3 (3,030 lb/yd^3). It is an approximate evaluation to compare models with each other but not necessary for a specific customer or application.
Field Rated Payload (FRP)	Field Rated Payload is a specific calculation for a machine configuration including attachment, bucket and GET. It is to be used for productivity and truck match calculations for a unique customer application. Field Rated Payload = Rated Swung Load (RSL) – actual Gross Bucket Weight

HYDRAULIC MINING SHOVEL PAYLOAD POLICY

Table 1 contains Rated Swung Load information for current HMS models to be used for matching buckets to customer applications. **The Rated Payload** for each model is the RSL minus the Gross Bucket Weight, including GET and wear package, etc.

Payloads of 80%-100% of Rated Payload result in higher productivity without reducing the life of structures and components.

Payloads from 100%-110% of Rated Payload can reduce life depending on the amount and duration of overloading. Therefore, Payloads between 100-110% of Rated Payload should occur on no more than 10% of the loads.

The Maximum Allowable Payload is 110% of the Field Rated Payload. Exceeding 110% of the Rated Payload can be considered machine abuse and violates this policy. Excessive loads will likely reduce the life of structures and components thereby reducing the economic life of the machines.

This payload policy applies to all Cat Hydraulic Mining Shovel models delivered to customers worldwide. Cat Hydraulic Mining Shovels are designed around an optimal balance of factors to provide the lowest possible cost per ton. Payload is just one of these factors — increasing it can potentially upset that balance and have consequences that may negate any productivity gained from loading more material or increase operating costs.

PLATFORM	ATTACHMENT	RSL – kg (lb)
6015	BH/Short stick	23 115 (50,960)
6015	BH/Long stick	18 588 (40,980)
6020	BH	34 372 (75,777)
6030	BH	49 400 (108,908)
	FS	57 053 (125,780)
6040	BH	64 600 (142,419)
	FS	78 609 (173,303)
6050	BH	81 924 (180,612)*
	FS	93 191 (205,451)
6060	BH	95 600 (210,762)/100 000 (220,462)**
	FS	111 367 (245,522)
6090	FS	181 683 (400,542)

Table 1 reference RSL information for current HMS models.

*No overload is permitted beyond the RSL for the 6050 with BH attachment.

**For increased RSL information related to 100 000 kg (220,462 lb), please reference TEKQ1791.

EXAMPLES

The following are examples of how to apply the payload policy to specific situations.

6020 with BH attachment loading material with density 2200 kg/m³ (3,708 lb/yd³), 85% Fill Factor.

RSL = 34 372 kg (75,777 lb) for BH attachment
Bucket selection: 11 m³ (14.4 yd³) Heavy Rock 617-1609
Gross Bucket Weight = 13 754 kg (30,322 lb) including standard couplers and penetration tips
Field Rated Payload = 34 372 kg (75,777 lb) – 13 754 kg (30,322 lb) = 20 618 kg (45,455 lb)
Calculated payload = 2200 kg/m³ (3,708 lb/yd³) × 11 m³ (14.4 yd³) × 0.85 = 20 517 kg (45,232 lb)

PAYLOAD POLICY MET

6040 with FS attachment loading material with density 2000 kg/m³ (3,371 lb/yd³), 90% Fill Factor.

RSL = 78 609 kg (173,303 lb) for FS attachment
Bucket selection: 22 m³ (28.8 yd³) Standard Rock 468-8235 FRONT CLAM – 462-2259 BACKWALL
Gross Bucket Weight = 38 117 kg (84,034 lb) including standard couplers and penetration tips
Field Rated Payload = 78 609 kg (173,303 lb) – 38 117 kg (84,034 lb) = 40 492 kg (89,269 lb)
Calculated payload = 2000 kg/m³ (3,371 lb/yd³) × 22 m³ (28.8 yd³) × 0.90 = 39 600 kg (87,376 lb)

PAYLOAD POLICY MET

6060 with BH attachment and increased RSL 100 000 kg (220,462 lb) loading material with density 1900 kg/m³ (3,203 lb/yd³), 100% Fill Factor.

RSL = 100 000 kg (220,462 lb) for BH attachment and increased RSL
Bucket selection: 34 m³ (44.5 yd³) Standard Rock 504-9719
Gross Bucket Weight = 34 660 kg (76,412 lb) including standard couplers and penetration tips
Field Rated Payload = 100 000 kg (220,462 lb) – 34 660 kg (76,412 lb) = 65 340 kg (144,050 lb)
Calculated payload = 1900 kg/m³ (3,203 lb/yd³) × 34 m³ (44.5 yd³) × 1.00 = 64 600 kg (142,419 lb)

PAYLOAD POLICY MET

SPECIAL CONSIDERATIONS

SPECIAL CONSIDERATIONS

WARRANTY, CUSTOMER SUPPORT AGREEMENTS, AND EXTENDED POWERTRAIN POLICIES

The lives of machines' structures and components are directly related to operating loads and the duration machines handle the loads, so the standard machine warranty shall be administered according to this payload policy.

Exceeding the Maximum Allowable Payload (110% of Rated Payload) will be judged as machine abuse. The use of payloads between 100% – 110% of Rated Payload for more than 10% of all loads will be judged as improper use. Customers whose machines exceed this payload policy may forfeit some or all of the standard warranty protection at the discretion of the appropriate Caterpillar field and administrative personnel.

It is strongly recommended that customer support, extended power train, rental, lease, and other agreements include this payload policy as a provision of the contract. Violation of the payload policy constitutes grounds to void Caterpillar participation in these agreements.

COMPETITIVE WORK TOOLS, GET, AND MODIFICATIONS

Caterpillar designs and builds a full range of work tools for all Hydraulic Mining Shovel models. These work tools are designed to provide optimal performance based upon machine system attributes like hydraulic dig and lift forces, machine weight and balance, etc. This level of system integration can only be achieved with Cat work tools.

The addition of aftermarket components such as cylinder guards may reduce the RSL of the standard machine. This payload policy does not prohibit the use of competitive work tools, GET or dealer and customer modifications. However, this policy and the Rated Swung Load for the machine must be followed.

ON-BOARD SCALES

For machines equipped with onboard payload monitoring systems, it is strongly recommended that customer support, extended power train, rental, lease, and other such agreements include this payload policy as a provision of the contract. Violation of the payload policy constitutes grounds to void Caterpillar participation in these agreements. It is also recommended that these agreements require customers to maintain the calibration of these scales and allow Caterpillar and dealer personnel access to this data upon request. Alternately, any other customer records like truck scales (weighbridges) which track machines' payloads should also be accessible to Caterpillar and dealer personnel upon request, to corroborate on-board scale data or provide payload data in their absence.

CAT HYDRAULIC MINING SHOVELS

PAYLOAD MANAGEMENT GUIDELINES

For more complete information on Cat products, dealer services and industry solutions, visit us at www.cat.com

PEBJ0162-02
Replaces PEBJ0162-01
(Global)

Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.